ARCADIS Design & Consultancy for natural and built assets

Public Services and Procurement Canada (PSPC) on Behalf of Transport Canada

# FORMER IQALUIT METAL DUMP AND COMMUNITY LANDFILL

## Final Site Remediation Summary Report

February 9, 2018

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# CONTENTS

Acronyms and Abbreviations ..... xii
Executive Summary ..... 1
1 Introduction ..... 4
1.1 Site Location and Access ..... 4
1.2 Site Overview ..... 4
1.3 Background ..... 5
1.4 Previous Investigations ..... 6
1.4.1 Contaminants of Concerns ..... 7
2 Roles and Responsibilities ..... 8
2.1 Contractor ..... 8
2.1.1 General ..... 8
2.1.2 Remediation Activities ..... 8
2.1.3 Regulatory Responsibilities ..... 8
2.1.4 Health and Safety ..... 8
2.1.5 Submittals ..... 9
2.2 Departmental Representative (DR) ..... 9
2.2.1 General ..... 9
2.2.2 Site Reporting Activities ..... 9
3 Regulatory Framework and Environmental Quality Criteria ..... 11
3.1 Nunavut Water Board Water Licence ..... 11
3.2 Regulatory Framework ..... 12
3.3 Environmental Quality Guidelines (EQGs) ..... 12
4 Objectives and Methodology ..... 16
4.1 Site Remedial Objectives ..... 16
4.1.1 Physical Hazards ..... 16
4.1.2 Site Chemical Hazards ..... 16
4.1.3 Geotechnical Hazards and Slope Stability ..... 18
4.2 Methodologies ..... 18
4.2.1 Soil Sampling ..... 18

4.2.1.1 Confirmatory Soil Sampling ..... 18
4.2.1.2 Stockpile Characterization Sampling ..... 19
4.2.1.3 Temporary Work Area Characterization Sampling ..... 19
4.3 Remediation Summary Report ..... 19
5 SITE INSPECTIONS ..... 20
5.1 Site Visitors ..... 20
6 Remediation Activities ..... 21
6.1 Timeline ..... 21
6.2 Remedial Activities ..... 21
6.3 Specification Division 02 – Existing Conditions ..... 25
6.3.1 Item 02 41 13: Move Non-Hazardous material/debris from AEC-1 and AEC-2 and Move Non-Hazardous material/debris from AEC-3 ..... 25
6.3.2 Item 02 61 00-1: Excavation Consolidation and Transportation of Hydrocarbon Contaminated Material (HCM) To an Off-Site Facility ..... 30
6.3.3 Item 02 61 00-2: Excavation and Transportation of Metal Contaminated Soil to Main Landfill ..... 35
6.3.4 Item 02 61 00-3: Excavation Consolidation and Transportation of PCB Contaminated Sediment to the off-site Temporary Working area ..... 39
6.3.5 Item 02 61 00-4: PCB Contaminated Sediment: Package, Transport and Disposal at an appropriately licensed facility in southern Canada ..... 41
6.3.6 Item 02 81 01-1: Hazardous Materials at AEC-1, AEC-2 and AEC-3: Collect, Move to and Sort at the off-site Temporary Working Area ..... 43
6.3.7 Item 02 81 01-2: Hazardous Wastes - Lead Amended Material: Package, Transport and Dispose at an appropriately licensed facility in southern Canada ..... 43
6.3.8 Item 02 81 01-3: Tires ..... 45
6.3.9 Item 02 81 00-1: Batteries ..... 47
6.3.10 Item 02 81 00-2: Liquids Various ..... 48
6.3.11 Item 02 81 00-3: Other Including Equipment Containing PCBs ..... 51
6.3.12 Item 02 82 00-4: Hazardous Wastes- Asbestos Containing Materials and Wastes: collect, package, transport and dispose at an appropriately licensed facility in southern Canada 52
6.4 Specification Division 31 - Earthwork ..... 52
6.4.1 Item 31 05 16-1: Type 1 Aggregate materials - fine gravel/sand supply and deliver to the Site ..... 52

6.4.2 Item 31 05 16-2: Type 2 Aggregate materials – coarse granular supply and deliver to the Site ..... 53
6.4.3 Item 31 05 16-3: Type 3 Aggregate materials – Rip Rap - supply and deliver to the Site 53
6.4.4 Item 31 05 16-4: Type 4 Aggregate materials - fine granular supply and deliver to the Site ..... 53
6.4.5 Item 31 22 15-1: Provide Temporary Working Areas – one located north of AEC-1 and one at the base of AEC-3 ..... 54
6.4.6 Item 31 22 15-2: Re-Shape and Regrade AEC-1 with Type 2 Aggregate - 300mm thick on average ..... 56
6.4.7 Item 31 22 15-3: Re-Shape and Regrade AEC-2 with Type 2 Aggregate - 300 mm thick in average ..... 57
6.4.8 Item 31 22 15-4: Move from a stockpile, place, compact all non-hazardous wastes and Type 1 granular material in Zone 1 of the Landfill Embankment ..... 59
6.4.9 Item 31 23 33.01-1: Common Excavation - ditches/swales at AEC-3 ..... 61
6.4.10 Item 31 23 33.01-2: Rock Excavation - ditches/swales at AEC-3 ..... 63
6.4.11 Item 31 24 13-1: Stripping including grubbing beneath Road Embankment - nominal volume indicated ..... 63
6.4.12 Item 31 24 13-2: Stripping including grubbing below Landfill Embankment – nominal volume indicated ..... 63
6.4.13 Item 31 24 13-3: Common Excavation beneath Road Embankment – nominal volume indicated ..... 64
6.4.14 Item 31 24 13-4: Common Excavation beneath Landfill Embankment – nominal volume indicated ..... 64
6.4.15 Item 31 24 13-5: Rock Excavation beneath Road Embankment - nominal volume indicated ..... 64
6.4.16 Item 31 24 13-6: Rock Excavation beneath Landfill Embankment – nominal volume indicated ..... 64
6.4.17 Item 31 24 13-7: Place and Compact Type 2 Material in Main Access Road Embankment ..... 64
6.4.18 Item 31 24 13-8: Place, Compact and Grade Type 2 Material in Zone 2 of Landfill Embankment ..... 67
6.4.19 Item 31 24 13-9: Place and Compact and Grade Type 4 Material on Main Access Road surface ..... 70
6.4.20 Item 31 24 13-10: Place, Compact and Grade: 100mm Type 1 on 250mm Type 4 Material on top surface of Landfill Embankment ..... 72

6.4.21 Item 31 32 19.01-1: Place Geotextile beneath rip rap in drainage pathways within AEC-2 ..... 74
6.4.22 Item 31 32 19.01-2: Place Geotextile beneath rip rap in road ditches and landfill swales in AEC-3 ..... 74
6.4.23 Item 31 32 19.01-3: Place Geotextile on outer surface of Zone 2 in the landfill embankment beneath rip rap ..... 76
6.4.24 Item 31 37 00-1: Place Type 3 Aggregate Materials - Rip Rap in drainage pathways within AEC-2 ..... 78
6.4.25 Item 31 37 00-2: Place Type 3 Aggregate Materials in road ditches and swales within AEC-3 ..... 79
6.4.26 Item 31 37 00-3: Place Type 3 Aggregate Materials - Rip Rap on Landfill Embankment ..... 82
6.4.27 Item 33 42 13: Supply and install a CSP pipe culvert including bedding and backfill ..... 84
7 Hazardous Waste Disposal ..... 86
7.1 Off-Site Disposal of Hazardous Materials ..... 86
7.2 Disposal of Hydrocarbon Contaminated Material (HCM) ..... 87
7.3 Off-site Sediment Disposal ..... 87
8 Confirmatory Soil Sampling and Soil/Sediment Characterization ..... 88
8.1 Sample Methodologies ..... 88
8.1.1 Solids ..... 88
8.1.2 Sample Duplicates ..... 88
8.2 Confirmatory Sampling Analytical Results ..... 90
8.2.1 Stockpile Soil/Sediment Characterization ..... 90
8.2.1.1 Hydrocarbon Contaminated Material (HCM) Stock Piles ..... 90
8.2.1.2 Sediment Stockpiles ..... 91
8.2.2 Temporary Work Area Sampling Results ..... 91
8.2.3 Excavation Confirmatory Sampling ..... 93
9 Material/Labour & Volume Confirmation ..... 95
9.1 Aggregate Supply Volumes ..... 95
9.2 Constructed Earthworks Volumes ..... 96
9.2.1 Compaction Control ..... 97
9.3 Labour Items ..... 98
9.4 Hazardous Waste Volume Measurements ..... 99

10 Performance Monitoring ..... 101
10.1 Field Chemistry Monitoring – Surface Water ..... 101
10.1.1 Field Chemistry Monitoring Methodology ..... 101
10.1.2 Field Chemistry Monitoring Results ..... 101
10.2 Chemical Monitoring – Surface Water ..... 101
10.2.1 Surface Water Chemical Monitoring Methodology ..... 102
10.2.2 Results and Discussion of Surface Water Chemical Monitoring ..... 102
11 Long-Term Monitoring ..... 103
11.1 Post-Closure Monitoring Plan ..... 103
11.1.1 Visual Monitoring ..... 103
11.1.1.1 Rationale ..... 103
11.1.1.2 Monitoring Plan: Visual Monitoring ..... 103
11.1.2 Seepage Monitoring ..... 104
11.1.2.1 Rationale ..... 104
11.1.2.2 Monitoring Plan: Seepage Monitoring ..... 105
11.1.3 Soil Sampling ..... 105
11.1.3.1 Rationale ..... 105
11.1.3.2 Monitoring Plan: Soil Sampling ..... 105
11.1.4 Surface Water Monitoring ..... 106
11.1.4.1 Rationale ..... 106
11.1.4.2 Monitoring Plan: Surface Water Sampling ..... 106
11.1.5 Sediment Sampling ..... 106
11.1.5.1 Rationale ..... 106
11.1.5.2 Monitoring Plan: Sediment Sampling ..... 107
11.1.6 Natural Environmental Monitoring ..... 107
11.1.6.1 Rationale ..... 107
11.1.6.2 Monitoring Plan: Natural Environment ..... 107
11.2 Schedule ..... 108
12 Remedial Summary ..... 109
12.1 The Way Forward ..... 109

13 Limitations ..... 110
14 References ..... 111

# TABLES (IN TEXT)

Table ES1: Estimated Quantities versus Actual Quantities Exceeding Estimates ..... 2
Table 1-1: Summary of AECs and Potential Concerns ..... 7
Table 2-1: Former Iqaluit Metal Dump and Community Landfill Regulatory Permits ..... 8
Table 2-2: Summary of Health and Safety/Environmental Incidents ..... 9
Table 3-1: Summary of Monitoring Sample Stations ..... 11
Table 3-2. Summary of Site Specific Environmental Quality Criteria ..... 14
Table 4-1: Summary of Chemical Hazards Identified at the Site ..... 17
Table 6-1: Estimated Quantities versus Actual Quantities ..... 21
Table 7-1: Summary of Hazardous Material and Associated Receiving Waste Facility ..... 86
Table 8-1: Criteria for the Evaluation of Blind and Duplicate Sample Results ..... 89
Table 8-2: Summary of Hydrocarbon Contaminated Material (HCM) Stockpile Sampling. ..... 90
Table 8-3: Summary of Sediment Stock Pile Sampling ..... 91
Table 8-4: Summary of Temporary Work Area Sampling ..... 92
Table 8-5: Summary of Excavation Wall Soil Sampling ..... 93
Table 9-1: Aggregate Supply Measurement Methods ..... 95
Table 9-2: Earthworks Volume Measurement Methods. ..... 96
Table 9-3: Labour Items Summary ..... 98
Table 9-4: Hazardous Waste Volume Measurement Methods. ..... 99

# PHOTOGRAPHS (IN TEXT)

Photograph 1: Showing Main Landfill Prior to Remedial Work. ..... 6
Photograph 2: Showing – Vehicle Dump Prior to Remedial Work. ..... 6
Photograph 3: Collecting non-hazardous debris from AEC-1 using the mini-excavator and placing in portable dumpster for transport to AEC-3 for landfilling ..... 25
Photograph 4: Manually collecting debris in AEC-1. ..... 26

Photograph 5: Manually collecting debris in AEC-1. ..... 26
Photograph 6: Sorting and processing debris in AEC-2. ..... 27
Photograph 7: Loading debris from AEC-2 into the rock truck for transport to AEC-3. ..... 28
Photograph 8: Un-loading inter non-hazardous debris from AEC-2 into the temporary work area in AEC-3 for further processing. ..... 28
Photograph 9: Processing and sorting waste at the toe of AEC-3 using the shear. ..... 29
Photograph 10: The two excavators processing and sorting debris at the toe of AEC-3 ..... 30
Photograph 11: HCM excavation in AEC-2, excavated down to bedrock. ..... 31
Photograph 12: Stockpiled HCM material from the HCM-1 excavation, temporarily stockpiled on top of AEC-3 prior to screening and transport to TWA-1 stockpile area. ..... 31
Photograph 13: Excavation of HCM-2 during the initial stages on August 01, 2017. ..... 32
Photograph 14: Completion of the HCM-2 excavation on August 26, 2017 down to permafrost. ..... 33
Photograph 15: Stockpiling HCM material in lined berms in TWA-1 for characterization and processing. HCM-1 on the right and HCM-2 being dumped in this photograph. ..... 33
Photograph 16: Excavating the small HCM-3 excavation using the CAT 305-SE excavator. ..... 34
Photograph 17: Showing the final HCM-3 excavation down to permafrost. ..... 35
Photograph 18: Advancing the metal contaminated soil excavation in AEC-1. ..... 36
Photograph 19: Dumping the metal contaminated soil from AEC-1 into the debris lifts within AEC-3. ..... 36
Photograph 20: Working on the AEC-2 metal contaminated soil excavation. ..... 37
Photograph 21: Dumping the metal contaminated soil from AEC-2 Zone 1 landfill lifts. ..... 38
Photograph 22: showing the completed metal contaminated soil excavation in AEC-2. Excavated down to bedrock throughout. ..... 38
Photograph 23: Commencing the sediment excavations in AEC-2. ..... 39
Photograph 24: Sediment excavation advanced down to bedrock. ..... 40
Photograph 25: Showing progress of sediment excavation down to bedrock along drainage pathway. ..... 40
Photograph 26: Showing progress of sediment excavation down to bedrock along drainage pathway. ..... 41
Photograph 27: Showing sediment stockpiles. ..... 42
Photograph 28: Showing the bagged impacted sediment material ready for transportation south. ..... 42
Photograph 29: Showing the stockpiles of material with lead-amended paint stored in TWA-1. ..... 43
Photograph 30: Stockpile material with lead-amended paint. ..... 44
Photograph 31: Further processing the material with lead amended paint in TWA-1 using the Hitachi excavator and shear. ..... 44

Photograph 32: Packaging the lead-amended material for transportation south. ..... 45
Photograph 33: Collecting tires and transporting them to TWA-1. ..... 46
Photograph 34: Tire stockpile in TWA-1. ..... 46
Photograph 35: Tires in a sea can ready for transportation south. ..... 47
Photograph 36: Batteries packaged and ready for transportation south. ..... 48
Photograph 37: The small loader and tub used to transport any drums containing potential contents up to the TWA-1 processing area. ..... 49
Photograph 38: Showing the liquid contents processing area in TWA-1. ..... 49
Photograph 39: Overview of the liquid processing area in TWA-1, showing the lined berm and empty drums. ..... 50
Photograph 40: Full drums with liquid gathered from contents on site. ..... 50
Photograph 41: Vacuuming up the PHC impacts from the HCM-2 excavation in AEC-1. ..... 51
Photograph 42: Showing the propane cylinders, oxygen cylinders, and fire extinguishers. ..... 52
Photograph 43: Showing the TWA-1 liquid processing pad. ..... 55
Photograph 44: Showing another view of the liquid processing pad. ..... 55
Photograph 45: Showing the western portion of the site where the lead-amended material was stockpiled and processed. ..... 56
Photograph 46: Showing the final capping (Type 2 material) in AEC-1. ..... 57
Photograph 47: Showing AEC-2 post capping. View from the southeast, looking northwest. ..... 58
Photograph 48: Showing AEC-2 after completion of the Type 2 aggregate cap. Looking to the east. ..... 58
Photograph 49: Beginning material lifts in the main landfill face. ..... 59
Photograph 50: Combining the non-hazardous waste with Type 1 aggregate in lifts. ..... 60
Photograph 51: Compacting each lift after placement of 300 mm of Type 1 aggregate material. ..... 60
Photograph 52: Building up the landfill embankment with Type 2 aggregate material as each Zone 1 material lift is added. ..... 61
Photograph 53: Completing common excavation activities at the northwestern extent of the landfill toe. ..... 62
Photograph 54: Completing common excavation on the AEC-3 upper drainage swales. ..... 62
Photograph 55: Completing common excavation activities on the lower AEC-3 drainage swales. ..... 63
Photograph 56: One of the first truck-loads of Type 2 aggregate material delivered to the site on July 25th, 2017. ..... 65
Photograph 57: Progress of Main Access Road A. ..... 65
Photograph 58: Progress of Main Access Road A. ..... 66

Photograph 59: Progress of Main Access Road A, nearing completion. ..... 66
Photograph 60: The level of Zone 2 (Type 2 material) was raised in conjunction with the Zone 1 construction. ..... 67
Photograph 61: Continuing with Type 2 aggregate material placement, compaction and grading in 400 mm lifts. ..... 68
Photograph 62: Continuing with Type 2 aggregate material placement, compaction and grading. Geotextile is visible between landfill embankment Zones 2 and 3. ..... 68
Photograph 63: Continuing with Type 2 aggregate material placement, compaction and grading..... 69
Photograph 64: Continuing with Type 2 aggregate material placement, compaction and grading..... 69
Photograph 65: Adding the final Type 2 aggregate to the top of the main landfill. ..... 70
Photograph 66: Placing and compacting Type 4 aggregate material on the main access road..... 71
Photograph 67: Adding Type 4 aggregate material to the Road B surface. ..... 71
Photograph 68: Adding Type 4 aggregate material to the Road B surface. ..... 72
Photograph 69: Placing and compacting the final Type 1 cap on top of the landfill. ..... 73
Photograph 70: Showing the final placement and compaction of the Type 1 aggregate on top of the landfill. ..... 73
Photograph 71: Geotextile in drainage swale within AEC-2..... 74
Photograph 72: Installing geotextile in the landfill swales at the bottom of AEC-3. ..... 75
Photograph 73: Geotextile in the drainage swales on top of AEC-3. ..... 75
Photograph 74: Geotextile on the outer surface of Zone 2 beneath the rip-rap..... 76
Photograph 75: Geotextile on the outer surface of Zone 2 beneath the rip-rap..... 77
Photograph 76: Geotextile on the outer surface of Zone 2 beneath the rip-rap..... 77
Photograph 77: Type 3 (rip-rap) in the drainage within AEC-2. ..... 78
Photograph 78: Type 3 (rip-rap) in the drainage within AEC-2. ..... 79
Photograph 79: Showing Type 3 (rip-rap) aggregate in the lower drainage swales in AEC-3..... 80
Photograph 80: Showing Type 3 (rip-rap) aggregate in the lower drainage swales in AEC-3..... 80
Photograph 81: Showing Type 3 (rip-rap) aggregate in the upper drainage swale in AEC-3. ..... 81
Photograph 82: Showing Type 3 (rip-rap) aggregate in the upper drainage swale in AEC-3. ..... 81
Photograph 83: Showing Type 3 (rip-rap) aggregate in the upper drainage swale in AEC-3. ..... 82
Photograph 84: Placement of the Type 3 (rip-rap) aggregate on the landfill embankment. ..... 83
Photograph 85: Placement of the Type 3 (rip-rap) aggregate on the landfill embankment. ..... 83
Photograph 86: Placement of the Type 3 (rip-rap) aggregate on the landfill embankment completed..... 84

Photograph 87: Installing new culvert on compacted bedding as per specifications ..... 85
Photograph 88: Backfilling the new culvert ..... 85

# TABLES (AFTER MAIN TEXT)

Table 1 Stockpile Metals and Inorganics
Table 2 Stockpile Polycyclic Aromatic Hydrocarbons (PAHs)
Table 3 Stockpile Polychlorinated Biphenyls (PCBs)
Table 4 Stockpile Petroleum Hydrocarbons (PHCs)
Table 5 Stockpile Volatile Organic Compounds (VOCs)
Table 6 Sediment Metals and Inorganics
Table 7 Sediment Polycyclic Aromatic Hydrocarbons (PAHs)
Table 8 Sediment Pesticides and Polychlorinated Biphenyls (PCBs)
Table 9 Sediment Petroleum Hydrocarbons (PHCs)
Table 10 Sediment Volatile Organic Compounds (VOCs)
Table 11 TWA Metals and Inorganics
Table 12 TWA Polycyclic Aromatic Hydrocarbons (PAHs)
Table 13 TWA Polychlorinated Biphenyls (PCBs)
Table 14 TWA Petroleum Hydrocarbons (PHCs)
Table 15 TWA Volatile Organic Compounds (VOCs)
Table 16 TWA Glycol
Table 17 Excavation Metals and Inorganics
Table 18 Excavation Petroleum Hydrocarbons (PHCs)
Table 19 Metals and Inorganics in Surface Water
Table 20 Polycyclic Aromatic Hydrocarbons (PAHs) in Surface Water
Table 21 Polychlorinated Biphenyls (PCBs) in Surface Water
Table 22 Petroleum Hydrocarbons (PHCs) in Surface Water
Table 23 Volatile Organic Compounds (VOCs) in Surface Water
Table 24 Surface Water Metals

# FIGURES

Map 1 AEC Boundaries (in text, pp 17)
Figure 1 Site Location
Figure 2 Former AEC Boundaries
Figure 3 Long-Term Monitoring Sample Locations
Figure 4 HCM and Sediment Stockpiles
Figure 5 Temporary Work Area Sample Locations
Figure 6 HCM Excavation Wall Samples

# APPENDICES

Appendix A Health and Safety Plan
Appendix B Kudlik Submittals
Appendix C Weekly Construction Reports
Appendix D Weekly Meeting Minutes
Appendix E Water Licence
Appendix F Aggregate Gradation Curves
Appendix G Compaction Testing Results
Appendix H Waste Disposal Manifests
Appendix I Laboratory Certificates of Analysis
Appendix J Kudlik Daily Truck and Material Logs
Appendix K As-Built Drawings and Soil Volume Confirmations
Appendix L Field Chemistry Monitoring Results
Appendix M Long-Term Monitoring Plan
Appendix N Selected Site Photographs
Appendix O Contractor Completion Forms
Appendix P Site Photographs (on DVD)

# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AEC | Areas of Environmental Concern |
| AMSRP | Abandoned Military Site Remediation Protocol |
| BTEX | benzene, toluene, ethylbenzene, and xylenes |
| CALA | Canadian Association of Laboratory Accreditation |
| CCME | Canadian Council of Ministers of the Environment |
| COC | contaminants of concern |
| CSedQG | Canadian Sediment Quality Guidelines |
| CSQG | Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health |
| CWS-PHC | Canada-Wide Standards for Petroleum Hydrocarbons in Soil |
| CWQG | Canadian Water Quality Guidelines |
| DOC | dissolved organic carbon |
| DO | dissolved oxygen |
| ESA | Environmental Site Assessment |
| EQG | Environmental Quality Guidelines |
| HCM | Hydrocarbon Contaminated Material |
| INAC | Indigenous Affairs and Northern Development Canada |
| LTM | Long-Term Monitoring |
| MDL | method detection limit |
| NWB | Nunavut Water Board |
| ORP | oxidation-reduction potential |
| PAH | polycyclic aromatic hydrocarbons |
| PCB | polychlorinated biphenyls |
| PHC | petroleum hydrocarbons |
| PSPC | Public Services and Procurement Canada |
| RFP | Request for Proposal |
| QA/QC | quality assurance/quality control |
| RAP | Remedial Action Plan |
| RPD | relative percent difference |
| TC | Transport Canada |

| | |
|---|---|
| TDS | total dissolved solids |
| TOC | total organic carbon |
| USEPA | United States Environmental Protection Agency |
| VOC | volatile organic compounds |

# EXECUTIVE SUMMARY

Arcadis Canada Inc. (Arcadis), was retained by Public Services and Procurement Canada (PSPC) Environmental Services on behalf of Transport Canada (TC) to act as the Crown's Resident Engineer during the environmental remediation activities at the former Community Landfill and Metal Dump located in Iqaluit, Nunavut.

In the summer of 2017, PSPC on behalf of TC released the RFP Solicitation related to the contract services required for the environmental site remediation of the Community Landfill and Metal Dump. The Project Specification Package was developed based on the 2017 Remedial Action Plan, Former Metal Dump and Community Landfill, Iqaluit, Nunavut dated January 27, 2017 and included a model contract and construction specifications.

The successful bid was submitted by Kudlik Construction Limited (Kudlik) based out of Iqaluit, Nunavut.

The objective of the remediation at the former Metal Dump and Community Landfill was to mitigate human and ecological hazards related to the historical military and Iqaluit community use of the site as a landfill and vehicle dump.

Remedial activities were completed between the dates of July 24$^{th}$ and October 13$^{th}$, 2017. The remediation activities completed at former Metal Dump and Community Landfill were itemized and defined within the Contract Basis of Payment. Each remedial activity along with the estimated debris quantities as defined in the Project Specification Package compared to actual quantities of waste moved (hazardous and non-hazardous), impacted soil/sediment and aggregate quantities was tracked. In general, most of the tracked quantities were less than the original estimates except for the following as summarized in Table ES1 on the following page.

**Table ES1: Estimated Quantities versus Actual Quantities Exceeding Estimates**

| Basis of Payment Items [1] | Items of Work Description | Unit | Estimated Quantity[2] | Actual Quantity[3] | Estimated vs. Actual (%)[4] | Rationale for Change |
|---|---|---|---|---|---|---|
| **Division 02 Items** | | | | | | |
| 02 61 00-2 | Excavation and Transportation of Metal Contaminated Soil to Main Landfill | $m^3$ | 300 | 372 | 124% | Impacted soil continued slightly deeper than anticipated. |
| 02 81 01-3 | Tires | each | 100 | 300 | 300% | Buried tires were not visible during initial assessments. |
| 02 81 00-2 | Liquids - various | litres | 2,000 | 6,120 | 306% | A buried drum was punctured during excavation and forced vacuum collection of PHC-impacted surface water. |
| 31 05 16-2 | Type 2 Aggregate materials – coarse granular supply and deliver | $m^3$ | 30,000 | 36,226 | 121% | Field modifications and increased aerial extent of cap required. |
| 31 05 16-4 | Type 4 Aggregate materials - fine granular supply and deliver to the | $m^3$ | 1,700 | 2,185 | 129% | Field modifications and increased aerial extent of cap required. |
| 31 22 15-2 | Re-Shape and Regrade AEC-1 with Type 2 Aggregate - 300mm thick on average | $m^2$ | 5,000 | 6,566.2 | 131% | Field fit – necessary modifications to aerial limits of cap. |
| 31 22 15-3 | Re-Shape and Regrade AEC-2 with Type 2 Aggregate - 300 mm thick in average | $m^2$ | 2,500 | 4,999 | 200% | Field fit – necessary modifications to aerial limits of cap. |
| 31 24 13-8 | Place, Compact and Grade Type 2 Material in Zone 2 of Landfill Embankment | $m^3$ | 24,200 | 29,877 | 123% | Increase of Type 2 material amount due to decrease of other material zones in landfill embankment, and overhang area requiring backfill. |
| 31 24 13-9 | Place and Compact and Grade Type 4 Material on Main Access Road surface | $m^3$ | 1,000 | 1,321 | 132% | Field fit for road path. |
| 31 24 13-10 | Place, Compact and Grade: 100mm Type 1 on 250mm Type 4 Material on top surface of Landfill Embankment | $m^3$ | 990 | 1,096.9 | 111% | Field fit for road path. |

1. "Section" refers to the numerical identification of each Basis of Payment Item.
2. "Estimated Quantity" refers to Arcadis' initial quantity estimates, as presented in the contract Basis of Payment table.
3. "Actual Quantity" refers to the volume that was removed, handled, remediated, provided etc. during remediation work.
4. "Estimated vs. Actual" refers to the percentage of actual versus estimated quantities.

Two incidents occurred during the remedial activities. One environmental incident included a small hydraulic oil spill, which was quickly contained and cleaned using on-site fuel spill supplies, and one incident

involved minor equipment damage. No lasting effects to the environment and no injuries resulted from these two incidents. The incident reports are presented in Appendix A as reported to the Crown by Kudlik.

As part of the remedial activities, several streams of hazardous material were sorted, segregated, stockpiled and packaged. Waste manifests, disposal certificates, and cargo receipts for the respective waste streams are provided in Appendix H. At the time of this reporting, materials have not been received by the destination licenced facilities. Completed waste disposal manifests will be provided as an Addendum to this report once received. Impacted sediments were placed into 3.82 $m^3$ Quatrex Bags and shipped off-site via sea lift. Completed disposal manifests will be provided as an Addendum to this report once received in 2018.

Two Crown site inspections were conducted during site activities. The purpose of the inspections was to witness work progress, address any contract concerns and remedy any non-compliance issues related to the Project Specification Package. The initial inspection was conducted approximately half way through remediation activities. After a site tour with the Arcadis Departmental Representative (DR), the Crown (PSPC and TC) did not identify any non-compliance issues and was satisfied with the progress of the work. The final inspection was completed after all the debris material had been collected from the field. Upon completion of the second site tour, the Crown accepted the site as fully remediated and tasks outlined within the Project Specifications (with the exception of final removal off-site of the collected debris and metals impacted sediments) had been successfully completed. The Crown also signed off on the contract Certificate of Completion provided by Kudlik signed on November 23, 2017 (See Appendix O).

The remediation program at the former Iqaluit Metal Dump and Community Landfill was successfully completed.

Based on the provisions outlined in the Performance and Long-Term Monitoring Plan (LTM), as part of the Nunavut Water Board (NWB) water licence number 1BR-MDR1721 issued July 31, 2017 and associated Long-Term Monitoring Plan (LTM) approval letter dated September 25, 2017, long-term monitoring should be undertaken at the site annually to confirm that the risk management measures implemented as part of the remedial program remain stable and provides the level of protection to human and ecological receptors as modelled in the site specific risk assessment.

# 1 INTRODUCTION

Arcadis Canada Inc. (Arcadis), was retained by Public Services and Procurement Canada (PSPC) Environmental Services on behalf of Transport Canada (TC) to act as the Crown's Resident Engineer during the environmental remediation activities at the former Community Landfill and Metal Dump located in Iqaluit, Nunavut (herein referred to as the 'Site'). The project was completed under the terms of the existing Northern As/When Supply Arrangement (SA) for Environmental Services (EW699-141143/001/NCS).

In the summer of 2017, PSPC on behalf of TC released the RFP Solicitation EW699-180040/001/NCS related to the contract services required for the environmental site remediation of the Community Landfill and Metal Dump. The Project Specifications Package was developed based on the 2017 Remedial Action Plan, Former Metal Dump and Community Landfill, Iqaluit, Nunavut dated January 27, 2017 (included as an appendix to the RFP) and included construction specifications.

A successful bid was submitted by Kudlik Construction Limited (Kudlik) based out of Iqaluit, Nunavut. The work was carried out under Contract No. EW699-180040/001/NCS, File No. NCS-7-40013, dated July 12, 2017.

The objective of the remediation at the former Metal Dump and Community Landfill was to mitigate human and ecological hazards related to the historical military and Iqaluit community use of the site as a landfill and vehicle dump. The Remedial Action Plan (RAP) and subsequent specifications were developed on the basis of a risk-based approach to mitigating environmental concerns on site.

## 1.1 Site Location and Access

Iqaluit is located on the southern tip of Baffin Island. The Iqaluit Former Metal Dump and Community Landfill (UTM coordinates of E521904.94, N7067812.69) is located at the West 40 area on the border of Sylvia Grinnell Territorial Park and the Sylvia Grinnell River, 1.7 km southwest of the City of Iqaluit (Figure 1). Historically, the site has been referred to as Sylvia Grinnell Park Dump and West 40 – Dump Site #1 and Vehicle Dump and Community Landfill or simply "site" or "landfill".

## 1.2 Site Overview

The limits of the remedial works covered an area of approximately 72,500 $m^2$ situated on an escarpment leading to the Sylvia Grinnell River. Prior to remedial activities several shallow ravines and coulees partially filled with metal debris were identified within the site limits. The debris was scattered over a large area and consisted of vehicles, equipment, barrels, scrap metal, and domestic waste.

The Remedial Action Plan (Arcadis 2017) identified four areas of environmental concern (AECs) at the site, namely:

**AEC 1 – Upgradient Buried Debris**

The area of the site directly up gradient from the vehicle dump contains buried metal debris identified during the Phase I/II/III ESA completed by Franz (2009, 2010c).

**AEC 2 – Vehicle Dump**

The area was referred to as the vehicle dump in the Franz (2009, 2010c) studies and was described as containing vehicles, such as trucks, cars, trailers, boilers, tankers, boats, and others. During the Arcadis 2016 supplemental assessment, the area was observed to contain less debris as a result of a community-wide recycling program undertaken in 2011 that entailed the removal of vehicular debris from the site. The contractor involved in that recycling program removed the vehicles, crushed them and shipped remains to a receiving site in Southern Canada. The removal of this debris had previously been communicated to both PSPC and Transport Canada. The area where vehicle debris was removed was located to the east of the main landfill area. A drainage channel ran directly through the center of this debris pile discharging into a series of ponds, then subsequently into the Sylvia Grinnell river.

**AEC 3 – Main Landfill**

The main landfill area consisted of a mixture of debris spread across a steeply graded bedrock slope. The top of the landfill area had been capped with granular material during previous site operations, however the toe of the slope was left exposed with debris scattered throughout the area.

**AEC 4 – Downgradient, Off-site**

The downgradient and off-site area is located below the escarpment and includes part of the Sylvia Grinnell Park. This area contained only very few pieces of scattered debris however some of the debris was partially buried in sediments at the bottom of the ponds located within the site limits.

## 1.3 Background

The United States Air Force (USAF) used the site from between 1955 to 1963 as a metal dump for vehicles, truck bodies, barrels and scrap metal. The majority of materials were deposited in 1963 when the US Military left Iqaluit (formerly known as the Community of Frobisher Bay). Shops, buildings, and other materials were simply bulldozed over the cliff edge. The cliff is a bedrock outcrop rising approximately 30 m above the tidal area where the Sylvia Grinnell River meets Frobisher Bay. The area to the north side of the slope was used by the USAF, and to a lesser degree the Community of Iqaluit, as a landfill site for household garbage until sometime in the 1970's.

Two main areas of waste are present at the site: 1) the main debris/community landfill area located in the central portion of the site and spanning the top, side and toe of a bedrock escarpment that runs northwest/southeast (Photograph 1), and 2) the vehicle dump located approximately to the south and parallel with the main landfill (Figure 2).

Environmental investigations have been carried out at the site dating back to 1988. The work has focused on the presence and impacts of petroleum hydrocarbons (PHCs), inorganic elements, pesticides, polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCB) contamination in soils, surface water, and sediments. Debris quantification and a designated substances survey (i.e. asbestos surveys) were also undertaken.

**Photograph 1: Showing Main Landfill Prior to Remedial Work.**

**Photograph 2: Showing – Vehicle Dump Prior to Remedial Work.**

## 1.4 Previous Investigations

Significant reports on the Iqaluit Former Metal Dump and Community Landfill that preceded this RAP include:

- Arcadis Canada Inc., 2017. Remedial Action Plan, Former Metal Dump and Community Landfill, Iqaluit, Nunavut. Prepared for Public Services and Procurement Canada on behalf of Transport Canada. Dated January 27, 2017.
- Arcadis Canada Inc., 2016. Surface Water and Sediment Testing at the Former Metal Dump and Community Landfill (Presented in the Remedial Action Plan – See above).
- Franz Environmental Inc., 2010a. Remedial Action Plan, Vehicle Dump and Community Landfill, Iqaluit, Nunavut. Prepared for Public Works and Government Services Canada on behalf of Transport Canada.
- Franz Environmental Inc., 2010b. Ecological and Human Health Detailed Quantitative Risk Assessment (DQRA). Prepared for Public Works and Government Services Canada on behalf of Transport Canada.
- Franz Environmental Inc., 2010c. Phase III Environmental Site Assessment, Vehicle Dump and Community Landfill, Iqaluit, Nunavut. Prepared for Public Works and Government Services Canada on behalf of Transport Canada.
- Preliminary Quantitative Risk Assessment (PQRA) – Human Health, Franz Environmental Inc., 2009, Vehicle Dump and Community Landfill, Iqaluit, Nunavut. Prepared for Public Works and Government Services Canada on behalf of Transport Canada. March 2009.

- Franz Environmental Inc., 2009. Phase I/II Environmental Site Assessment, Vehicle Dump and Community Landfill, Iqaluit, Nunavut. Prepared for Public Works and Government Services Canada on behalf of Transport Canada. February 2009.
- Earth Tech Canada Inc., 2001. Desk Top Review of Scrap Metal Dump Site West of Iqaluit Airport, Iqaluit, Nunavut, Canada. Prepared for Transport Canada, Prairie and Northern Region-Programs;
- Lisa A. Peramaki and Jody F. Decker, School of Planning – University of Waterloo, 1999. Lead in Soil and Sediment in Iqaluit Nunavut, Canada and Links with Human Health;
- Royal Military College – Environmental Sciences Group, Victoria, BC, 1995. Environmental Study of a Military Installation and Six Waste Disposal Sites at Iqaluit, NWT. Prepared for Department of Indian and Northern Affairs Canada & Environment Canada;
- Avati Ltd., 1993. Remediation Options for an Abandoned US Airforce Base and Two Waste Sites at Iqaluit, NWT. October 1993;
- Public Works Canada Literature Review, 1992; and
- Härtling, J., 1988. PCB and Trace Metal Pollution from a Former Military Waste Disposal Site at Iqaluit, Northwest Territories. Master's Thesis.

The analytical results from the three most recent investigation programs were grouped by environmental media and location and summarized below.

### 1.4.1 Contaminants of Concerns

Preliminary concerns with historical usage of the site relate to the disposal of waste debris including the burial and disposal of metallic and domestic waste (i.e., volatile organic compounds (VOCs), metals, and PCBs), the potential disposal of petroleum products (i.e., petroleum hydrocarbon (PHC) fractions 1 to 4 (F1-F4), benzene, toluene, ethylbenzene and xylenes (BTEX), PAHs, VOCs, and metals), solvents and degreasers (i.e., F1-F4, BTEX, PAHs, VOCs), heavy oil and lubricants (i.e., PCBs, and PAHs), and use of pesticides. The contaminants of concern are summarized in Table 1-1: for each AEC. For each AEC, these contaminants were suspected to be present in soil, surface water and/or sediment at locations where contamination could reasonably be expected to be present (e.g., PHCs in soil around fuel barrel caches).

**Table 1-1: Summary of AECs and Potential Concerns**

| AEC | Potential Contaminant of Concerns | Environmental Media Potentially Affected | Receptors Potentially Affected |
|---|---|---|---|
| AEC 1 – Upgradient Buried Debris | PHCs, Metals, PCBs, and Pesticides | Soil, surface water and sediment | Human Health and Ecological |
| AEC 2 – Vehicle Dump | PHCs, PAHs, VOCs, Metals, PCBs, and Pesticides | Soil, surface water and sediment | Human Health and Ecological |
| AEC 3 – Main Landfill | PHCs, PAHs, VOCs, Metals, PCBs, and Pesticides | Soil, surface water and sediment | Human Health and Ecological |
| AEC 4 – Down Gradient, Off Site | PHCs, PAHs, VOCs, Metals, PCBs, and Pesticides | Soil, surface water and sediment | Human Health and Ecological |

# 2 ROLES AND RESPONSIBILITIES

## 2.1 Contractor

### 2.1.1 General

Kudlik Construction Limited (Kudlik) assumed the role of Primary Contractor for the Former Iqaluit Metal Dump and Community Landfill project and were retained by PSPC to execute the remediation activities stipulated in the PSPC contract #EW699-180040/001/NCS, File #NCS-7-40013, Dated 2017-07-12. The contractor's primary roles and responsibilities are identified below.

### 2.1.2 Remediation Activities

Kudlik was responsible for the completion of environmental remediation services outlined in the remediation contract. A summary of work undertaken as a function of the Basis of Payment table is provided in Section 6 Remediation Activities.

### 2.1.3 Regulatory Responsibilities

Kudlik was responsible for following all regulatory requirements and to comply with the permits obtained for this project. Table 2-1 below identifies the site permits that were obtained prior to the commencement of work.

**Table 2-1: Former Iqaluit Metal Dump and Community Landfill Regulatory Permits**

| Permit | Permit Issued By | Permit Obtained By |
|---|---|---|
| Water License | Nunavut Water Board, Gjoa Haven, Nunavut | The Crown |
| Quarry Permit (Included within the Land Use Permit) | City of Iqaluit, Nunavut | Kudlik |
| Use of temporary work area (TWA-1) | City of Iqaluit, Nunavut | Kudlik |

No regulatory compliance issues were identified during environmental remediation. Further information related to regulatory compliance is presented in Section 3 Regulatory Framework.

### 2.1.4 Health and Safety

Prior to the commencement of work, Arcadis reviewed and the Crown approved the site-specific health and safety plan (SSHASP) prepared by Kudlik for this program. The SSHASP provided safe work practices detailing site hazards and mitigation procedures, as well as environmental protection procedures relevant to work activities completed at the Former Iqaluit Metal Dump and Community Landfill. Kudlik was

responsible for ensuring that the terms and conditions of the SSHASP were followed by all site personnel, including workers, sub-contractors and site visitors (including Arcadis staff). Copies of the SSHASP, site inspection reports, and incident reports are provided in Appendix A.

Two incidents occurred during site activities at Former Iqaluit Metal Dump and Community Landfill as outlined below in Table 2-2. Neither incident resulted in workers being harmed or injured. There were no lost time injuries associated with this program.

**Table 2-2: Summary of Health and Safety/Environmental Incidents**

| Incident | Details |
|---|---|
| Compactor Damage<br>2017.09.01 | While compacting lifts close to the cliff area in AEC-3 the operator backed into the bedrock side of the escarpment, slightly damaging the plastic housing of the compactor. No injuries as a result. |
| Shear Excavator Leak<br>2017.08.19 | Broken O-ring on the hydraulic shear, discharge of roughly 4L of hydraulic oil to ground in AEC-2. The leak was quickly stopped and contained with sorbent material. Impacted soil was subsequently removed, and the shear repaired. No injuries or ongoing environmental impacts as a result. |

### 2.1.5 Submittals

Kudlik was responsible for submitting to the Crown all information as described within the contract specifications as outlined in Table 01 33 00-1 of Specification Section 01 33 00 Contractor Submittal Schedule. Each submittal was reviewed by the Departmental Representative (DR) for completeness and compliance with the construction specifications and remediation contract. Copies of the Kudlik submittals are provided in Appendix B.

## 2.2 Departmental Representative (DR)

### 2.2.1 General

Arcadis assumed the role of the Crown's Departmental Representative (DR) for the Former Iqaluit Metal Dump and Community Landfill remediation project. The DR's primary responsibility was to ensure the remedial work was conducted in accordance with the remediation contract and technical specifications while adhering to applicable regulatory, environmental, and health and safety requirements.

### 2.2.2 Site Reporting Activities

The DR submitted Weekly Construction Progress Reports to the Crown that summarized the site events on a daily basis. Within the weekly reports was a description of work completed in that week, any environmental or health and safety issues, site visitors and information regarding regulatory compliance. Each report was uploaded to a group SharePoint site on the Friday of every week for review by the Crown while the DR was present on site overseeing the remediation program. The DR reported no compliance

issues related to the execution of the work or regulatory requirements. Weekly Construction Reports, as submitted to the Crown, are presented in Appendix C.

In addition, weekly Construction Update Meetings were held each Monday at 11:00, local time, via conference call. Weekly construction meetings were held in accordance with Section 01 31 19 of the construction specifications, following the agenda outlines in Part 1, Clause 1.4.6. The DR submitted meeting minutes from the weekly construction update meetings via e-mail, as well as uploading them to the SharePoint site. The minutes summarized action items brought forth in weekly project meetings between project management and site personnel. A compiled set of meeting minutes is provided in Appendix D.

# 3 REGULATORY FRAMEWORK AND ENVIRONMENTAL QUALITY CRITERIA

## 3.1 Nunavut Water Board Water Licence

Water licence 1BR-MDR1721 was granted on July 21, 2017 by the Nunavut Water Board (NWB) with the approval of the Performance and Long-Term Monitoring Plan on September 25, 2017 and is set to expire on July 21, 2021. The licence allowed for the use and diversion (for the purpose of sediment removal) of fresh water, up to a maximum of 50 $m^3$ per day. The water licence and letter approving the monitoring program are attached within Appendix E.

A maximum of approximately 100 litres of water was extracted during the project for on-going environmental surface water sampling. No other water was utilized, diverted, or modified during the remedial activities at the site.

As part of the performance monitoring, surface water sampling stations were established on site with their coordinates are presented below in Table 3-1 and the locations shown on Figure 3:

**Table 3-1: Summary of Monitoring Sample Stations**

| Performance Monitoring Station # | Surface Water Sample | Easting (UTM83) | Northing (UTM83) | Feature |
|---|---|---|---|---|
| 1 | LTM1 | 521750.251 | 7067946.256 | Pond 1 |
| 2 | LTM2 | 521800.108 | 7067986.503 | Pond 2 |
| 3 | LTM3 | 521836.893 | 7067795.774 | Pond 3 |
| 4 | LTM4 | 521860.124 | 7067686.315 | Pond 4 |
| 5 | LTM5 | 521915.011 | 7067718.731 | Pond 5 |
| 6 | LTM6 | 521936.764 | 7067744.086 | Pond 6 |
| 7 | LTM7 | 522027.627 | 7067865.856 | Culvert discharge area - upgradient |

These sample stations correspond with the sample stations to be utilized during the long-term monitoring program. During the performance monitoring stage (i.e., during active remediation), each station was monitored on a weekly basis (minimum) for the field parameters of pH, temperature, conductivity, dissolved oxygen, and turbidity using a field calibrated multi-meter (Horiba U-52). In the event of work being conducted within 30 m of a water body, the monitoring frequency increased to three times per week minimum as a good industry practice.

Results from performance monitoring will be reported in the annual report in accordance with Part B, Item 1(c) of the NWB water licence.

Upon approval of the Performance and Long-Term Monitoring Plan on September 25, 2017, Arcadis commenced additional chemical surface water monitoring at the site. Two rounds of surface water samples were collected as part of this monitoring on September 21, 2017 and October 3, 2017, during the remediation works. Due to frozen conditions, station LTM-1 was not able to be sampled during the October 3, 2017 monitoring event. Results of this monitoring are provided in the tables at the rear of this report, and will be provided in the annual report in accordance with Part B, Item 1(c) of the NWB water licence. Details on the execution of the performance monitoring program is provided in Section 10 Performance Monitoring.

## 3.2 Regulatory Framework

The Contaminated Sites Management Working Group for federal government departments has defined a contaminated site as a site at which substances occur in concentrations that either: 1) are above background levels and pose, or are likely to pose, an immediate or long-term hazard to human health or the environment; or 2) exceed levels specified in policies and/or regulations. For the latter, the Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (CCME, 1999 and annual updates), including the Canada-Wide Standards for Petroleum Hydrocarbons in Soil (CCME, 2001 and updates) are applied in the numerical comparison of laboratory data to determine whether the site should be deemed a contaminated site. The guidelines are numerical limits intended to maintain, improve or protect environmental quality and human health at contaminated sites.

The Government of Nunavut Department of Environment Guideline for the Management of Contaminated Sites (revised December 2014) has adopted the federal CCME Guidelines for the management of contaminated sites within its jurisdiction.

The chemical data obtained during the Franz (2009 & 2010c) Phase I/II and Phase III ESAs and during the 2016 surface water and sediment testing conducted by Arcadis as part of the RAP update were compared to these established guidelines from the federal CCME. The federal guidelines, referred to in this report as environmental quality guidelines (EQG) are relevant since the site(s) is currently federally managed and Nunavut has adopted the CCME approach.

## 3.3 Environmental Quality Guidelines (EQGs)

The federal Environmental Quality Guidelines (EQGs) are based on the level of risk a contaminant poses to humans, plants and wildlife. The EQG were used in the RAP and as part of the remedial work to identify the areas where mitigation of exposure to chemicals of concern is required. They are also incorporated as site-specific remedial objectives.

The specific guidelines that are used for remedial work and monitoring of surface water, sediment and soil are as follows:

- Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (CSQGs) (CCME, 1999, with updates).
- Canada-Wide Standards for Petroleum Hydrocarbons in Soil (CWS-PHC) (CCME, 2008).
- Canadian Soil Quality Guidelines (CSQG) Polycyclic Aromatic Hydrocarbons factsheet (CCME, 2010).
- Canadian Environmental Quality Guidelines. Canadian Sediment Quality Guidelines (CSedQG) for the Protection of Aquatic Life (CCME, 2007, with updates).

- Canadian Environmental Quality Guidelines. Canadian Water Quality Guidelines (CWQG) for the Protection of Aquatic Life (CCME, 2007, with updates).

The soil EQG are further categorized by land use (i.e., agricultural/wildland, residential/parkland, commercial and industrial) and soil properties (i.e., fined or coarse-grained soil). Based on a review of the site settings, site usage, municipal zoning and adjacent activities, the site was divided into two land use sectors for the purpose of evaluating the soil environmental quality against the EQG and the subsequent remedial work:

- The lower sector below the escarpment and encompassing ponds 1 to 6 and part of the Sylvia Grinnell Territorial Park was considered to be a wildland sector. This sector is outlined as Area of Environmental Concern 4 (AEC 4). The Sylvia Grinnell Territorial Park plays a significant role in bird migration and over 40 species have been recorded in the park at different times of the year. CCME agricultural/wildland use is defined as "*Land on which the primary activity is related to the productivity capability of the land and includes lands that provide habitat for wildlife and birds*". Based on this definition and on the significance of the park's role as a habitat, the CCME wildland guidelines are applicable to the northern section of AEC 4 which is part of the park. The southern portion of AEC 4 presents similar geomorphological/biological features and the presence of equivalent wildlife habitat can be expected throughout AEC 4. The wildland soil EQG are protective of the more sensitive ecological habitats expected in the area while protecting for the recreational usage observed and permitted by the municipal zoning (i.e., Iqaluit by-law 704 Open Area Zone (OR) which permits the use of the area as cultural interpretation centre, dog area, park, beach shack, temporary camping structures and utility installation).
- The upper sector including the vehicle dump, the landfill and the upper debris was considered to be a commercial sector. This sector is outlined as AECs 1, 2, and 3 on Figure 2. This sector is predominantly located within Iqaluit by-law 704, zone M2 and is regulated for heavy industrial usage. This sector also already includes a zoning allowance for a former waste disposal site (Iqaluit by-law, zone MR, exclusion 1). The local residents are known to use the area for social activities (e.g., bonfire) and for accessing the Sylvia Grinnell River and Park. It is assumed that this behavior will continue following the remediation of the site and that no residential dwellings will be installed in the sector. The CCME commercial guidelines would be protective of the site users and ecological receptors because they are calculated based on 10 hours per day, 5 days per week, 48 weeks per year exposure assumptions that include site usage by all members of the public. These considerations included children (toddlers) and consider the different potential exposure routes such as direct soil contact (ingestion and dermal contact), vapour inhalation and ecological soil contact.

The coarse grained EQG were applied to both sectors as soils on site were noted by field observation to be predominantly coarse, and as they are the most stringent of the set.

Surface water and sediment EQG are further refined into freshwater or marine environment. The upper sector including AECs 1, 2, and 3 contains drainage features and small ponds that act as headwater to the lower sector. Surface water and sediment from this sector is not affected by the tides and the freshwater EQG are applicable. Similarly, the eastern portion of the lower sector (AEC 4) including ponds 2, 5 and 6 is not considered to be significantly affected by the tides making the freshwater EQGs applicable. The western portion of the lower sector (AEC 4) including ponds 1, 3 and 4 is replenished by the upstream freshwater features and intruded with saline water twice daily during high tide. Sodium concentrations

measured in these ponds are generally less than the 1000 mg/L freshwater threshold; however, since it was observed that marine water intrudes the ponds and in the absence of sufficient information on resident species and environmental conditions, the water quality guideline protecting the most sensitive condition should be applied (CCME, 2007; *A Protocol for the Derivation of Water Quality Guidelines for the Protection of Aquatic Life 2007*). As such, the ponds are considered a brackish water environment and the lowest of the freshwater or marine surface water/sediment guidelines are applicable.

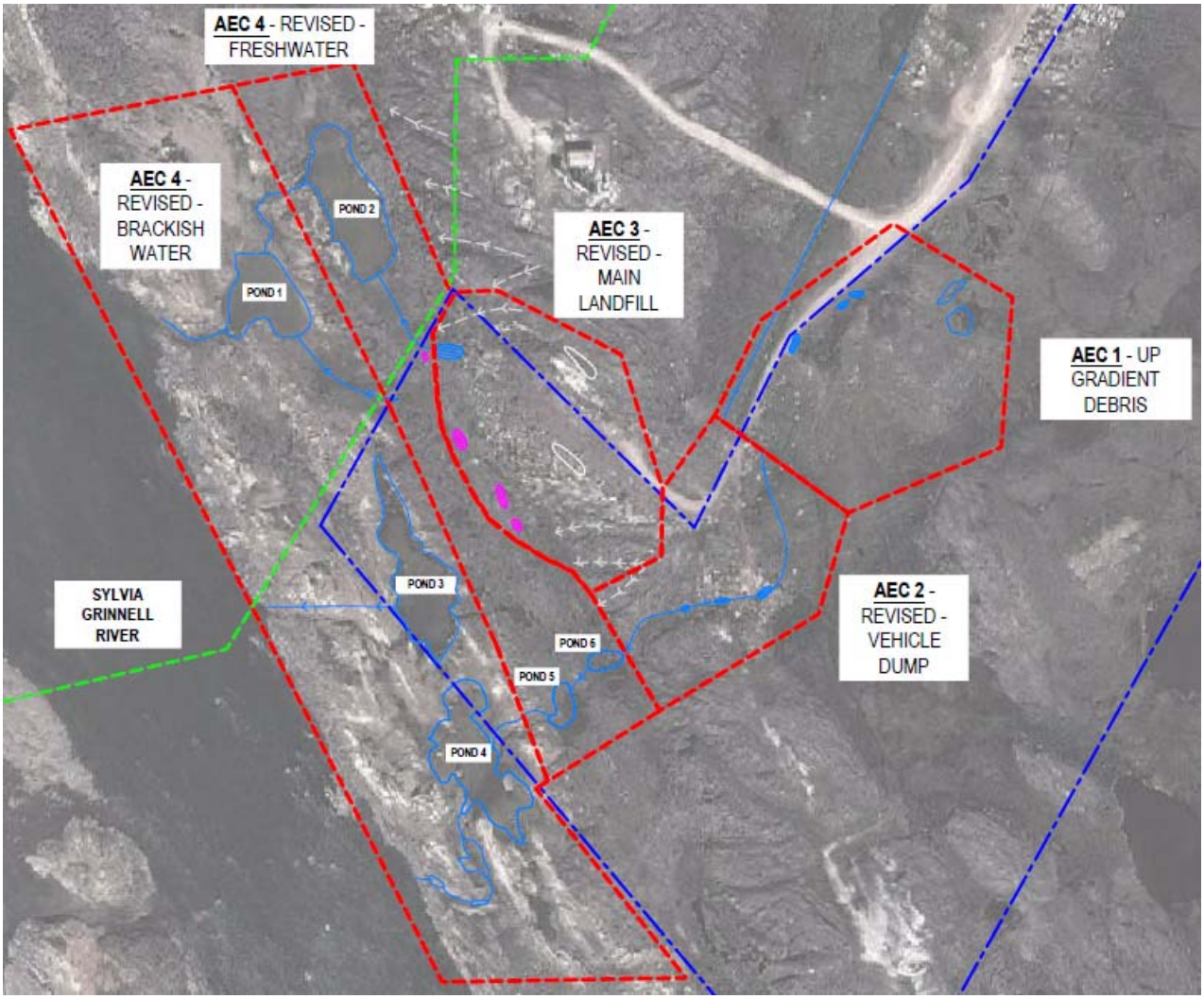
Federal groundwater EQG have been published by the CCME as well as under the Federal Contaminated Sites Action Plan (FCSAP); however, they were not used for comparison during the remedial work. Exposure to contaminated groundwater is considered not applicable to the site (i.e., groundwater exposure pathway non-operable) for the following reasons: 1) overland flow is the primary mode of water transport in the area, 2) groundwater associated with fractures in the bedrock and through the thin overburden would likely be minor, 3) groundwater is not used as a drinking water source in the area and 4) the site lies within the continuous permafrost zone (Franz, 2010c).

The site specific EQGs are summarized in Table 3-2 for the different sectors and AEC and also presented in Map 1.

**Table 3-2. Summary of Site Specific Environmental Quality Criteria**

| Sector | AEC | EQG |
|---|---|---|
| Upper | 1, 2, 3 | Commercial, Freshwater, Coarse grained soil |
| Lower – Eastern portion | 4 | Wildland, Freshwater, Coarse grained soil |
| Lower – Western portion | 4 | Wildland, Lowest of Marine or Freshwater, Coarse grained soil |

**Map 1: AEC Boundaries**



# 4 OBJECTIVES AND METHODOLOGY

## 4.1 Site Remedial Objectives

The objective of the environmental remediation at the Site was to mitigate human and ecological hazards related to the historical military and community land use. The human and ecological hazards related to The Site as defined in the RAP were either physical, chemical, or geotechnical in nature.

The site environmental conditions were evaluated in 2008, 2009 and 2016. The findings of the 2008 and 2009 investigations are detailed in the Phase III ESA (Franz, 2010c), with further 2016 data tabulated within the Remedial Action Plan (Arcadis, 2017). The Phase III ESA and RAP documents form the baseline information used in the preparation of the remediation specifications for this project.

### 4.1.1 Physical Hazards

During all investigative field programs, Franz/Arcadis completed site reconnaissance including waste inventory, drainage system analysis and visual assessment of the stability of the toe of the landfill.

A variety of non-hazardous waste debris types are found within the different areas/AECs. The major waste streams were rusted metallic debris, abandoned vehicles and parts, fuel drums, and domestic waste debris.

The majority of the waste was considered non-hazardous, however, lead-amended paint was identified on the painted vehicles in AEC 2/AEC 3. Hazardous wastes (e.g., asbestos, unknown liquids, batteries, and lead-amended paint) were also present throughout the site in small quantities.

A general summary of the most typical physical hazards identified on Site were:

- Metal debris;
- Vehicles;
- Wood;
- Drums;
- Domestic waste;
- Building materials;
- Cables; and
- Other various forms of landfill debris and waste.

To mitigate these physical hazards, debris was relocated to dedicated containment areas according to their waste stream. Debris selected for onsite disposal were sorted and directed to the landfill. Hazardous debris was consolidated, containerized and directed to the temporary staging area where it was prepared for recycling and/or for shipment south to applicable registered waste disposal sites.

### 4.1.2 Site Chemical Hazards

Based on historical investigations and the Remedial Action Plan, chemical hazards were identified at the site and are summarized in Table 4-1 below.

**Table 4-1: Summary of Chemical Hazards Identified at the Site**

| Area Identification | Impacted Media | Exceedances of EQG | Elevated Leachate Indicator | Impact Location | Degree of Impact |
|---|---|---|---|---|---|
| AEC 1 – Upgradient Buried Debris | Soil | Metals (copper); PHCs (F2, F3) | - | Two discrete areas | Significant |
| | Sediment | Metal (zinc), DDT, DDD, DDE | Metal (calcium) | Small pond and ditch at road near AEC 1 & AEC 2 | Not significant (small pond) to moderate (ditch roadside) |
| | Surface Water | Metals (aluminum, chromium (IV), copper, iron) | - | Small pond and ditch at road near AEC 1 & AEC 2 | Moderate |
| AEC 2 – Vehicle Dump | Soil | Metals (cadmium, copper); PHCs (F2, F3, F4) | - | Three discrete areas | Significant |
| | Sediment | Metals (arsenic, cadmium, chromium, copper, lead, zinc); DDT, DDD, DDE; PAHs; PCBs | PHCs (F2, F3, F4); Metals (calcium, iron) | Drainage features leading to pond 6 | Moderate to significant (degree of impact increases from north to south and present all across AEC 2) |
| | Surface Water | Metals (aluminum, cadmium, copper, iron, lead) | Metal (zinc) | Drainage features leading to pond 6 | Moderate to significant (degree of impact greatest at the height of vehicle debris) |
| AEC 3 – Main Landfill | Soil | Metals (zinc); 3 PAHs | - | Two discrete areas | Significant |
| | Sediment | - | - | - | None; no sediment observed |
| | Surface Water | Metals (aluminum, copper, iron, lead, zinc) | Metal (cadmium) | Water accumulation at toe of the landfill | Significant |
| AEC 4 – Downgradient and Off Site | Soil | - | - | - | - |
| | Sediment | Metals (cadmium, chromium, copper, lead, zinc), PCBs, PAHs, DDE, DDD | Metals (calcium, iron), PHCs (F1, F2, F3, F4) | Pond 2 to 6 | Not significant (pond 2, 4) to moderate (pond 3, 5) to significant (pond 6) |

| Area Identification | Impacted Media | Exceedances of EQG | Elevated Leachate Indicator | Impact Location | Degree of Impact |
|---|---|---|---|---|---|
| | Surface Water | Metals (boron, chromium (IV), copper, iron), pH, TCE | Metal (zinc), PCB | Pond 1 to 6 | Not significant (pond 1, 2, 3) to moderate (pond 4, 5, 6) |

### 4.1.3 Geotechnical Hazards and Slope Stability

Based on the geotechnical assessment of the main landfill southern slope (AEC 3), it was determined that the slope was at its maximum angle of repose and that the landfill posed a potential physical hazard. Remedial work consisting of slope grade reduction and buttressing the slope toe using engineered fill material was required to mitigate this hazard. An area of potentially unstable bedrock overhang requiring backfill was also identified once on site once backfill activities had commenced.

## 4.2 Methodologies

Site remediation activities were carried out in accordance with the 2017 INAC/PSPC Remediation Action Plan (RAP) and the PSPC construction specifications as per the PSPC contract #EW699-180040/001/NCS, File #NCS-7-40013, dated 2017-07-12. All site activities were conducted in compliance with all applicable permits and regulations. The methodologies employed by Arcadis to verify the execution of the work are outlined below.

### 4.2.1 Soil Sampling

All soil sampling was conducted via manual soil grab sampling procedures for both the excavation confirmation sampling and the stockpile soil characterization sampling.

Immediately after collection, soil samples were placed into appropriately labelled, laboratory supplied jars. Soil samples remained in a cooler with ice until they were submitted to the laboratory. The sampling equipment was decontaminated using Alconox and distilled water between sample locations. Disposable nitrile gloves were worn and replaced between each sample. Further details regarding soil sampling collection and procedures are provided in Section 8.

#### 4.2.1.1 Confirmatory Soil Sampling

All soil excavations for metals impacted soil and PHC impacted soil were excavated to depth ending at either bedrock or permafrost; therefore, no confirmatory floor samples were collected. Arcadis field personnel collected confirmatory wall samples at all soil excavations at a minimum rate of one wall sample per cardinal side. This sample frequency was deemed appropriate, as all soil excavations during this remediation were relatively small.

#### 4.2.1.2 Stockpile Characterization Sampling

PHC impacted soil and PHC/PCB impacted sediment excavated from the site was transported and stored in stockpiles within temporary work area one (TWA-1). Arcadis completed stock pile sampling of each soil stockpile (each pile not exceeding 10 $m^3$ maximum volume), by collecting five discrete grab samples and compositing these for submission to the contract laboratory. Therefore, one soil sample was collected and submitted for analysis from each soil stock pile.

#### 4.2.1.3 Temporary Work Area Characterization Sampling

Arcadis sampled the soils below Temporary Work Area One (TWA-1) both prior to commencing any work and after remedial activities in order to ensure that site activities did not negatively impact the work area. Manual test pits were advanced into the TWA-1 gravel pad using a shovel and soil samples collected by hand.

## 4.3 Remediation Summary Report

This Remediation Summary Report has been completed to provide the PSPC/TC with a summary of site activities related to the environmental site remediation program. Details regarding regulatory compliance, as outlined in the contract documents, along with site figures, photographs, data and tables are provided throughout this report and within the appropriate Appendices.

# 5 SITE INSPECTIONS

## 5.1 Site Visitors

Various visitors arrived at the site throughout the duration of the project. Official project visitors in the form of Arcadis senior personnel, Regulatory officers and Crown officials visited the site to conduct site inspections and monitor work progress. A summary of the official visits to the former Iqaluit Metal Dump and Community Landfill are provided in chronological order below.

- August 10th, 2017, Mr. Stephen Livingstone (Project Principal – Arcadis). On-site to inspect the site project progress to date;
- August 25th, 2017, Mr. Barry Cooke (Principal Engineer – Arcadis). On-site to inspect progress and geotechnical components of the landfill construction to ensure the project was progressing according to the design parameters;
- September 7th, 2017, Mr. Michael Brownlee (Project Manager – PSPC). On-site to inspect project progress to date and meet directly with contractor staff;
- September 14th, 2017, Mr. Justin Hack, Mr. John Mesher, and Mr. Jeremy Fraser (Environmental Compliance Officers – INAC). On-site to conduct a site inspection on behalf of the Nunavut Water Board and to discuss the progress of the Water License application and potential options to move forward with the sediment remediation in the potential absence of a license approval.
- October 4th, 2017, Ms. Jackie Barker, Ms. Anita Gudmundson (Transport Canada) and Mr. John Hawkins (Nunavut Airports). On-site to conduct a brief site tour and discuss options for limiting site access with Mr. Hawkins.
- October 5th, 2017, Ms. Jackie Barker, Ms. Anita Gudmundson (Transport Canada), and Mr. Michael Brownlee (PSPC). On-site to conduct the final site closure inspection.

# 6 REMEDIATION ACTIVITIES

## 6.1 Timeline

The on-site remedial program commenced in July 25th, 2017 with the mobilization of heavy equipment and supplies to site. The heavy equipment and supplies were mobilized by road and with flatbed trailers used to float equipment that could not be driven to site. Site remedial works were completed between the 25th July 25 and 13th October , 2017. Equipment demobilization occurred October 12th, 2017.

## 6.2 Remedial Activities

The remediation activities completed at Former Iqaluit Metal Dump and Community Landfill were itemized and defined within the Construction Specifications. Each remedial activity, along with Arcadis' original estimates of quantities as provided in the contract documents, as well as actual item quantities removed/hauled/remediated from the site are provided below in Table 6-1.

**Table 6-1: Estimated Quantities versus Actual Quantities**

| Basis of Payment Items [1] | Items of Work Description | Unit | Estimated Quantity[2] | Actual Quantity[3] | Estimated vs. Actual (%)[4] | Rationale for Change |
|---|---|---|---|---|---|---|
| **Division 02 Items** | | | | | | |
| 02 41 13-1 | **Move Non-Hazardous material/debris from AEC-1 and AEC-2** to an approved Temporary Work Area; Sort and Process; and transfer the processed materials to stockpiles(s) at the base of the Main Landfill | $m^3$ | 850 | 369 | 43% | Less material than estimated and highly efficient reduction in material size in the field. |
| 02 41 13-2 | **Move Non-Hazardous material/debris from AEC-3** to an approved Temporary Work Area; Sort and Process; and transfer the processed materials to stockpiles(s) at the base of the Main Landfill | $m^3$ | 1,650 | 1,044 | 63% | Less material than estimated and highly efficient reduction in material size in the field. |
| 02 61 00-1 | **Excavation Consolidation and Transportation of Hydrocarbon Contaminated Material (HCM)** to off-site facility | $m^3$ | 500 | 81 | 16% | Contamination was shallower and less pervasive than expected. |
| 02 61 00-2 | **Excavation and Transportation of Metal Contaminated Soil** to Main Landfill | $m^3$ | 300 | **372** | **124%** | **Impacted soil continued slightly deeper than anticipated.** |

| Basis of Payment Items [1] | Items of Work Description | Unit | Estimated Quantity[2] | Actual Quantity[3] | Estimated vs. Actual (%)[4] | Rationale for Change |
|---|---|---|---|---|---|---|
| 02 61 00-3 | **Excavation Consolidation and Transportation of PCB Contaminated Sediment** to the off-site Temporary Working area (HWPA) | $m^3$ | 100 | 42.02 | 42% | Less hazardous sediment than estimated. |
| 02 61 00-4 | **PCB Contaminated Sediment: Package, Transport and Dispose at** an appropriately licensed facility in southern Canada | $m^3$ | 100 | 42.02 | 42% | Less hazardous sediment than estimated. |
| 02 81 01-1 | **Hazardous Materials at AEC-1, AEC-2 and AEC-3: Collect, Move to and Sort at** the off-site Temporary Working Area (HWPA) | $m^3$ | 800 | 205.2 | 26% | Less hazardous material than estimated. |
| 02 81 01-2 | **Hazardous Wastes - Lead Amended Material: Package, Transport and Dispose at** an appropriately licensed facility in southern Canada | $m^3$ | 780 | 171 | 22% | Less hazardous material than estimated. |
| 02 81 01-3 | **Tires** | No. | 100 | **300** | **300%** | **Buried tires were not visible during initial assessments.** |
| 02 81 00-1 | **Batteries** | No. | 20 | 18 | 90% | |
| 02 81 00-2 | **Liquids – various** | litres | 2,000 | **6,120** | **306%** | **A drum was punctured during excavation and forced vacuum collection of impacted surface water.** |
| 02 81 00 -3 | **Other including equipment containing PCBs** | $m^3$ | 10 | 3.2 | 32% | This line item was intended as a contingency. |
| 02 82 00-4 | **Hazardous Wastes - Asbestos Containing Materials and Wastes:** collect, package, transport and dispose at an appropriately licensed facility in southern Canada | $m^3$ | 2 | 1 | 50% | Less hazardous material than estimated. |
| **Division 31 and 33 Items** | | | | | | |
| 31 05 16-1 | **Type 1 Aggregate materials -** fine gravel/sand supply and deliver to the Site | $m^3$ | 3,900 | 1,470 | 38% | Less non-hazardous waste than anticipated in zone 1 of the main landfill. |
| 31 05 16-2 | **Type 2 Aggregate materials** – coarse granular supply and deliver to the Site | $m^3$ | 30,000 | **36,226** | **121%** | **Field modifications and additional capping extent.** |

| Basis of Payment Items [1] | Items of Work Description | Unit | Estimated Quantity[2] | Actual Quantity[3] | Estimated vs. Actual (%)[4] | Rationale for Change |
|---|---|---|---|---|---|---|
| 31 05 16-3 | **Type 3 Aggregate materials** – Rip Rap - supply and deliver to the Site | $m^3$ | 5,900 | 4,156 | 70% | |
| 31 05 16-4 | **Type 4 Aggregate materials** - fine granular supply and deliver to the Site | $m^3$ | 1,700 | **2,185** | **129%** | **Field modifications and additional capping extent.** |
| 31 22 15-1 | **Provide Temporary Working Areas** – one located north of AEC-1 and one at the base of AEC-3 | $m^3$ | 1,800 | 900 | 50% | Field modifications and elimination of one temporary work area. |
| 31 22 15-2 | **Re-Shape and Regrade AEC-1 with Type 2 Aggregate - 300mm thick on average** | $m^2$ | 5,000 | **6,566.2** | **131%** | **Field fit – necessary modifications to extents.** |
| 31 22 15-3 | **Re-Shape and Regrade AEC-2 with Type 2 Aggregate - 300 mm thick in average** | $m^2$ | 2,500 | **4,999** | **200%** | **Field fit – necessary modifications to extents.** |
| 31 22 15-4 | **Move from a stockpile, place, compact all non-hazardous wastes and Type 1 granular material** in Zone | $m^3$ | 7,000 | 1,369 | 20% | Less non-hazardous waste than anticipated in zone 1 of the main landfill. |
| 31 23 33.01-1 | **Common Excavation - ditches/swales at AEC-3** | $m^3$ | 900 | 233 | 26% | Significantly less overburden than estimated. |
| 31 23 33.01-2 | **Rock Excavation - ditches/swales at AEC-3** | $m^3$ | 300 | 0 | 0% | Rock excavation was avoided by field modifications to the design. |
| 31 24 13-1 | **Stripping including grubbing beneath Road Embankment** - nominal volume indicated | $m^3$ | 650 | 0 | 0% | No significant plant growth – no grubbing required. |
| 31 24 13-2 | **Stripping including grubbing below Landfill Embankment** – nominal volume indicated | $m^3$ | 500 | 0 | 0% | no significant plant growth – no grubbing required. |
| 31 24 13-3 | **Common Excavation beneath Road Embankment –** nominal volume indicated | $m^3$ | 650 | 84 | 13% | Significantly less overburden than estimated. |
| 31 24 13-4 | **Common Excavation beneath Landfill Embankment** – nominal volume indicated | $m^3$ | 500 | 128 | 26% | Significantly less overburden than estimated. |
| 31 24 13-5 | **Rock Excavation beneath Road Embankment** - nominal volume indicated | $m^3$ | 200 | 0 | 0% | Rock excavation was avoided by field modifications to the design. |
| 31 24 13-6 | **Rock Excavation beneath Landfill Embankment** – nominal volume indicated | $m^3$ | 200 | 0 | 0% | Rock excavation was avoided by field modifications to the design. |
| 31 24 13-7 | **Place and Compact Type 2 Material in Main Access Road Embankment** | $m^3$ | 10,400 | 10,080 | 97% | |

| Basis of Payment Items [1] | Items of Work Description | Unit | Estimated Quantity[2] | Actual Quantity[3] | Estimated vs. Actual (%)[4] | Rationale for Change |
|---|---|---|---|---|---|---|
| 31 24 13-8 | **Place, Compact and Grade Type 2 Material in Zone 2 of Landfill Embankment** | $m^3$ | 24,200 | **29,877** | **123%** | **Increase of Type 2 material amount due to decrease of other material zones in landfill embankment, and overhang area requiring backfill.** |
| 31 24 13-9 | **Place and Compact and Grade Type 4 Material on Main Access Road surface** | $m^3$ | 1,000 | **1,321** | **132%** | **Field fit for road path, slight under estimation initially.** |
| 31 24 13-10 | **Place, Compact and Grade: 100mm Type 1 on 250mm Type 4 Material** on top surface of Landfill Embankment | $m^3$ | 990 | **1,096.9** | **111%** | **Field fit for road path.** |
| 31 32 19.01-1 | **Place Geotextile beneath rip rap in** drainage pathways within AEC-2 | $m^2$ | 1,100 | 450 | 41% | Lesser excavation extents than estimated. |
| 31 32 19.01-2 | **Place Geotextile beneath rip rap in** road ditches and landfill swales in AEC-3 | $m^2$ | 2,600 | 839 | 32% | Field modifications and elimination of some drainage swales that were not required. |
| 31 32 19.01-3 | **Place Geotextile on outer surface of Zone 2 in the landfill embankment beneath rip rap** including subgrade, forming anchor trench and securing geotextile in anchor trench | $m^2$ | 5,400 | 4,751 | 88% | |
| 31 37 00-1 | **Place Type 3 Aggregate Materials - Rip Rap i**n drainage pathways within AEC-2 | $m^3$ | 260 | 100 | 38% | Lesser excavation extents than estimated. |
| 31 37 00-2 | **Place Type 3 Aggregate Materials - Rip Rap i**n road ditches and swales within AEC-1 and AEC-3 | $m^3$ | 600 | 100 | 17% | Field modifications and elimination of some drainage swales that were not required. |
| 31 37 00-3 | **Place Type 3 Aggregate Materials - Rip Rap** on Landfill Embankment | $m^3$ | 5,100 | 3,973 | 78% | |
| 33 42 13 | **Supply and install a CSP pipe culvert** including bedding and backfill | m | 20 | 12 | 60% | Only one culvert section required instead of the estimated two. |

1. "Section" refers to the numerical identification in the contract Basis of Payment.
2. "Estimated Quantity" refers to Arcadis' initial quantity estimates, as presented in the contract Basis of Payment.
3. "Actual Quantity" refers to the volume that was removed, handled, remediated, provided etc. during remediation work.
4. "Estimated vs. Actual" refers to the percentage of actual versus estimated quantities.

**X** Quantity exceeded the initial estimate.

Details summarizing the efforts required to complete each remediation activity, as defined by the Construction Specifications, are presented below in the following sections. In addition, a photo diary of

remediation events was created to aid in the visualization of site activities. These reports are presented in Appendix C and were provided to PSPC/TC on a weekly basis during remedial activities.

## 6.3 Specification Division 02 – Existing Conditions

### 6.3.1 Item 02 41 13: Move Non-Hazardous material/debris from AEC-1 and AEC-2 and Move Non-Hazardous material/debris from AEC-3

All exposed non-hazardous waste was consolidated and removed from AEC-1 using a small CAT 305- SE rubber tracked mini excavator. All waste was placed into a small metal dumpster and transported to AEC-3 temporary work area using a Komatsu G5-10 loader. Debris was measured by the volume of the metal dumpster and confirming by measuring the debris pile once placed in AEC-3 prior to landfilling. In addition, smaller debris was collected manually using labourers and an all-terrain vehicle (ATV) equipped with a trailer. A total of 369 $m^3$ of material was moved from AEC-1 and AEC-2, which was 43% of the estimated 850 $m^3$. A total of 1044 $m^3$ of material was consolidated within AEC-3, which was 63% of the estimated 1650 $m^3$.

**Photograph 3: Collecting non-hazardous debris from AEC-1 using the mini-excavator and placing in portable dumpster for transport to AEC-3 for landfilling**

**Photograph 4: Manually collecting debris in AEC-1.**

**Photograph 5: Manually collecting debris in AEC-1.**

All exposed and buried non-hazardous debris was removed from AEC-2 using a Hitachi 350 LC excavator equipped with a hydraulic metal shear and an electromagnet, or the Komatsu PC 3000 LC (long arm) excavator. Non-hazardous debris from AEC-2 was loaded into a CAT A40F articulating rock truck and transported to the temporary work area in AEC-3. Most of the non-hazardous debris was processed in place within AEC-2 prior to loading into the rock truck for transportation; however, debris was typically further processed once in AEC-3 to meet specification size requirements for compaction and backfill prior to landfilling.

**Photograph 6: Sorting and processing debris in AEC-2.**

**Photograph 7: Loading debris from AEC-2 into the rock truck for transport to AEC-3.**

**Photograph 8: Un-loading inter non-hazardous debris from AEC-2 into the temporary work area in AEC-3 for further processing.**

All exposed and accessible non-hazardous debris from AEC-3 was collected from the sides, top, and toe of the main landfill using the Hitachi 350 LC excavator equipped with a hydraulic metal shear and an electromagnet and the Komatsu PC 3000 LC excavator. Debris was loaded into one of the two CAT A40F articulating rock trucks for transportation (top and sides of AEC-3) to the temporary work area at the toe of AEC-3. All non-hazardous debris located at the main toe of AEC-3 was consolidated and transported directly using either of the two excavators and placed in piles. The piles were then manually measured by both Kudlik and the DR to confirm quantities.

**Photograph 9: Processing and sorting waste at the toe of AEC-3 using the shear.**

**Photograph 10: The two excavators processing and sorting debris at the toe of AEC-3**

The processing and sorting of the hazardous material commenced in conjunction with the non-hazardous material in AEC-1, AEC-2, and AEC-3.

### 6.3.2 Item 02 61 00-1: Excavation Consolidation and Transportation of Hydrocarbon Contaminated Material (HCM) To an Off-Site Facility

Three areas of hydrocarbon contaminated materials were excavated during the site remediation at the former Iqaluit Metal Dump and Community Landfill. A total of 81 $m^3$ of HCM was removed to the off site facility for treatment, which was 16% of the estimated 500 $m^3$.

The first area of HCM material (HCM-1), located in AEC-2 beneath the location of access road A, was excavated on July 27, 2017 and temporarily stockpiled on top of AEC 3 prior to transportation to the HCM stockpile area in TWA-1. In TWA-1, all impacted soil was stockpiled on a 6 mil (minimum) polyethylene liner. This area of HCM material was excavated down to bedrock; therefore, no confirmatory soil sampling was required. The area was immediately backfilled with Type II material to progress the construction of Access Road A.

**Photograph 11: HCM excavation in AEC-2, excavated down to bedrock.**

**Photograph 12: Stockpiled HCM material from the HCM-1 excavation, temporarily stockpiled on top of AEC-3 prior to screening and transport to TWA-1 stockpile area.**

The second area of HCM material excavated (HCM-2) was located at the entrance of the site to the south of the site office in AEC-1. The area was excavated in two stages, with the first stage taking place on August 1, 2017. Debris was removed and stockpiled during this initial stage of excavation. The second stage of excavation took place on August 26, 2017. The excavation was advanced down to permafrost and therefore, no confirmatory floor sampling was required. The HCM material was screened in place and transported to TWA-1 in the rock trucks for characterization and processing. Any metal debris sorted out of the HCM soil were transported to AEC-3 for disposal using the rock truck.

**Photograph 13: Excavation of HCM-2 during the initial stages on August 01, 2017.**

**Photograph 14: Completion of the HCM-2 excavation on August 26, 2017 down to permafrost.**

**Photograph 15: Stockpiling HCM material in lined berms in TWA-1 for characterization and processing. HCM-1 on the right and HCM-2 being dumped in this photograph.**

The third and final HCM soil excavation was a small area along the eastern extent of AEC-1, which was excavated on August 31, 2017 using the CAT 305-SE mini rubber tracked excavator. The material was placed into a CAT A40F rock truck and transported to TWA-1 for characterization and processing. HCM-3 was also excavated down to permafrost and therefore, no floor samples were required. The DR collected confirmatory wall samples on September 13, 2017 prior to final backfilling.

**Photograph 16: Excavating the small HCM-3 excavation using the CAT 305-SE excavator.**

**Photograph 17: Showing the final HCM-3 excavation down to permafrost.**

### 6.3.3 Item 02 61 00-2: Excavation and Transportation of Metal Contaminated Soil to Main Landfill

Two areas of metal contaminated soil were removed during the remediation of former Iqaluit Metal Dump and Community Landfill. The first area was located in AEC-1 within the portion west of the temporary access road (METALS-1). The second area of metal impacted soil was located throughout AEC-2 (METALS-2). A total of 372 $m^3$ of metal impacted soil was removed, which was 124% of the estimated 300 $m^3$.

Excavation of the metal contaminated soil in AEC-1 commenced on August 27, 2017 using the Komatsu PC 3000 LC excavator and a CAT A40F rock truck. The area was excavated down to permafrost and impacted soil loaded into the rock truck. Any metal debris was sorted out and transported to either AEC-3 or TWA-1 based on its waste stream (i.e., hazardous versus non-hazardous).

**Photograph 18: Advancing the metal contaminated soil excavation in AEC-1.**

**Photograph 19: Dumping the metal contaminated soil from AEC-1 into the debris lifts within AEC-3.**

Excavation of the metal contaminated soil in AEC-2 took place on September 12, 2017. The excavation was completed using the Komatsu 3000 LC excavator and a CAT A40F rock truck. Excavated soil was loaded into the rock truck and incorporated into lifts within the main AEC-3 landfill. The excavation was advanced down to bedrock across the entire site and no sidewalls were present as the excavation tapered to bedrock contours; therefore, no confirmatory samples were required.

**Photograph 20: Working on the AEC-2 metal contaminated soil excavation.**

**Photograph 21: Dumping the metal contaminated soil from AEC-2 Zone 1 landfill lifts.**

**Photograph 22: showing the completed metal contaminated soil excavation in AEC-2. Excavated down to bedrock throughout.**

A total of 372 $m^3$ of metal contaminated soil was removed from AEC-1 and AEC-2 and placed and compacted into the main landfill, in Zone 1 of the landfill embankment during the remedial activities.

### 6.3.4 Item 02 61 00-3: Excavation Consolidation and Transportation of PCB Contaminated Sediment to the off-site Temporary Working area

The excavation and consolidation of the PCB contaminated sediment took place on September 26 and 27, 2017 using the small rubber tracked CAT 305-SE excavator. Sediments were loaded into the CAT A40F rock truck and transported to TWA-1 for characterization and determination of waste stream.

**Photograph 23: Commencing the sediment excavations in AEC-2.**

**Photograph 24: Sediment excavation advanced down to bedrock.**

**Photograph 25: Showing progress of sediment excavation down to bedrock along drainage pathway.**

**Photograph 26: Showing progress of sediment excavation down to bedrock along drainage pathway.**

Impacted sediment material was removed from AEC-2 and transported to TWA-1 for characterization. Upon completion of characterization, the sediments were placed into, 3.82 $m^3$ Quatrex bags (approved UN container) and shipped off-site. A total of 40.02 $m^3$ of impacted sediment was removed, which was 42% of the estimated 100 $m^3$.

### 6.3.5 Item 02 61 00-4: PCB Contaminated Sediment: Package, Transport and Disposal at an appropriately licensed facility in southern Canada

The impacted sediment was stored and stockpiled in TWA-1 and sampled by the DR on September 28th, 2017. Based on the results of the characterization sampling, roughly 42.02 $m^3$ of impacted sediment required transportation south for disposal. The sediment was bagged on October 7, 2017 and transported off site on October 12, 2017 for shipping south.

This was 42% of the estimated 100 $m^3$ of impacted material. There was a total of 11 soil bags filled, each containing 3.82 $m^3$ of impacted soil.

**Photograph 27: Showing sediment stockpiles**

**Photograph 28: Showing the bagged impacted sediment material ready for transportation south.**

### 6.3.6 Item 02 81 01-1: Hazardous Materials at AEC-1, AEC-2 and AEC-3: Collect, Move to and Sort at the off-site Temporary Working Area

As outlined in Section 6.3.1, hazardous material was excavated, transported, and segregated in conjunction with the non-hazardous material. All of the hazardous materials were collected and transported to TWA-1 for processing, quantification, and packaging. The total quantity transported was 205.2 $m^3$, which was 26% of the estimated 800 $m^3$.

### 6.3.7 Item 02 81 01-2: Hazardous Wastes - Lead Amended Material: Package, Transport and Dispose at an appropriately licensed facility in southern Canada

Material with lead-amended paint was collected, segregated and transported to TWA-1 for further processing. Once in TWA-1, this material was further reduced in size using the Hitachi 350 LC excavator and shear. The material was then packaged in sea cans for transportation south to an appropriate disposal facility. The volume of the lead amended metal material was measured based on the containers utilized for shipment south.

**Photograph 29: Showing the stockpiles of material with lead-amended paint stored in TWA-1.**

**Photograph 30: Stockpile material with lead-amended paint.**

**Photograph 31: Further processing the material with lead amended paint in TWA-1 using the Hitachi excavator and shear.**

**Photograph 32: Packaging the lead-amended material for transportation south.**

A total of 171 $m^3$ of lead-amended material was packaged for transportation and disposal south. This was 22% of the estimated 780 $m^3$ originally anticipated. Kudlik's onsite sorting, cutting and compression accounted for a significant volume decrease.

### 6.3.8 Item 02 81 01-3: Tires

During the collection and consolidation of the hazardous and non-hazardous material/debris within AEC-1, AEC-2, and AEC-3, a total of 300 tires were collected and consolidated in TWA-1 in preparation for transportation south for disposal. This was 300% of the initial estimate of 100 tires, with the majority of the increase coming from tires that were not visible (either partially buried or beneath other debris) during the initial assessments. A range of tires from automobile to heavy equipment sizes were found.

**Photograph 33: Collecting tires and transporting them to TWA-1.**

**Photograph 34: Tire stockpile in TWA-1.**

**Photograph 35: Tires in a sea can ready for transportation south.**

### 6.3.9 Item 02 81 00-1: Batteries

A total of 18 automotive or similar batteries were identified, collected and consolidated in TWA-1. The batteries were packaged and shipped south for disposal.

**Photograph 36: Batteries packaged and ready for transportation south.**

### 6.3.10 Item 02 81 00-2: Liquids Various

Various liquids were identified in drums during the remedial activities at former Iqaluit Metal Dump and Community Landfill. Any drums with liquid contents were transported to TWA-1 using a small loader equipped with a waterproof tub to contain any potential spillage. The drums were then drained of their contents and recovered liquids of like type were consolidated and transferred to new drums for transportation off-site to the Qikiqtuaaluk Environmental (Q.E.) facility located at 2027 Iqaluit Lane, Iqaluit, Nunavut for disposal.

**Photograph 37: The small loader and tub used to transport any drums containing potential contents up to the TWA-1 processing area.**

**Photograph 38: Showing the liquid contents processing area in TWA-1.**

**Photograph 39: Overview of the liquid processing area in TWA-1, showing the lined berm and empty drums.**

**Photograph 40: Full drums with liquid gathered from contents on site.**

In addition to the liquid contents identified in drums and containers on site during the remedial activities, some PHC impacted water was collected using a vacuum operated by Q.E. in the HCM-2 excavation located in AEC-1. During the excavation, a drum containing liquid contents believed to be hydraulic oil was punctured with the excavator causing it to empty into the excavation. These liquids were collected, along with impacted surface water, and transported to the Q.E. facility for disposal.

**Photograph 41: Vacuuming up the PHC impacts from the HCM-2 excavation in AEC-1.**

The total volume of liquids collected, processed, and disposed of was 6,120 litres. This totaled 306% of the initial estimate of 2,000 L.

### 6.3.11 Item 02 81 00-3: Other Including Equipment Containing PCBs

Some additional hazardous materials were identified, collected and packaged for disposal. These items included 29 fire extinguishers and their powder contents, two propane tanks, nine oxygen cylinders, and one oil solid (tar like) material. All of these items were transferred to the Q.E. facility for disposal. All of these items combined accounted for a total of 3.2 $m^3$ of material, which was 32% of the estimated 10 $m^3$.

**Photograph 42: Showing the propane cylinders, oxygen cylinders, and fire extinguishers.**

### 6.3.12 Item 02 82 00-4: Hazardous Wastes- Asbestos Containing Materials and Wastes: collect, package, transport and dispose at an appropriately licensed facility in southern Canada

A small quantity of asbestos material (mostly insulation and brake pads from old vehicles) was collected from the debris throughout the site during the remedial activities. A total of 1 $m^3$ of asbestos was collected, packaged and disposed of. This amounted to 50% of the initial 2 $m^3$ estimate.

## 6.4 Specification Division 31 - Earthwork

### 6.4.1 Item 31 05 16-1: Type 1 Aggregate materials - fine gravel/sand supply and deliver to the Site

Throughout the duration of the remedial activities at the former Iqaluit Metal Dump and Community Landfill a total of 1,470 $m^3$ of Type 1 aggregate material was transported and delivered to the site for use in landfill construction. This accounted for 38% of the estimated contracted value of 3,900 $m^3$. The majority of this decrease is accounted for by the reduced volume of metal debris found on site to be included in the landfill embankment.

The Type 1 material was a fine, well sorted aggregate, and its primary use was as backfill amid the metal debris in Zone 1 of the landfill embankment. Less metal debris than expected meant a smaller Zone 1, and less backfill (Type 1) required.

The Type 1 aggregate met the gradation requirements as outlined in the construction specifications Section 03 05 16 (Aggregate Materials), Part 2, Section 2.1.4.2. Gradation curves for the materials supplied are provided in Appendix F.

### 6.4.2 Item 31 05 16-2: Type 2 Aggregate materials – coarse granular supply and deliver to the Site

Throughout the duration of the remedial activities at the former Iqaluit Metal Dump and Community Landfill a total of 36,226 $m^3$ of Type 2 aggregate material was transported and delivered to the site for use in landfill construction, access roads, and capping material. This accounted for 121% of the estimated contracted value of 30,000 $m^3$.

The Type 2 material was a well-graded, coarse aggregate and was the most widely used material on site; in embankments, grading and capping on site. The primary reason for the increase is Type 2 volume was the reduction in Type 1 (the reduced volume of Zone 1 required a commensurate increase in Type 2 material to keep grades/embankment dimensions as per spec), and the issue of an overhanging bedrock section, which – for slope stability and safety concerns – was backfilled using Type 2 material. Capped areas in AEC 1 and 2 were also larger than expected.

The Type 2 aggregate met the gradation requirements as outlined in the construction specifications Section 03 05 16 (Aggregate Materials), Part 2, Section 2.1.5.4. Gradation curves for the materials supplied are provided in Appendix F.

### 6.4.3 Item 31 05 16-3: Type 3 Aggregate materials – Rip Rap - supply and deliver to the Site

Throughout the duration of the remedial activities at the former Iqaluit Metal Dump and Community Landfill a total of 4,156 $m^3$ of Type 3 aggregate material was transported and delivered to the site for use in landfill construction, access roads, and capping material. This accounted for 70% of the estimated contracted value of 5,900 $m^3$.

The Type 3 material was a well-sorted coarse, angular aggregate, used primarily as an armour stone on the main landfill embankment slopes and as erosion control in drainage swales. The elimination of some drainage swales and slight reduction in bench height of the main landfill embankment accounts for the reduction in volume required.

The Type 3 aggregate met the gradation requirements as outlined in the construction specifications Section 03 05 16 (Aggregate Materials), Part 2, Section 2.1.6.3. Gradation curves for the materials supplied are provided in Appendix F.

### 6.4.4 Item 31 05 16-4: Type 4 Aggregate materials - fine granular supply and deliver to the Site

Throughout the duration of the remedial activities at the former Iqaluit Metal Dump and Community Landfill a total of 2,185 $m^3$ of Type 2 aggregate material was transported and delivered to the site for use in landfill construction, access roads, and capping material. This accounted for 129% of the estimated contracted value of 1,700 $m^3$.

The Type 4 material was a well-graded, finer aggregate material, primarily used as a topcoat on access roads/embankments to allow the passage of smaller vehicles. Some field fits to the road path and embankment top areas enlarged the topcoat areas, and road reinstatement and regrading after heavy rains required a slight volume increase.

The Type 3 aggregate met the gradation requirements as outlined in the construction specifications Section 03 05 16 (Aggregate Materials), Part 2, Section 2.1.7.3. Gradation curves for the materials supplied are provided in Appendix F.

### 6.4.5 Item 31 22 15-1: Provide Temporary Working Areas – one located north of AEC-1 and one at the base of AEC-3

A temporary work area was created to the northeast of the site along the access road on a piece of land owned by the City of Iqaluit. Kudlik Construction utilized this land under a work permit obtained from the City of Iqaluit. TWA-1 consisted of a soil stock pile area in the northern portion, a liquid processing area in the central portion and a lead-amended painted material storage and processing area in the southern portion. The temporary work area was constructed by placing an approximately 200 mm thick layer of Type 2 material and compacting it to create a work pad. The liquid processing area and the soil stock pile area were lined with 12 mil waterproof polyethylene liners to prevent impacting the material beneath and surrounding the temporary work area.

A round of soil sampling was conducted by the DR prior to any work commencing at TWA-1 on August 10$^{th}$, 2017 to ensure that the site activities did not negatively impact the site. Upon completion of the work, another round of sampling was conducted on October 4$^{th}$, 2017. Results of this soil sampling are presented in Section 8.2.2 of this report.

A total area of 900 m$^2$ was prepared as temporary work areas, which accounted for 50% of the estimated 1800 m$^2$.

**Photograph 43: Showing the TWA-1 liquid processing pad.**

**Photograph 44: Showing another view of the liquid processing pad.**

**Photograph 45: Showing the western portion of the site where the lead-amended material was stockpiled and processed.**

### 6.4.6 Item 31 22 15-2: Re-Shape and Regrade AEC-1 with Type 2 Aggregate - 300mm thick on average

Upon removal of all the debris and excavation of the HCM and metal contaminated soils, AEC-1 was re-shaped and re-graded with Type 2 aggregate material to approximately 300 mm in thickness. A total of 6,566 $m^2$ of area was capped, which is 131% of the initial estimated, due primarily to field fit and encountering further debris outside the initially delineated areas.

**Photograph 46: Showing the final capping (Type 2 material) in AEC-1.**

### 6.4.7 Item 31 22 15-3: Re-Shape and Regrade AEC-2 with Type 2 Aggregate - 300 mm thick in average

After the removal of all the hazardous and non-hazardous debris, as well as the excavation of the metals impacted soil, starting September 23, 2017, AEC-2 was capped with approximately 300 mm of Type II aggregate cover. A total of 4,999 $m^2$ of area was capped, which was 200% of the initial estimated 2,500 $m^2$ contract value, again due to field fit for site grades and encountering debris further afield than originally expected.

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**Photograph 47: Showing AEC-2 post capping. View from the southeast, looking northwest.**

**Photograph 48: Showing AEC-2 after completion of the Type 2 aggregate cap. Looking to the east.**

### 6.4.8 Item 31 22 15-4: Move from a stockpile, place, compact all non-hazardous wastes and Type 1 granular material in Zone 1 of the Landfill Embankment

The placement and compaction of all non-hazardous material into AEC-3 Zone 1 commenced on August 16th, 2017 and was completed on September 5th, 2017. The dimensions of the Zone 1 area were field fit and was significantly reduced in size to accommodate bedrock outcroppings, better fit with the topography present on site, and take into account the lesser volume than expected of non-hazardous debris requiring relocation to this Zone. As a result of this lesser volume of non-hazardous debris, Zone 1 was significantly smaller in horizontal and vertical extent than originally designed; the final lift was completed at 12 m above sea level (asl), which was 1 m less than the original design of 13 m asl.

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**Photograph 49: Beginning material lifts in the main landfill face.**

**Photograph 50: Combining the non-hazardous waste with Type 1 aggregate in lifts.**

**Photograph 51: Compacting each lift after placement of 300 mm of Type 1 aggregate material.**

**Photograph 52: Building up the landfill embankment with Type 2 aggregate material as each Zone 1 material lift is added.**

A total of 1,369 $m^3$ of non-hazardous debris was consolidated, processed and added to the lifts within AEC-3 main landfill during the remedial activities at the site. This constituted 20% of the original estimate of 7000 $m^3$.

All work within the Zone 1 area was verified by the DR to be in accordance with the construction specifications in Section 31 22 15 (Grading), Part 3, Section 3.5.

### 6.4.9 Item 31 23 33.01-1: Common Excavation - ditches/swales at AEC-3

Minor quantities of common excavation were required during the remedial activities at the site. Common excavation, for this project, referred to the removal of inert soils to allow for a more stable foundation for the landfill cap. A total of 233 $m^3$ of material was removed as part of the common excavation. The initial contract value estimate was for 900 $m^3$ of material; therefore, the volume removed accounted for 26% of the initial estimate.

Most of the common excavation activities took place on August 20th, 2017, when some organic material was removed down to bedrock from the northwestern extent of the landfill toe. Some additional minor common excavation was also conducted between September 17 and September 20th, 2017 during the excavation of the AEC-3 drainage swales at the toe and top of the landfill.

**Photograph 53: Completing common excavation activities at the northwestern extent of the landfill toe.**

**Photograph 54: Completing common excavation on the AEC-3 upper drainage swales.**

**Photograph 55: Completing common excavation activities on the lower AEC-3 drainage swales.**

### 6.4.10 Item 31 23 33.01-2: Rock Excavation - ditches/swales at AEC-3

No rock excavation was required during the remedial activities at the former Iqaluit Metal Dump and Community Landfill. Slight layout modifications, as approved by the DR in the field, allowed for construction as per specifications without blasting bedrock outcrops in AEC-3.

### 6.4.11 Item 31 24 13-1: Stripping including grubbing beneath Road Embankment - nominal volume indicated

No stripping or grubbing beneath the road embankment was required during the remedial activities at the former Iqaluit Metal Dump and Community Landfill. There was no significant plant matter and little deleterious material encountered on site.

### 6.4.12 Item 31 24 13-2: Stripping including grubbing below Landfill Embankment – nominal volume indicated

No stripping and grubbing below the landfill embankment was required during the remedial activities at the former Iqaluit Metal Dump and Community Landfill. There was no significant plant matter and little deleterious material encountered on site.

### 6.4.13 Item 31 24 13-3: Common Excavation beneath Road Embankment – nominal volume indicated

A total of 84 $m^3$ of material was removed as part of stripping and grubbing activities below the road embankment during the remedial activities at the former Iqaluit Metal Dump and Community Landfill. This accounted for 13% of the estimated 650 $m^3$. Soils on site were found to be suitable for embankment founding; very little deleterious or organic material was found on site. For the most part, the founding surface was exposed bedrock.

### 6.4.14 Item 31 24 13-4: Common Excavation beneath Landfill Embankment – nominal volume indicated

A total of 128 $m^3$ of material was removed as part of common excavation activities below the northern extent of the landfill embankment during the remedial activities at the former Iqaluit Metal Dump and Community Landfill. This accounted for 26% of the estimated 500 $m^3$. Soils on site were found to be suitable for embankment founding; very little deleterious or organic material was found on site. For the most part, the founding surface was exposed bedrock.

### 6.4.15 Item 31 24 13-5: Rock Excavation beneath Road Embankment - nominal volume indicated

No rock excavation below the road embankment was required during the remedial activities at the former Iqaluit Metal Dump and Community Landfill. Slight modifications to the road path and elevation (on the order of 1m) as approved by the DR in the field allowed for construction as per spec without blasting bedrock outcrops.

### 6.4.16 Item 31 24 13-6: Rock Excavation beneath Landfill Embankment – nominal volume indicated

No rock excavation below the landfill embankment was required during the remedial activities at the former Iqaluit Metal Dump and Community Landfill. This was mainly added to the specifications as a due diligence requirement in case of complications with drainage paths.

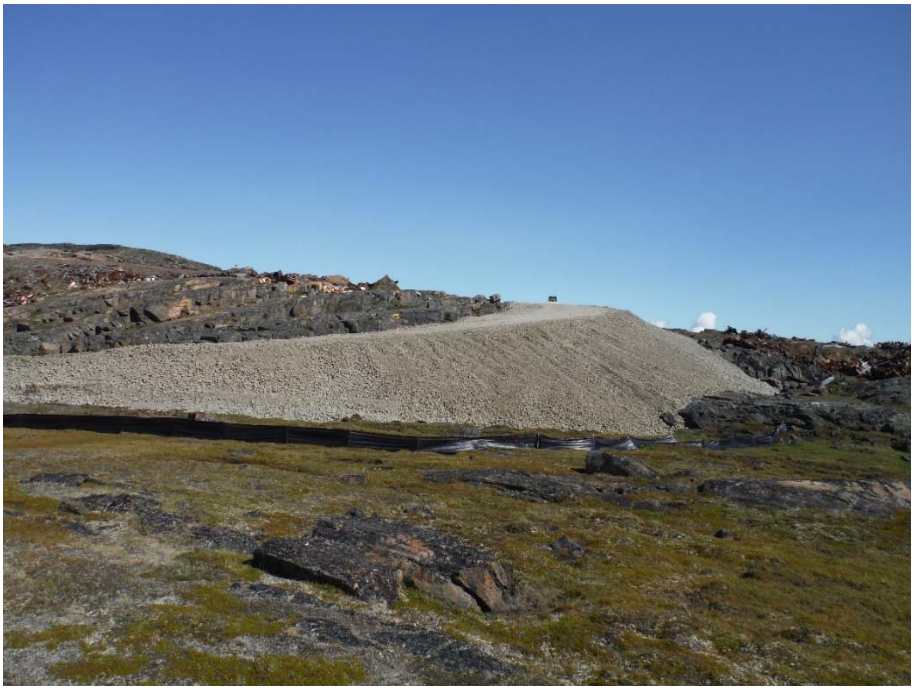
### 6.4.17 Item 31 24 13-7: Place and Compact Type 2 Material in Main Access Road Embankment

The placement and compaction of Type 2 aggregate material commenced on July 25, 2017. Over the duration of the contract, a total of 10,080 $m^3$ of Type 2 aggregate material was delivered and incorporated into the main Access Road A embankment. This accounted for 97% of the original estimate of 10,400 $m^3$.

**Photograph 56: One of the first truck-loads of Type 2 aggregate material delivered to the site on July 25th, 2017.**

**Photograph 57: Progress of Main Access Road A.**

**Photograph 58: Progress of Main Access Road A.**



**Photograph 59: Progress of Main Access Road A, nearing completion.**

As verified by the DR, all Type 2 aggregate was delivered, placed and compacted in accordance to the contract specifications Section 31 24 13 (Roadway and Landfill Embankments), Section 31 05 16 (Aggregate Materials), and Section 31 22 15 (Grading). Method compaction for the Type 2 material included track packing using the Komatsu D65ex Dozer followed by passes using the Dynapac 10-023 CA 2500 roller compactor, as well as continuous usage by haul trucks throughout the duration of construction activities.

### 6.4.18 Item 31 24 13-8: Place, Compact and Grade Type 2 Material in Zone 2 of Landfill Embankment

Placement, compaction and grading of the Type 2 material in Zone 2 of the main landfill embankment coincided with the construction of the Zone 1 area (See Section 6.4.8) and commenced on August 16, 2017 and was completed on September 26th, 2017. Over the duration of the contract, a total of 29,877 $m^3$ of Type 2 aggregate material was delivered, placed, compacted, and graded into the main landfill. This accounted for 123% of the initial estimate of 24,200 $m^3$. As stated in earlier sections, the reduction in Zone 1 volume and backfill of overhang sections accounts for this volume increase.

**Photograph 60: The level of Zone 2 (Type 2 material) was raised in conjunction with the Zone 1 construction.**

**Photograph 61: Continuing with Type 2 aggregate material placement, compaction and grading in 400 mm lifts.**

**Photograph 62: Continuing with Type 2 aggregate material placement, compaction and grading. Geotextile is visible between landfill embankment Zones 2 and 3.**

**Photograph 63: Continuing with Type 2 aggregate material placement, compaction and grading.**

**Photograph 64: Continuing with Type 2 aggregate material placement, compaction and grading.**

**Photograph 65: Adding the final Type 2 aggregate to the top of the main landfill.**

As verified by the DR, all Type 2 aggregate was delivered, placed and compacted in accordance to the contract specifications Section 31 24 13 (Roadway and Landfill Embankments), Section 31 05 16 (Aggregate Materials), and Section 31 22 15 (Grading). Method compaction for the Type 2 material included track packing using the Komatsu D65ex Dozer followed by passes using the Dynapac 10-023 CA 2500 roller compactor, as well as continuous usage by haul trucks throughout the duration of construction activities.

### 6.4.19 Item 31 24 13-9: Place and Compact and Grade Type 4 Material on Main Access Road surface

Delivery, placement, compaction and grading of the Type 4 material on the main Access Road A surface commenced on August 11, 2017 and the Road B surface on September 26th, 2017. Over the duration of the contract, a total of 1,321 $m^3$ of Type 4 aggregate material was delivered, placed, compacted, and graded into the main landfill. This accounted for 132% of the initial estimate of 1,000 $m^3$. Some field fits to the road path and embankment top areas enlarged the topcoat areas, and road reinstatement and regrading after heavy rains required a slight volume increase.

**Photograph 66: Placing and compacting Type 4 aggregate material on the main access road.**

**Photograph 67: Adding Type 4 aggregate material to the Road B surface.**

**Photograph 68: Adding Type 4 aggregate material to the Road B surface.**

As confirmed by the DR, placement, compaction and grading was completed by conducting multiple passes with the Dynapac 10-023 CA2500 roller compactor and was in compliance with the construction specifications Section 31 24 13 (Roadway and Landfill Embankments), Section 31 05 16 (Aggregate Materials), and Section 31 22 15 (Grading). Kudlik contracted EXP to conduct compaction testing on the Type 4 aggregate using a nuclear densometer (confirmed 98% SPMDD at all test locations), as requested by the DR. Results of these tests are provided in Appendix G.

### 6.4.20 Item 31 24 13-10: Place, Compact and Grade: 100mm Type 1 on 250mm Type 4 Material on top surface of Landfill Embankment

The supply, compaction and grading of the Type 1 material on the top surface of the landfill embankment was completed on October 3rd, 2017. A total of 1,097 $m^3$ of Type 1 aggregate material was delivered, placed, compacted, and graded into the top surface of the main landfill. This accounted for 111% of the initial estimate of 990 $m^3$.

**Photograph 69: Placing and compacting the final Type 1 cap on top of the landfill.**

**Photograph 70: Showing the final placement and compaction of the Type 1 aggregate on top of the landfill.**

As confirmed by the DR, placement, compaction and grading was completed by conducting multiple passes with the Dynapac 10-023 CA2500 roller compactor and was in compliance with the construction specifications Section 31 24 13 (Roadway and Landfill Embankments), Section 31 05 16 (Aggregate Materials), and Section 31 22 15 (Grading). Kudlik contracted exp Services Inc. (exp) to conduct compaction testing on the Type 1 using a nuclear densometer (confirming 98% SPMDD all test locations), as requested by the DR and results of these test are provided in Appendix G.

### 6.4.21 Item 31 32 19.01-1: Place Geotextile beneath rip rap in drainage pathways within AEC-2

Geotextile was placed beneath the Rip-rap in the main drainage pathway in AEC-2 on September 27, 2017 in accordance with construction specifications Section 31 32 19.01 (Geotextiles). A total of 450 $m^2$ of geotextile was installed, which accounted for 41% of the initial 1,100 $m^2$ estimate. Eliminating several unnecessary drainage swales accounts for the lesser area required.

**Photograph 71: Geotextile in drainage swale within AEC-2.**

### 6.4.22 Item 31 32 19.01-2: Place Geotextile beneath rip rap in road ditches and landfill swales in AEC-3

Geotextile was placed beneath the Rip-rap in road ditches and landfill swales in AEC-3 in accordance with construction specifications Section 31 32 19.01 (Geotextiles). A total of 839 $m^2$ of geotextile was installed, which accounted for 41% of the initial 2,600 $m^2$ estimate. Eliminating several unnecessary drainage swales accounts for the lesser area required.

**Photograph 72: Installing geotextile in the landfill swales at the bottom of AEC-3.**

**Photograph 73: Geotextile in the drainage swales on top of AEC-3.**

### 6.4.23 Item 31 32 19.01-3: Place Geotextile on outer surface of Zone 2 in the landfill embankment beneath rip rap

Geotextile was placed beneath the Rip-rap in road ditches and landfill swales in AEC-3 in accordance with construction specifications Section 31 32 19.01 (Geotextiles). A total of 4,751 $m^2$ of geotextile was installed, which accounted for 88% of the initial 5,400 $m^2$ estimate. As described in previous sections, the landfill embankment bench was finished at 12masl, 1m lower than the original design specification. This resulted in a smaller Zone 3, and less geotextile required.

**Photograph 74: Geotextile on the outer surface of Zone 2 beneath the rip-rap.**

**Photograph 75: Geotextile on the outer surface of Zone 2 beneath the rip-rap.**

**Photograph 76: Geotextile on the outer surface of Zone 2 beneath the rip-rap.**

### 6.4.24 Item 31 37 00-1: Place Type 3 Aggregate Materials - Rip Rap in drainage pathways within AEC-2

The supply and placement of Type 3 aggregate material (rip-rap) within the drainage pathway in AEC-2 was completed on September 28th, 2017. As confirmed by the DR, all work related to the supply and placement of the Type 3 aggregate material was conducted in accordance to the construction specifications Section 31 37 00. The total amount of Type 3 rip-rap placed in AEC-2 drainage was 100 m3, which accounted for 38% of the estimate of 260 $m^3$. As noted earlier, several proposed drainage pathways were able to be eliminated based on existing drainage, resulting in a volume reduction.

**Photograph 77: Type 3 (rip-rap) in the drainage within AEC-2.**

**Photograph 78: Type 3 (rip-rap) in the drainage within AEC-2.**

### 6.4.25 Item 31 37 00-2: Place Type 3 Aggregate Materials in road ditches and swales within AEC-3

The supply and placement of Type 3 aggregate material (rip-rap) within the drainage swales in AEC-3 was completed on September 20/21, 2017 for the lower drainage swale and September 28/29$^{th}$, 2017 for the upper drainage swale. As confirmed by the DR, all work related to the supply and placement of the Type 3 aggregate material was conducted in accordance to the construction specifications Section 31 37 00. The total amount of Type 3 rip-rap placed in AEC-2 drainage was 100 m$^3$, which accounted for 17% of the estimate of 600 m$^3$. Eliminating several unnecessary drainage swales accounts for the lesser area required.

**Photograph 79: Showing Type 3 (rip-rap) aggregate in the lower drainage swales in AEC-3.**

**Photograph 80: Showing Type 3 (rip-rap) aggregate in the lower drainage swales in AEC-3.**

**Photograph 81: Showing Type 3 (rip-rap) aggregate in the upper drainage swale in AEC-3.**

**Photograph 82: Showing Type 3 (rip-rap) aggregate in the upper drainage swale in AEC-3.**

**Photograph 83: Showing Type 3 (rip-rap) aggregate in the upper drainage swale in AEC-3.**

### 6.4.26 Item 31 37 00-3: Place Type 3 Aggregate Materials - Rip Rap on Landfill Embankment

The supply and placement of Type 3 aggregate material (rip-rap) on the landfill embankment in AEC-3 commenced on August 31, 2017. As confirmed by the DR, all work related to the supply and placement of the Type 3 aggregate material was conducted in accordance to the construction specifications Section 31 37 00. The total amount of Type 3 rip-rap placed in AEC-3 landfill embankment was 3,973 $m^3$, which accounted for 78% of the initial estimate of 5,100 $m^3$. As described in previous sections, the landfill embankment bench was finished at 12 masl, 1m lower than the original design specification. This resulted in a smaller Zone 3, and less geotextile required.

**Photograph 84: Placement of the Type 3 (rip-rap) aggregate on the landfill embankment.**

**Photograph 85: Placement of the Type 3 (rip-rap) aggregate on the landfill embankment.**

**Photograph 86: Placement of the Type 3 (rip-rap) aggregate on the landfill embankment completed.**

### 6.4.27 Item 33 42 13: Supply and install a CSP pipe culvert including bedding and backfill

A new CSP pipe culvert was supplied and installed on July 26, 2017. This new culvert was installed to replace an existing culvert that was observed to be in severe disrepair. The installation included the bedding and backfill as per the specifications. As confirmed by the DR, the culvert was installed in accordance to the construction specifications Section 33 42 13 (Culverts). Bedding and backfill was completed in accordance to Part 3, Section 3.4 and 3.7 respectively. Kudlik contracted EXP to complete compaction testing of the bedding and backfill (confirmed 98% SPMDD), the results of, which are provided in Appendix G.

**Photograph 87: Installing new culvert on compacted bedding as per specifications**

**Photograph 88: Backfilling the new culvert**

# 7 HAZARDOUS WASTE DISPOSAL

## 7.1 Off-Site Disposal of Hazardous Materials

As part of the remedial activities at the Former Iqaluit Metal Dump and Community Landfill, several streams of hazardous material waste streams were sorted, segregated, stockpiled and packaged including:

- Metal debris with lead amended paint;
- Tires;
- Batteries;
- Liquids (hydrocarbons, glycols, solvents, etc.);
- Asbestos Containing Materials;
- Hydrocarbon Contaminated Material (HCM);
- PCB/Metal Impacted Sediment; and
- Others (including fire extinguishers, propane canisters, and oxygen canisters).

The following Table 7-1 outlines the specification items and their associated receiving waste facility. Waste manifests, disposal certificates, and cargo receipts are provided in Appendix H.

**Table 7-1: Summary of Hazardous Material and Associated Receiving Waste Facility**

| Specification Item | Description | Status |
|---|---|---|
| 02 81 01 | **Hazardous Wastes - Lead Amended Material: Package, Transport and Dispose at** an appropriately licensed facility in southern Canada | Solva Rec Environment, 795 Rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada, J2X 5M3 |
| 02 81 01 | **Tires** | Lafarge Canada Inc. |
| 02 81 00 | **Batteries** | Qikiqtuaaluk Environmental (Q.E.) Environmental |
| 02 81 00 | **Liquids - various** | Currently stored at Qikiqtuaaluk Environmental (Q.E.) Environmental Waste Processing Facility (EWPF) in Iqaluit, NU. To be shipped south autumn 2018 for disposal in January 2019. |
| 02 81 00 | **Other including equipment containing PCBs** | Qikiqtuaaluk Environmental (Q.E.) Environmental |
| 02 82 00 | **Hazardous Wastes - Asbestos Containing Materials and Wastes:** collect, package, transport and dispose at an appropriately licensed facility in southern Canada | In progress – Final disposal facility T.B.D. end of January 2018 |
| 02 61 00 | **PCB Contaminated Sediment: Package, Transport and Dispose at** an appropriately licensed facility in southern Canada | Sol+, 10930 rue Sherbroke Est, Montreal-Est, Quebec, H1B 1B4, 450-649-7484 |

| Specification Item | Description | Status |
|---|---|---|
| 02 61 00 | **Excavation Consolidation and Transportation of Hydrocarbon Contaminated Material (HCM)** to off-site facility | On treatment pad at Q.E. in Iqaluit, NU to be treated in the Spring of 2018. |

T.B.D. – to be determined.

At the time of this writing, materials have not been received by the destination licenced facilities. Additional disposal manifests will be provided as an Addendum to this report once received (Appendix H).

## 7.2 Disposal of Hydrocarbon Contaminated Material (HCM)

Hydrocarbon contaminated material (HCM) was removed from TWA-1 and transported to the Qikiqtuaaluk Environmental (Q.E.) Environmental Waste Processing Facility (EWPF) in Iqaluit, NU located at 2027 Iqaluit Lane, Iqaluit, Nunavut, Canada. The HCM material will be treated with other like wastes in the land farm at this facility.

## 7.3 Off-site Sediment Disposal

Based on the analytical results (See Section 8.2.1.2), some of the sediment reported copper concentrations above the EQGs and required disposal in a properly licensed facility outside of Iqaluit. The sediments identified were placed into 3.82 $m^3$ Quatrex Bags and shipped off-site via sea lift. Proper disposal manifests will be provided as an Addendum to this report once received in early 2018 (Appendix H).

# 8 CONFIRMATORY SOIL SAMPLING AND SOIL/SEDIMENT CHARACTERIZATION

As part of the remedial activities at the former Iqaluit Metal Dump and Community Landfill, confirmatory sampling was required upon excavation of contaminated soils and sediments. All excavations were advanced to either bedrock or permafrost; therefore, no confirmatory floor sampling was required. Three of the soil excavations required confirmatory wall sampling.

In addition, all of the excavated material (with the exception to the metal impacted soils, which were directly incorporated into the landfill material lifts) were transported to the temporary work area 1 (TWA-1), stockpiled and characterized through soil sampling prior to disposal.

Original laboratory certificates of analysis for all samples analysed are provided in Appendix I.

## 8.1 Sample Methodologies

### 8.1.1 Solids

Solids, for the purpose of this project, refer to soil and sediment samples. Samples were collected from soil stockpiles or excavation walls manually using hand tools (shovel, trowel, or by gloved hand) which were decontaminated between locations using Alconox and distilled water. Field personnel used a new pair of Nitrile gloves for each sample station. Each solid sample was collected in either laboratory supplied 250 mL clear glass jars or, 125 mL clear glass jars, which were each filled with soil as to meet the instructions provided by the project laboratory. Samples collected for analysis of volatiles (i.e., VOCs and/or BTEX) were collected in two 40 mL clear glass vials with methanol for preservation.

All locations were photographed during sampling.

### 8.1.2 Sample Duplicates

Quality assurance/quality control (QA/QC) procedures were consistent with CALA regulations and guidelines. At least 10% of samples were taken and analyzed in duplicate and appropriate QA/QC data was generated. All samples were given sequential alphanumerical coding before submission to the analytical laboratories; this coding method was intended to mask any information concerning site location, sample type or possible concentrations in the samples.

Sampling procedures and laboratory analytical precision were evaluated by calculating the relative percent difference (RPD) for a sample and duplicate pair according the following equation:

$$RPD = | X_1 - X_2 | / X_{avg} \times 100$$

where: $x_1$ and $x_1$ are the duplicate concentrations and $x_{avg}$ is the mean of these two values.

The duplicate results were evaluated using criteria developed by Zeiner (1994), which draws from several data validation guidelines developed by the United States Environmental Protection Agency (USEPA).

According to these criteria, the RPD for duplicate samples should be less than 60% for solid samples. In addition, the newly developed CCME Guidance manual – PN1551; 2016 indicates the use of RPD values of less than 60% for soils. RPDs can only be calculated when the compound is detected in both the original and the duplicate sample at concentrations of five times above the reportable detection limit (or method detection limit - MDL), or greater. Alternative criteria are used to evaluate duplicate pairs where one or both of the results are less than five times the MDL, or where one or both of the results is less than the MDL (i.e. nd or 'not-detected'). The alternative criteria used for the evaluation of the data, adapted from Zeiner (1994), are presented in the table below. When both concentrations are less than the MDL, no calculation/ evaluation criterion is required.

**Table 8-1: Criteria for the Evaluation of Blind and Duplicate Sample Results**

| Scenario | Result A | Result B | Criteria for Acceptance | |
|---|---|---|---|---|
| | | | Aqueous (water) | Soil (Soil) |
| **A** | nd | nd | Acceptable precision; no evaluation required | |
| **B** | nd | positive | result B – 0.5 x MDL < MDL | result B – 0.5 x MDL < 2 x MDL |
| **C** | positive and > 5 x MDL | positive and > 5 x MDL | RPD < 40% (Zeiner) | RPD <60% (Zeiner) |
| **D** | positive and < or = 5 x MDL | positive | \|result B – result A\| < MDL[1] | \|result B – result A\| < 2 x MDL[1] |

Source(s):

Zeiner, S.T., Realistic Criteria for the Evaluation of Field Duplicate Sample Results, Proceedings of

Superfund XV, November 29-December 1, 1994, Sheraton Washington Hotel, Washington, D.C. – modified to use Method Detection Limit (MDL) or Reportable Detection Limit (RDL) in lieu of the Quantitation Limit (QL), the Instrument Detection Limit (IDL) and/or Laboratory Reporting Limit (LRL).

**Notes:**

nd – not detected

RPD – relative percent difference, |result A - result B| / |(result A + result B)/2|

1. When result reported are less than half the quantitation limit, half the limit will be used in the equation.

The precision is considered acceptable when the evaluation criteria are met or when both results are below the MDL. When the evaluation criteria are not satisfied, the following apply:

- nd vs. positive – unacceptable precision: the positive result is considered an estimate and the nd result is considered inconclusive.
- Positive vs. positive – unacceptable precision: the results are considered an estimate.

Results of the duplicate sampling are presented in Tables 1 through 23 in the tables section of this report. The duplicate samples follow the parent sample in the analytical tables.

## 8.2 Confirmatory Sampling Analytical Results

Arcadis conducted confirmatory sampling of sediments and soils excavated, as well as confirmatory sampling of excavations (where warranted and required) during the remedial activities at the site.

### 8.2.1 Stockpile Soil/Sediment Characterization

Soils and sediments removed from the remediation site were temporarily stock piled in the TWA-1 stockpile area. Arcadis conducted confirmatory sampling on the stockpiled material and submitted for chemical analysis for the contaminants of concern based on where the soil/sediment originated.

#### 8.2.1.1 Hydrocarbon Contaminated Material (HCM) Stock Piles

Hydrocarbon contaminated material was removed from two locations and stockpiled in the TWA-1 stockpile area. Confirmatory sampling was conducted by collecting five discreet grab samples from areas around each individual stock pile and combining them into one composite sample for each stockpile. The samples are presented in the following Table 8-2 and shown on Figure 4. Analytical results are presented on Tables 1 through 5 in the tables section of this report.

**Table 8-2: Summary of Hydrocarbon Contaminated Material (HCM) Stockpile Sampling.**

| Sample Identification | Date | Purpose | Analysis |
|---|---|---|---|
| **TWA1-SP1** | September 13, 2017 | Characterize Stockpile | PHC, PAH, Metals, VOCs, and PCBs |
| **TWA1-SP2** | September 13, 2017 | Prior to work | PHC, PAH, Metals, VOCs, and PCBs |
| **TWA1-SP3** | September 13, 2017 | Prior to work | PHC, PAH, Metals, VOCs, and PCBs |
| **TWA1-SP4** | September 13, 2017 | Prior to work | PHC, PAH, Metals, VOCs, and PCBs |
| **TWA1-SP5** | September 13, 2017 | Prior to work | PHC, PAH, Metals, VOCs, and PCBs |

Based on the results of the analysis, TWA1-SP2 (and DUP1) and TWA1-SP5 both had concentrations of phenanthrene above the selected EQGs. PHCs were detected in all of the stockpiles below the selected commercial EQG with the exception to an exceedance of PHC F2 in TWA1-SP3. PCBs and VOCs were below the selected commercial EQGs for all stockpiles.

Based on the low volumes excavated and the presence of sheen on the stockpiles, it was decided to send all stockpiled soils to the Q.E. land farm for treatment.

#### 8.2.1.2 Sediment Stockpiles

Excavated sediments were also removed from the remedial site in AEC 2 and placed within the TWA-1 soil stockpile area. Confirmatory sampling was conducted by collecting two composite samples from each stockpile (one on each side of the individual stockpiles). Each composite sample consisted of five discrete grab samples. The samples are presented in the following Table 8-3 and shown on Figure 4. Analytical results are presented on Tables 6 through 10 in the tables section of this report.

**Table 8-3: Summary of Sediment Stock Pile Sampling**

| Sample Identification | Date | Purpose | Analysis |
|---|---|---|---|
| **S01** | September 28, 2017 | Characterize Stockpile | PHC, PAH, Metals, VOCs, Pesticides, and PCBs |
| **S02** | September 28, 2017 | Characterize Stockpile | PHC, PAH, Metals, VOCs, Pesticides, and PCBs |
| **S03** | September 28, 2017 | Characterize Stockpile | PHC, PAH, Metals, VOCs, Pesticides, and PCBs |
| **S04** | September 28, 2017 | Characterize Stockpile | PHC, PAH, Metals, VOCs, Pesticides, and PCBs |
| **S05** | September 28, 2017 | Characterize Stockpile | PHC, PAH, Metals, VOCs, Pesticides, and PCBs |
| **S06** | September 28, 2017 | Characterize Stockpile | PHC, PAH, Metals, VOCs, Pesticides, and PCBs |
| **S07** | September 28, 2017 | Characterize Stockpile | PHC, PAH, Metals, VOCs, Pesticides, and PCBs |
| **S08** | September 28, 2017 | Characterize Stockpile | PHC, PAH, Metals, VOCs, Pesticides, and PCBs |

Based on the analytical results, all reported concentrations in sediment were either non-detect or below the selected EQGs for PHCs, Pesticides, PCBs, PAHs, and VOCs. The analytical results reported concentrations of the metal copper above the commercial EQG at S06 and S08. Due to the fact that the landfill was completed at the time of the sediment removal and sampling, these elevated levels of metals required disposal in southern Canada (See Section 7.3).

### 8.2.2 Temporary Work Area Sampling Results

Soil sampling was conducted on the pad of the temporary work area one (TWA-1) prior to commencement of any remediation activities and upon completion of site activities and de-mobilization of material and equipment from site, with the aim of ensuring activities did not negatively impact the work area. The samples are presented in the following Table 8-4 and shown on Figure 5. The post-work analysis was

selected based on the exceedances reported within the stockpiles and/or the materials handled in any given area (e.g., lead-amended paint processing area was analysed for metals only). Analytical results are presented on Tables 11 through 16 in the tables section of this report. Selected analytes are also presented below in Table 8-4.

**Table 8-4: Summary of Temporary Work Area Sampling**

| Sample Identification | Date | Purpose | Location | Analysis |
|---|---|---|---|---|
| **TWA1-2017-08-10** | August 10, 2017 | Prior to work | East | PHC, PAH, Metals, VOCs |
| **TWA2-2017-08-10** | August 10, 2017 | Prior to work | Center East | PHC, PAH, Metals, VOCs |
| **TWA3-2017-08-10** | August 10, 2017 | Prior to work | Center West | PHC, PAH, Metals, VOCs |
| **TWA4-2017-08-10** | August 10, 2017 | Prior to work | West | PHC, PAH, Metals, VOCs |
| **DUP-2017-08-10** | August 10, 2017 | Prior to work | Duplicate Sample | PHC, PAH, Metals, VOCs |
| **TWA5-20171004** | October 4, 2017 | Post Work | Below HCM stockpile Areas | PHC |
| **TWA6-20171004** | October 4, 2017 | Post Work | Below HCM stockpile Areas | PHC |
| **TWA7-20171004** | October 4, 2017 | Post Work | Below Liquid Processing Pad | PHC, PAH, Glycol |
| **TWA8** | October 10, 2017 | Post Work | Below Sediment Stockpile Area | PAH |
| **TWA9** | October 10, 2017 | Post Work | Below Sediment Stockpile Area | PAH |
| **TWA10** | October 10, 2017 | Post Work | Below Sediment Stockpile Area | Metals |
| **TWA11** | October 10, 2017 | Post Work | Below Sediment Stockpile Area | Metals |
| **TWA12** | October 10, 2017 | Post Work | Below Lead-mended Paint Processing Area | Metals |
| **TWA13** | October 10, 2017 | Post Work | Below Lead-mended Paint Processing Area | Metals |

During the initial round of pre-work soil sampling conducted on August 10, 2017, TWA2-20170810 reported ethylbenzene (0.17 mg/kg, which exceeded the EQG of 0.082 mg/kg) and arsenic (12 mg/kg, which equaled

the EQG of 12 mg/kg). Sample station TWA3-20170810 also exceeded the EQG of 91 mg/kg for copper with a concentration of 120 mg/kg.

No exceedances of the selected EQGs were detected during the post-work soil sampling conducted on October 4th and October 10th, 2017.

Based on the reported results of the sampling conducted both prior to any work in the TWA-1 area and upon completion of work and demobilization of site facilities and equipment, it was determined that activities completed as part of the remedial activities related to the former Iqaluit Metal Dump and Community Landfill did not impact the soil within the TWA-1 designated area.

### 8.2.3 Excavation Confirmatory Sampling

A total of five separate soil excavations were undertaken during the remedial activities in AEC 1 and AEC 2. Hydrocarbon contaminated material (HCM) was excavated and transported to TWA-1 for characterization and metals impacted soil was removed and incorporated into the landfill construction as material lifts.

In AEC 1, two areas of hydrocarbon contaminated material were excavated, while one area with metals impacted soil was removed. Two of the excavations in AEC 1 required confirmatory wall samples (EX02 and EX03), while one (EX01) was excavated to the maximum extents possible and no sampling was required. All excavations in AEC 1 were excavated to permafrost and therefore, no confirmatory floor sampling was required.

In AEC 2, two soil excavations (one HCM and one metals) were completed to the maximum extents possible and both extended down to bedrock and either did not require confirmatory sampling. Upon completion of the soil excavations in AEC 1, confirmatory sampling was conducted on the excavation walls of EX02 and EX03 to ensure the contaminated soil was fully removed prior to backfilling the excavations.

The confirmatory soil samples are presented in the following Table 8-5 and shown on Figure 6 and were analysed for either metals or petroleum hydrocarbons (PHCs) as outlined below. Analytical results are presented on Tables 17 and 18 in the tables section of this report.

**Table 8-5: Summary of Excavation Wall Soil Sampling**

| Sample Identification | Date | Purpose | Analysis |
|---|---|---|---|
| **AEC1-EX02-WALL1** | September 13, 2017 | Confirmatory Sample | Metals |
| **AEC1-EX02-WALL2** | September 13, 2017 | Confirmatory Sample | Metals |
| **AEC1-EX02-WALL3** | September 13, 2017 | Confirmatory Sample | Metals |
| **AEC1-EX02-WALL4** | September 13, 2017 | Confirmatory Sample | Metals |
| **AEC1-EX03-WALL1** | September 13, 2017 | Confirmatory Sample | PHC |
| **AEC1-EX03-WALL2** | September 13, 2017 | Confirmatory Sample | PHC |

| | | | |
|---|---|---|---|
| **AEC1-EX03-WALL3** | September 13, 2017 | Confirmatory Sample | PHC |
| **AEC1-EX03-WALL4** | September 13, 2017 | Confirmatory Sample | PHC |

All soil samples for both excavations reported concentrations of either PHCs or Metals at either non-detect concentrations or below the selected commercial EQGs. Both excavations were considered clean and were backfill accordingly using Type II granular material.

# 9 MATERIAL/LABOUR & VOLUME CONFIRMATION

The basis of payment for the contractor was material volumes. Payment rates, estimated quantities and actual quantities can be found in the contractual documents signed by Kudlik and PSPC, as well as in Section 6 Remedial Activities above. Project quantities were divided by waste stream and/or type, and a brief description of the project measurement methods are described below:

## 9.1 Aggregate Supply Volumes

Aggregate materials were manufactured and supplied from the Kudlik quarry in Iqaluit. Materials were tested and shown to meet the specified gradation curves prior to being imported to site. Materials were imported to site via dump truck along municipal roads.

Quantities were tracked initially by counting truckloads of each material type entering the site. Truck bed volumes are known, and a simple calculation using this value and the number of trucks accessing the site allowed for an accurate total volume measurement. Arcadis and Kudlik maintained daily truck transportation logs for material volumes brought to site; these material tracking logs have been provided in Appendix J. These initial volumes were verified by volumetric calculations made from pre-, mid and post-construction surveys. The as-built drawings are provided in Appendix K.

The material supply quantities reflect the total amount of each material type supplied to site; that is, the volume of Type 2 material listed here includes material used in the roadway embankment, main landfill, embankment, AEC-1 and -2 capping, etc.

**Table 9-1: Aggregate Supply Measurement Methods.**

| Spec Section | Material Description | Units | Measurement Method |
|---|---|---|---|
| 31 05 16-1 | Type 1 aggregate materials | $m^3$ | Total truckloads brought to site were tracked by Arcadis and Kudlik. Volumetric calculations made from pre-, during, and post-construction surveys were made to ensure exact volume amounts and cross-checked against the initial truck count measurements. |
| 31 05 16-2 | Type 2 aggregate materials | $m^3$ | Total truckloads brought to site were tracked by Arcadis and Kudlik. Volumetric calculations made from pre-, during, and post-construction surveys were made to ensure exact volume amounts and cross-checked against the initial truck count measurements. |
| 31 05 16-3 | Type 3 aggregate materials | $m^3$ | Total truckloads brought to site were tracked by Arcadis and Kudlik. Volumetric calculations made from pre-, during, and post-construction surveys were made to ensure exact volume amounts and cross-checked against the initial truck count measurements. |
| 31 05 16-4 | Type 4 aggregate materials | $m^3$ | Total truckloads brought to site were tracked by Arcadis and Kudlik. Volumetric calculations made from pre-, during, and post-construction surveys were made to ensure exact volume amounts and cross-checked against the initial truck count measurements. |

## 9.2 Constructed Earthworks Volumes

Earthworks constitute the constructed embankments/caps on site. Truck counts were used to obtain an initial estimate of quantities. These initial volumes were verified by volumetric calculations made from pre-, mid- and post- construction topographic surveys. The as-built drawings, based on the topographic information collected are provided in Appendix K.

Similar materials were used in different specified earthworks items, e.g. Type 3 material was used for both lining drainage swales and an armour stone cap on the lower portion of the main landfill embankment. One notable instance was the road embankment, which was later deconstructed with the material used to construct the upper reaches of the landfill embankment. For this reason, the total volume of Type 2 material listed in Aggregate Supply does not match the total volume of the earthworks that used Type 2 material. Some reference is provided in Kudlik's daily tracking logs provided in Appendix J, and the post-construction surveys were used to generate the as-built figures in Appendix K.

**Table 9-2: Earthworks Volume Measurement Methods.**

| Spec Section | Material Description | Units | Measurement Method |
|---|---|---|---|
| 31 22 15-1 | Provide temporary working areas | $m^3$ | TWA-1 was measured manually. |
| 31 22 15-2 | Reshape and regrade AEC-1 with Type 2 Aggregate | $m^3$ | Pre- and post construction surveys used to make volume calculations. |
| 31 22 15-3 | Reshape and regrade AEC-2 with Type 2 Aggregate | $m^3$ | Pre- and post construction surveys used to make volume calculations. |
| 31 22 15-4 | Non-hazardous wastes and Type 1 Aggregate in Zone 1 of the Landfill Embankment | $m^3$ | Truck counts of materials (metal debris and Type 1) verified by pre- and mid-construction surveys used to make volumetric calculations of Zone 1. |
| 31 24 13-7 | Type 2 Aggregate in Main Access Road Embankment | $m^3$ | Truck counts verified by pre- and mid-construction surveys used to make volumetric calculations of the road embankment. |
| 31 24 13-8 | Type 2 Aggregate in Zone 2 of landfill embankment | $m^3$ | Truck counts verified by pre-, mid-, and post-construction surveys used to make volumetric calculations of Zone 2 of the landfill embankment. |
| 31 24 13-9 | Type 4 Aggregate on main access road surface | $m^3$ | Truck counts verified by mid-construction survey to confirm area extent of road embankment. |

| Spec Section | Material Description | Units | Measurement Method |
|---|---|---|---|
| 31 24 13-10 | Type 1 Aggregate on top surface of landfill embankment | $m^3$ | Truck counts verified by post-construction survey to confirm area extent of Type 1 cap on landfill embankment. |
| 31 32 19.01-1 | Geotextile in drainage pathways within AEC-2 | $m^2$ | Post-construction survey of drainage pathway extents. |
| 31 32 19.01-2 | Geotextile beneath in road ditches, landfill swales in AEC-3 | $m^2$ | Post-construction survey of drainage pathway extents. |
| 31 32 19.01-3 | Geotextile on outer surface of Zone 2 in the landfill embankment beneath rip rap | $m^2$ | Mid-construction survey of Zone 2 of the landfill embankment. |
| 31 37 00-1 | Type 3 Aggregate in drainage pathways within AEC-2 | $m^3$ | Post-construction survey of drainage pathway extents. |
| 31 37 00-2 | Type 3 Aggregate in road ditches, swales within AEC-1 and AEC-3 | $m^3$ | Post-construction survey of drainage pathway extents. |
| 31 37 00-3 | Type 3 Aggregate on Landfill Embankment | $m^3$ | Post-construction survey of landfill embankment. |
| 33 42 13 | CSP pipe culvert including bedding and backfill | m | The culvert installation was a lump sum per 12m section. One section was used and measured manually on site. |

### 9.2.1 Compaction Control

Method compaction was used in all earthworks construction. This is standard practice for northern projects. Method compaction consisted of at least three passes with the Komatsu D65ex bulldozer, followed by another three passes with the Dynapac 10-023 CA 2500 roller compactor. Compaction was supervised and approved by the DR throughout construction. It should be noted that each area also saw constant construction traffic (fully loaded triaxial dump trucks), which greatly assisted compaction as well.

EXP was contracted by Kudlik to perform compaction verification testing with a Troxler nuclear density gauge. Material Types 2 and 3 were too coarse for nuclear density testing. Type 4 material compaction

was verified in the culvert bed and on roadway surfaces. In every instance, compaction was verified at 100% SPMDD. The results of nuclear density testing are included as Appendix G.

## 9.3 Labour Items

Labour items constitute the moving/reduction/excavation/compaction of materials on site. The contractual basis of payment for these items was volume, not hours. Arcadis tracked these items by counting the number of known truck volumes moved/used for each task. Most of these quantities were also tracked by Kudlik, and are part of the daily tracking logs provided in Appendix J.

**Table 9-3: Labour Items Summary**

| Spec Section | Material Description | Units | Measurement Method |
|---|---|---|---|
| 02 41 13-1 | Move Non-Hazardous material/debris from AEC-1 and AEC-2 to an approved Temporary Work Area; Sort and Process; and transfer the processed materials to stockpiles(s) at the base of the Main Landfill | $m^3$ | Truck counts verified by mid-construction surveys of Zone 1. |
| 02 41 13-2 | Move Non-Hazardous material/debris from AEC-3 to an approved Temporary Work Area; Sort and Process; and transfer the processed materials to stockpiles(s) at the base of the Main Landfill | $m^3$ | Truck counts verified by mid-construction surveys of Zone 1. |
| 02 81 01-1 | Hazardous Materials at AEC-1, AEC-2 and AEC-3: Collect, Move to and Sort at TWA-1 | $m^3$ | Truck counts and material measurements performed by Arcadis and Kudlik. |
| 02 61 00-2 | Excavation and Transportation of Metal Contaminated Soil to Main Landfill | $m^3$ | Truck counts verified by mid-construction surveys of Zone 1. |
| 31 23 33.01-2 | Rock Excavation - ditches/swales at AEC-3 | $m^3$ | No rock excavation was undertaken as part of this project. |
| 31 24 13-1 | Stripping including grubbing beneath road embankment | $m^3$ | No stripping and grubbing was necessary as part of this project. |
| 31 24 13-2 | Stripping including grubbing below landfill embankment | $m^3$ | No stripping and grubbing was necessary as part of this project. |
| 31 24 13-3 | Common Excavation beneath road embankment | $m^3$ | Truck counts by Arcadis and Kudlik. |
| 31 24 13-4 | Common Excavation beneath Landfill Embankment – nominal volume indicated | $m^3$ | Truck counts by Arcadis and Kudlik. |

| Spec Section | Material Description | Units | Measurement Method |
|---|---|---|---|
| 31 24 13-5 | Rock Excavation beneath Road Embankment - nominal volume indicated | $m^3$ | No rock excavation was undertaken as part of this project. |
| 31 24 13-6 | Rock Excavation beneath Landfill Embankment – nominal volume indicated | $m^3$ | No rock excavation was undertaken as part of this project. |

## 9.4 Hazardous Waste Volume Measurements

Measurement of hazardous waste quantities was performed upon final packaging and shipment of waste materials. Prior to final packaging, waste volumes were reduced by mechanical means where applicable (e.g. hydraulic shearing of metal debris into smaller pieces) and like types were combined where possible to reduce container numbers (e.g. fluid wastes). These hazardous wastes were tracked by Arcadis and Kudlik, and are part of the daily tracking logs provided in Appendix J. Final quantities were also verified by Q.E.

**Table 9-4: Hazardous Waste Volume Measurement Methods.**

| Spec Section | Material Description | Units | Measurement Method |
|---|---|---|---|
| *Hazardous Waste Debris* | | | |
| 02 81 01-2 | Lead amended material | $m^3$ | Material volume was reduced using the hydraulic shear, then stacked and compacted in sea can containers. The final volume of the sea cans filled constitutes this measurement. |
| 02 81 01-3 | Tires | per each | Tires were counted visually. |
| 02 81 00-1 | Batteries | per each | Batteries were counted visually. |
| 02 81 00-2 | Liquids - various | L | Like types of fluid wastes were consolidated and pumped into 205L drums. The final number of drums was visually counted and constitutes the final measurement. |
| 02 81 00 -3 | Other including equipment containing PCBs | $m^3$ | Material volume was measured manually after packaging in sea can container for shipping. |
| 02 82 00-4 | Asbestos containing materials and wastes | $m^3$ | Material volume was measured manually after packaging in sea can container for shipping. |
| *Hazardous Waste Soils/Sediments* | | | |

| Spec Section | Material Description | Units | Measurement Method |
|---|---|---|---|
| 02 61 00-1 | Excavation, Consolidation and Transportation of Hydrocarbon Contaminated Material off-site | $m^3$ | Verified by QE upon receipt at landfarm. |
| 02 61 00-3 | Excavation Consolidation and Transportation of PCB Contaminated Sediment to TWA-1 | $m^3$ | Measured once packaged in Quatrex bags (each bag contains 3.82$m^3$). |
| 02 61 00-4 | PCB Contaminated Sediment: Package, Transport and Dispose at an appropriately licensed facility | $m^3$ | Measured once packaged in Quatrex bags (each bag contains 3.82$m^3$). |

# 10 PERFORMANCE MONITORING

During the performance monitoring stage (i.e., during active remediation), each surface water monitoring station (Figure 3) was monitored on a weekly basis (minimum) for the field parameters of pH, temperature, conductivity, dissolved oxygen, and turbidity using a field calibrated multi-meter (Horiba U-52). In the event of work being conducted within 30 m of a water body, the monitoring frequency increased to three times per week minimum.

Upon approval of the Performance and Long-Term Monitoring Plan on September 25, 2017, Arcadis commenced additional chemical surface water monitoring at the site. Two rounds of surface water were collected as part of this monitoring on September 21, 2017 and October 3, 2017. Due to frozen conditions, the sampling station LTM-1 was not available for sampling during the October 3, 2017 monitoring event.

The results of the field chemistry and chemical monitoring are provided in Appendix L and Tables 19 through 23 (in the tables section) respectively. Results from performance monitoring will also be reported in the annual report in accordance with Part B, Item 1(c) of the NWB water licence.

## 10.1 Field Chemistry Monitoring – Surface Water

Field chemistry monitoring was implemented beginning on August 13, 2017 and continued through until September 15, 2017. After September 15, 2017 the chemical monitoring replaced the use of the in-situ field measurements. The main purpose of the filed chemistry monitoring was to determine if any of the site activities were negatively affecting the down-gradient receiving water bodies. Field chemistry results are presented in Appendix L.

### 10.1.1 Field Chemistry Monitoring Methodology

The field data was collected using a Horiba U-52 water quality multi-meter. The data was collected at pre-determined stations. The data was collected from the same location during each monitoring round. The data was collected by directly dipping the Horiba into the surface water body and allowing adequate time for all of the parameters to stabilize prior to data collection. Stabilization time varied from one location to another; however, was typically in the range of approximately 5 minutes +/-. The data was stored within the hand-held computer and transferred to a Microsoft Excel spreadsheet.

### 10.1.2 Field Chemistry Monitoring Results

Based on the results of the field chemistry monitoring, it was determined that no significant change in surface water quality was observed during the construction and remediation program. Therefore, it was deduced that the remedial activities conducted in and around these water bodies had no negative impact on those water bodies.

## 10.2 Chemical Monitoring – Surface Water

Two rounds of surface water were collected as part of the performance monitoring on September 21, 2017 and October 3, 2017. Due to frozen conditions, the sampling station LTM-1 was not available for sampling during the October 3, 2017 monitoring round.

During each sampling event, surface water samples were collected from the pre-established long-term monitoring stations (See Figure 3) and were analysed for metals, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyl's (PCBs), petroleum hydrocarbons (PHCs), and volatile organic compounds (VOCs). The analytical results are presented in Tables 20 through 23 in the tables section of this report.

### 10.2.1 Surface Water Chemical Monitoring Methodology

All surface water samples were collected by directly dipping the laboratory supplied containers into the surface water bodies. The containers were filled to the laboratory specified volume and the laboratory specified preservatives were used based on the analyte being tested. Samples were then stored in a cooler on ice and kept below 10 degrees Celsius. The samples were shipped under chain of custody to Maxxam Analytics in Ottawa, Ontario, for analysis.

### 10.2.2 Results and Discussion of Surface Water Chemical Monitoring

Based on the results of the surface water chemical monitoring, the analytical results reported concentrations for PAHs, PCBs, PHCs, Inorganics, and VOCs at either non-detect concentrations or below the selected EQGs.

The metal analyte iron was reported at concentrations above the selected EQG at LTM1, LTM3, LTM4, LTM5, LTM6, and LTM7 during both sampling rounds. In addition, the metal analyte zinc was also reported above the selected EQG at LTM3 (first round only) and LTM 7 (for both rounds).

The long-term monitoring stations were designed to roughly correspond with stations previously sampled during the environmental assessment stage of the project. The elevated concentrations of lead match the levels reported in historical sampling events in both 2008 and 2009 (Franz, 2010 & Arcadis 2017).

# 11 LONG-TERM MONITORING

After remediation work at the former Metal Dump and Community Landfill is completed, the only structure that remains at the site is the capped landfill and associated drainage swales.

The LTM Plan is to be implemented in accordance to the NWB water licence 1BR-MDR1721 and corresponding Performance and Long-Term Monitoring Program to monitor the long-term performance of site remediation efforts. Monitoring will include visual, water quality, sediment and natural environmental monitoring. Seepage and soil sampling will be completed as required, based on field observations and landfill performance.

As part of the project activities, a long-term monitoring program was developed and is attached in Appendix M. The following sections provide brief outlines of the activities to be included as part of the long-term monitoring at the site. Please refer to the full Long-Term Monitoring Plan for further details.

## 11.1 Post-Closure Monitoring Plan

Based on a review of other similar sites throughout Nunavut, with consideration given to INAC's Abandoned Military Site Remediation Protocol, AMSRP (2008), the following post-closure monitoring activities are to be conducted at the site:

- Visual Monitoring
- Seepage Monitoring
- Potential soil sampling (if seepage is observed)
- Surface Water Monitoring
- Sediment Sampling
- Natural Environmental Monitoring

The following sections discuss each of the monitoring components in more detail.

### 11.1.1 Visual Monitoring

#### 11.1.1.1 Rationale

Visual monitoring is valuable as it provides information on the condition of the isolation cover and associated berms, culverts and tidal zone. Observations shall be documented with photographs. Pre-determined photograph locations will be established in the first year of monitoring, and these will be used to monitor future changes.

#### 11.1.1.2 Monitoring Plan: Visual Monitoring

Regular visual inspections will be conducted to check the physical integrity of the isolation cover and look for evidence of erosion, frost action, animal burrows, vegetation, staining, seepage points, exposed debris, breeches in the cover, condition of monitoring instruments and condition of the warning signs. The tidal zone and tidal periphery should be included in the inspection as well.

Photographs will be taken to document the condition of the isolation cover and substantiate the recorded observations. Pre-determined photograph locations will be established in the first year of monitoring, and these will be used to monitor future changes. At minimum, photos should be taken from each of these locations during each monitoring event.

The physical integrity of the landfill is to be inspected and reported on. A record of all observations will be collected and will include dimensions and location of each feature and its extent using a DGPS unit and note of significant changes and direction. If ponded water is noted in and around the landfill structure (other than naturally occurring ponds), the depth of water will be recorded along with its horizontal extents. Detailed field sketches will be generated and will include a correlation to existing features, monuments and survey identifiers noted on as-built drawings.

A visual inspection checklist will be utilized to compare the magnitude/severity and extent of features over time. A Visual Inspection Checklist is available in Appendix C of the Long-Term Monitoring Plan (See Appendix M of this report).

The following site features will be inspected:

- The isolation cover surface;
    - Settlement
    - Erosion
    - Lateral Movement
    - Frost Action
    - Sloughing
    - Cracking
    - Animal Burrows
    - Vegetation Re-establishment
    - Vegetation Stress
    - Seepage points and/or Ponded Water
    - Debris and/or Exposed Geotextile
    - Features of Note/Other Relevant Observations (e.g., signs of activity, ruts, etc.)
- Access Roadway
- Culverts
- Down-gradient Ponds
    - Staining
    - Vegetation Stress

This visual inspection monitoring program will be a significant component of the LTM Plan.

### 11.1.2 Seepage Monitoring

#### 11.1.2.1 Rationale

Seepage (i.e. surface water seeping through the landfill isolation cover) may be observed at some point during the LTM Plan. Water that contacts unfrozen landfill waste may become acidic and contain elevated concentrations of metals. Seepage monitoring, in combination with visual inspections, will indicate whether long-term containment of the landfill waste is maintained or if corrective action may be required.

This seepage monitoring program will be a potential component of the LTM Plan, used in support of the observations made through the visual monitoring program.

#### 11.1.2.2 Monitoring Plan: Seepage Monitoring

Any potential observed areas of seepage on the surface and edges of the landfill isolation cover will be noted during the Visual Inspection. Seepage samples will be collected from these areas, where sufficient volume exists. These samples will be analysed and the results will be compared to baseline/background samples, as well as applicable CCME guidelines.

Water samples will be analyzed for:

- Petroleum Hydrocarbons (PHCs), F1 to F4 (including BTEX);
- Arsenic, Cadmium, Cobalt, Chromium, Lead, Nickel, and Zinc;
- Polychlorinated biphenyls (PCBs);
- Major ions, hardness, total dissolved solids, total suspended solids; and
- pH, conductivity and temperature.

In addition, soil may also be collected at any given potential seepage point if required.

### 11.1.3 Soil Sampling

#### 11.1.3.1 Rationale

Soil sampling would be conducted on an as needed basis in the event of observed seepage through, below, or around the landfill isolation cover. Soil sampling would provide information pertaining to the state of any observed seepage points, including chemical composition and concentrations.

This soil sampling program will be a potential component of the LTM Plan, used in support of the observations made through the visual monitoring and seepage monitoring programs.

#### 11.1.3.2 Monitoring Plan: Soil Sampling

Soil sampling would be conducted on an as needed basis in the event of observed seepage through, below, or around the landfill isolation cover. Soil sampling would be limited to areas where seepage or staining has been identified as part of the visual inspection. When required, soil samples will be collected over the intervals of 0 to 0.15 metres and 0.35 to 0.5 metres depth (where possible). The parameters that will be analysed will include:

- Petroleum Hydrocarbons (PHCs), F1 to F4 (including BTEX);
- Arsenic, Cadmium, Cobalt, Chromium, Lead, Nickel, and Zinc;
- Polychlorinated biphenyls (PCBs).

The results will be compared to baseline/background samples, as well as applicable CCME guidelines.

### 11.1.4 Surface Water Monitoring

#### 11.1.4.1 Rationale

The natural drainage around the study area is influenced by the bedrock structure and numerous small, elongated ponds that have formed along fault lines and joints. The ponds are shallow (approximately less than 0.5 m deep) and are poorly drained. Six ponds of varying sizes exist on site and were assigned numbers from 1 to 6 (Figure 3). Three of these ponds experience influx of brackish ocean during high tides (ponds 1, 3, and 4). The other three ponds are considered to be a freshwater environment (ponds 2, 5 and 6). Two of these ponds (ponds 5 and 6) appear to play a significant role in naturally attenuating sediment and surface water contaminants prior to discharge into the Sylvia Grinnell River.

Surface water monitoring will provide valuable information on the on-going state of the down-gradient surface water bodies. This plan would effectively provide an early warning system that could be implemented in association with a Contingency Plan and could provide the decision criteria for termination.

#### 11.1.4.2 Monitoring Plan: Surface Water Sampling

Surface water sampling will be conducted at pre-determined LTM sampling stations (see Figure 3) along the down-gradient drainage and pond system. These sample stations were selected to correspond with previous surface water sampling conducted on site in order to maintain consistency and have comparable concentrations.

Additional surface water samples may be warranted based on the results of the visual inspection and identification of any potential seepage points (see Section 11.1.1). These samples will be analysed and the results will be compared to baseline/background samples, as well as applicable CCME guidelines.

Surface water samples will be analysed for:

- Petroleum Hydrocarbons (PHCs), F1 to F4 (including BTEX);
- Arsenic, Cadmium, Cobalt, Chromium, Lead, Nickel, and Zinc;
- Polychlorinated biphenyls (PCBs);
- Major ions, hardness, total dissolved solids, total suspended solids; and
- pH, conductivity and temperature.

### 11.1.5 Sediment Sampling

#### 11.1.5.1 Rationale

As with surface water, the natural drainage around the study area is influenced by the bedrock structure and numerous small, elongated ponds that have formed along fault lines and joints. The ponds are shallow (approximately less than 0.5 m deep), and are poorly drained. Six ponds of varying sizes exist on site and were assigned numbers from 1 to 6 (Figure 3). Three of these ponds experience influx of brackish ocean water twice daily (ponds 1, 3, and 4). The other three ponds are considered to be under a freshwater environment (ponds 2, 5 and 6). Two of these ponds (ponds 5 and 6) appear to play a crucial role in naturally attenuating sediment and surface water contaminants prior to discharge into the Sylvia Grinnell River.

Similar to surface water monitoring, sediment monitoring will provide valuable information on the on-going state of surface water bodies located down-gradient of the former infrastructure and the landfill. This plan would effectively provide an early warning system that could be implemented in association with a Contingency Plan and could provide the decision criteria for termination.

#### 11.1.5.2 Monitoring Plan: Sediment Sampling

Sediment sampling will be conducted at pre-determined LTM monitoring sample stations (See Figure 3) along the down-gradient drainage and pond system and will correspond (i.e., twin) with the LTM surface water stations. These samples will be analysed and the results will be compared to baseline/background samples, as well as applicable CCME guidelines.

Sediment samples will be analysed for:

- Petroleum Hydrocarbons (PHCs), F1 to F4 (including BTEX);
- Arsenic, Cadmium, Cobalt, Chromium, Lead, Nickel, and Zinc; and
- Polychlorinated biphenyls (PCBs).

### 11.1.6 Natural Environmental Monitoring

#### 11.1.6.1 Rationale

Natural environment data will be collected as part of the LTM plan at the site. This will include observations of animal usage of the site (i.e., direct observation, tracks, scat, etc.) and discussions with locals knowledgeable with the site regarding site usage (i.e., fishing, hunting, gathering, etc.). This information may be helpful for future planning.

#### 11.1.6.2 Monitoring Plan: Natural Environment

Natural environment data will be collected during site visits as well as during community meetings with people who use or visit the site/area frequently. The purpose of collecting this data is to provide anecdotal information related to the presence of wildlife and changes over time.

The site-specific data to be collected will include:

- wildlife sightings (species, number, gender, juveniles);
- other evidence of recent presence of wildlife (droppings, tracks, feathers/fur, carcass remains, etc.);
- wildlife activity (summering/nesting/denning, migratory/passing through);
- qualitative assessment of relative numbers versus previous years (more, same, less); and
- revegetation of disturbed areas versus previous years (more, same, less).

Information regarding observations of the site by local people may also be collected through consultations with local community members. The type of information that may be collected includes:

- wildlife sightings;
- use by people for traditional activities;
- season(s);
- activities (hunting, fishing, trapping, camping, other harvesting);

- relative frequency versus previous years (more, same, less);
- wildlife species present (sightings or evidence);
- wildlife presence versus previous years (more, same, less);
- health of wildlife observed or harvested (good, average, poor); and
- relative health of wildlife versus previous years (better, same, worse).

## 11.2 Schedule

Based on other landfill sites throughout the arctic and upon review of INAC's Abandoned Military Site Remediation Protocol, AMSRP (2008), the following protocol for monitoring frequency will be implemented at the site (expressed in years after landfill completion):

- Phase I: Years 1, 3 and 5
- Contingency -Phase II: Years 7, 10, 15 and 25
- Contingency -Phase III: beyond 25

The monitoring program is to be stopped at the end of Phase I (5 years post remediation) after landfill completion (i.e., 2022) if the evaluation of the program confirms that there are no stability issues and that the landfill waste has been successfully encapsulated. Otherwise, monitoring will continue into phase II (i.e., up to 25 years post remediation). An evaluation will be conducted at the end of each monitoring event in phase II to determine if further monitoring is required and what level of effort is appropriate for phase III monitoring (if necessary).

The long-term monitoring at the site would begin in the summer of 2018. The Phase I monitoring activities would take place in 2018, 2020, and 2022. Each of the monitoring activities discussed above will be conducted during each of the three site monitoring events (i.e., visual inspection, surface water monitoring, sediment monitoring, and natural environment monitoring – with the possibility of seepage monitoring and/or soil monitoring on an as needed basis). A site monitoring event would be conducted once per highlighted calendar year between the dates of July 15$^{th}$ and September 1$^{st}$ to account for the maximum permafrost thaw conditions. An evaluation and review of the monitoring data will be conducted at the end of 2022 to confirm if additional monitoring would be required.

# 12 REMEDIAL SUMMARY

The remediation program at the former Iqaluit Metal Dump and Community Landfill was completed in accordance with the provisions outlined in the Remedial Action Plan (RAP) (Arcadis, 2017) and the remedial specifications (PSPC, 2017), as well as Contract No. EW699-180040/001/NCS, File No. NCS-7-40013, dated July 12, 2017. The project operated over the period of one summer/fall field season starting on July 25, 2017 and ending on October 13, 2017 with all site activities, including mobilization and de-mobilization taking place within that timeframe.

The remedial activities were conducted in accordance with the regulatory requirements as stipulated in the Nunavut Water Board (NWB) water license and all applicable regulations dictated by the Government of Nunavut.

The remediation program at the former Iqaluit Metal Dump and Community Landfill was successfully completed.

The results of soil analyses on samples procured from the former areas of metals and/or petroleum hydrocarbon impacts reported that the soil at the final limits of the earthworks meet the clean-up criteria as outlined in the specifications and applicable CCME guidelines. All non-hazardous material was consolidated and incorporated into Zone 1 of the main landfill as per the specifications. All hazardous material was containerized and transported off site in its entirety as of October 13, 2017. Areas within AEC 1 and AEC 2 were fully capped using Type 2 granular material. The main landfill, located the former AEC 3 was fully constructed as per the specifications. No remediation work remains to be completed on site. Before and after photographs were collected and are presented in Appendix N.

A final inspection was completed after all the debris material had been collected from the field. Upon completion of the second (of two) site tour the Crown accepted the site as fully remediated and that tasks outlined within the Project Specifications (with the exception of final off-site removal of the collected debris and metals impacted sediments at the time of inspection) had been successfully completed. The crown signed off on the contract certificate of completion provided by Kudlik signed on November 23, 2017 (See Appendix O).

## 12.1 The Way Forward

Based on the provisions outlined in the Performance and Long-Term Monitoring Plan (LTM), as part of the Nunavut Water Board (NWB) water licence number 1BR-MDR1721 issued July 31, 2017 and associated LTM approval letter dated September 25, 2017, long-term monitoring should be undertaken at the site annually to confirm that the risk management measures implemented as part of the remedial program remain stable and provides the level of protection to human and ecological receptors as modelled in the site specific risk assessment.

# 13 LIMITATIONS

This report has been prepared and the work referred to in this report has been undertaken by Arcadis Canada Inc. (Arcadis), for Public Services and Procurement Canada (PSPC) on behalf of Transport Canada (TC). It is intended for the sole and exclusive use of PSPC and TC, its affiliated companies and partners and their respective insurers, agents, employees and advisors (collectively, "Client"). Any use, reliance on or decision made by any other person other than Client based on this report is the sole responsibility of such other person. Client and Arcadis make no representation or warranty to any other person with regard to this report and the work referred to in this report and they accept no duty of care to any other person or any liability or responsibility whatsoever for any losses, expenses, damages, fines, penalties or other harm that may be suffered or incurred by any other person as a result of the use of, reliance on, any decision made, or any action taken based on this report or the work referred to in this report.

Third party information reviewed and used to compile the data and conclusions contained in this report is assumed to be complete and correct. Arcadis used this information in good faith and will not accept any responsibility for deficiencies, misinterpretation or incompleteness of the information contained in documents prepared by third parties.

The investigation undertaken by Arcadis with respect to this report and any conclusions or recommendations made in this report reflect Arcadis' judgment based on the site conditions observed at the time of the site inspection on the date(s) set out in this report and on information available at the time of preparation of this report. This report has been prepared for specific application to the site and it is based, in part, upon visual observation of the site, subsurface investigation at discrete locations and depths, and specific analysis of specific chemical parameters and materials during a specific time interval, all as described in this report. Unless otherwise stated, the findings cannot be extended to previous or future site conditions, portions of the site which were unavailable for direct investigation, subsurface locations which were not investigated directly, or chemical parameters, materials or analysis which were not addressed. Substances other than those addressed by the investigation described in this report may exist within the site, substances addressed by the investigation may exist in areas of the site not investigated and concentrations of substances addressed which are different than those reported may exist in areas other than the locations from which samples were taken. Notwithstanding these limitations, this report is believed to provide a reasonable representation of activities completed and site conditions as of the time of this investigation.

If site conditions or applicable standards change or if any additional information becomes available at a future date, modifications to the findings, conclusions and recommendations in this report may be necessary.

Other than by Client, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted without the express written permission of Arcadis. Nothing in this report is intended to constitute or provide a legal opinion.

# 14 REFERENCES

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# TABLES

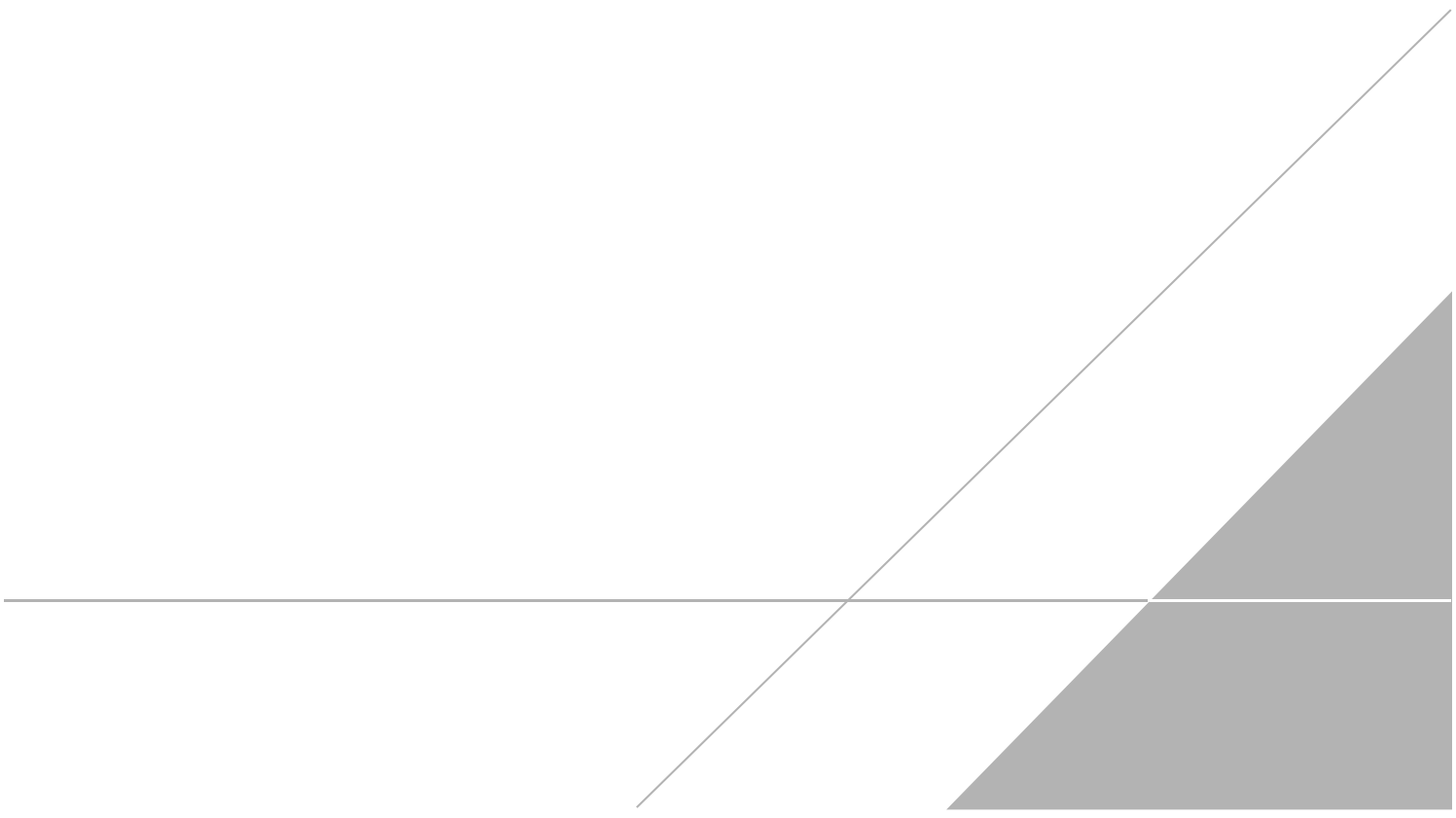

Table 1: Stockpile Metals and Organics
TC Iqaluit 102153-000
January 2017

| Area ID / Sample ID / Date | CCME Soil CL [1] | CCME Soil PL [2] | CCME AL [3] | TWA1 TWA1-SP1 13-Sep-17 | TWA1 DUP1 13-Sep-17 | RPD | TWA1 TWA1-SP2 13-Sep-17 | TWA1 TWA1-SP3 13-Sep-17 | TWA1 TWA1-SP4 13-Sep-17 | TWA1 TWA1-SP5 13-Sep-17 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Metals** | | | | | | | | | | |
| Hot Water Extractable Boron | - | - | - | 0.11 | 0.11 | 0% | 0.15 | 0.13 | 0.10 | 0.16 |
| Aluminum | - | - | - | - | - | nc | - | - | - | - |
| Antimony | 40 | 20 | 20 | 1.2 | 1.1 | 9% | 0.23 | <0.20 | 1.4 | 0.57 |
| Arsenic | 12[a] | 12[a] | 12 | 1.4 | 1.5 | 7% | 1.2 | <1.0 | 1.3 | 1.6 |
| Barium | 2000 | 500 | 750 | 49 | 50 | 2% | 40 | 32 | 47 | 47 |
| Beryllium | 8[a] | 4[a] | 4 | 0.26 | 0.24 | 8% | 0.21 | 0.24 | 0.27 | 0.28 |
| Boron | - | - | - | <5.0 | <5.0 | nc | <5.0 | <5.0 | <5.0 | <5.0 |
| Cadmium | 22 | 10 | 1.4 | 0.25 | 0.33 | 28% | <0.10 | 0.10 | <0.10 | 0.22 |
| Calcium | - | - | - | - | - | nc | - | - | - | - |
| Chromium | 87 | 64 | 64 | 26 | 27 | 4% | 24 | 24 | 24 | 26 |
| Chromium (VI) | 1.4 | 0.4 | 0.4 | <0.2 | <0.2 | nc | <0.2 | <0.2 | <0.2 | <0.2 |
| Cobalt | 300[a] | 50[a] | 40 | 6.7 | 6.4 | 5% | 5.3 | 5.2 | 5.5 | 6.5 |
| Copper | 91 | 63 | 63 | 15 | 14 | 7% | 9.6 | 10 | 11 | 13 |
| Iron | - | - | - | - | - | nc | - | - | - | - |
| Lead | 260 | 140 | 70 | ***77*** | ***72*** | 7% | 28 | 13 | 34 | 48 |
| Magnesium | - | - | - | - | - | nc | - | - | - | - |
| Manganese | - | - | - | - | - | nc | - | - | - | - |
| Mercury | 24 | 6.6 | 6.6 | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| Molybdenum | 40[a] | 10[a] | 5 | 1.3 | 1.2 | 8% | 1.1 | 0.75 | 1.3 | 1.4 |
| Nickel | 89 | 45 | 45 | 10 | 11 | 10% | 9.0 | 8.2 | 9.3 | 11 |
| Phosphorus | - | - | - | - | - | nc | - | - | - | - |
| Potassium | - | - | - | - | - | nc | - | - | - | - |
| Selenium | 2.9 | 1 | 1 | <0.50 | <0.50 | nc | <0.50 | <0.50 | <0.50 | <0.50 |
| Silver | 40[a] | 20[a] | 20 | <0.20 | <0.20 | nc | <0.20 | <0.20 | <0.20 | <0.20 |
| Sodium | - | - | - | - | - | nc | - | - | - | - |
| Strontium | - | - | - | - | - | nc | - | - | - | - |
| Thallium | 1 | 1 | 1 | 0.070 | 0.069 | 1% | 0.056 | <0.050 | 0.053 | 0.078 |
| Tin | 300 | 5 | 50 | - | - | nc | - | - | - | - |
| Uranium | - | - | - | 0.54 | 0.52 | 4% | 0.53 | 0.65 | 0.55 | 0.65 |
| Vanadium | 130 | 130 | 130 | 56 | 56 | 0% | 49 | 58 | 49 | 55 |
| Zinc | 360 | 200 | 200 | 130 | 140 | 7% | 56 | 54 | 82 | 130 |

All units in ug/g, unless otherwise noted.

**Notes:**

1 = CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Commercial/Industrial Land-use, course-grained soil
2 = CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Residential/Parkland Land-use, course-grained soil
3 = CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Agricultural Land-use, course-grained soil
***20 =*** RDL exceeds at least one SQG
20 = Denotes exceedance of CCME SQG for Commercial Land-use
-' = No Guideline/No Result
nc= not calculable

Table 2: Stockpile Polycyclic Aromatic Hydrocarbons (PAHs)
TC Iqaluit 102153-000
January 2017

| Area ID<br>Station ID<br>Date | CCME Soil CL [1] | CCME Soil PL [2] | CCME Soil AL [3] | Notes | MOE Table 9 | TWA1<br>TWA1-SP1<br>13-Sep-17 | TWA1<br>DUP1<br>13-Sep-17 | RPD | TWA1<br>TWA1-SP2<br>13-Sep-17 | TWA1<br>TWA1-SP3<br>13-Sep-17 | TWA1<br>TWA1-SP4<br>13-Sep-17 | TWA1<br>TWA1-SP5<br>13-Sep-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Polyaromatic Hydrocarbons** | | | | | | | | | | | | |
| Acenaphthene | 0.28 | 0.28 | 0.28 | b | 0.072 | <0.0050 | <0.0050 | 0% | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| Acenaphthylene | 320 | 320 | 320 | b | 0.093 | <0.0050 | <0.0050 | 0% | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| Anthracene | 32 | 2.5 | 2.5 | a | 0.22 | <0.0050 | 0.0065 | 0% | 0.021 | <0.0050 | <0.0050 | 0.030 |
| Benzo(a)anthracene | 10 | 1 | 0.10 | d | - | 0.0066 | 0.0088 | 29% | 0.014 | 0.0052 | <0.0050 | 0.031 |
| Benzo(a)pyrene | 72 | 20 | 20.00 | a | - | <0.0050 | <0.0050 | 0% | <0.0050 | <0.0050 | <0.0050 | 0.016 |
| Benzo(b)fluoranthene | --- | --- | --- | - | - | 0.0059 | 0.0084 | 35% | 0.010 | 0.0069 | <0.0050 | 0.018 |
| Benzo(g,h,i)perylene | --- | --- | --- | - | 0.68 | <0.0050 | <0.0050 | 0% | <0.0050 | <0.0050 | <0.0050 | 0.0067 |
| Benzo(k)fluoranthene | 10 | 1 | 0.10 | d | - | <0.0050 | <0.0050 | 0% | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| Chrysene | --- | --- | --- | - | 2.80 | 0.028 | 0.036 | 25% | 0.050 | 0.0080 | 0.0081 | 0.051 |
| Dibenz(a,h)anthracene | 10 | 1 | 0.10 | d | - | <0.0050 | <0.0050 | 0% | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| Fluoranthene | 180 | 50 | 50.00 | a | 0.69 | 0.018 | 0.022 | 20% | 0.032 | 0.015 | <0.0050 | 0.060 |
| Fluorene | 0.25 | 0.25 | 0.25 | b | 0.19 | <0.0050 | 0.018 | 0% | 0.025 | <0.0050 | <0.0050 | 0.010 |
| Indeno(1,2,3-cd)pyrene | 10 | 1 | 0.10 | d | - | <0.0050 | <0.0050 | 0% | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| 2-Methylnaphthalene | --- | --- | --- | - | 0.59 | <0.0050 | 0.0068 | 0% | 0.0074 | <0.020 (1) | <0.0050 | 0.010 |
| Naphthalene | 0.013 | 0.013 | 0.013 | b | 0.090 | <0.0050 | <0.0050 | 0% | <0.0050 | <0.030 (1) | <0.0050 | 0.0081 |
| Phenanthrene | 0.046 | 0.046 | 0.046 | b | 0.690 | 0.031 | **0.14** | 127% | **0.15** | 0.010 | <0.0050 | **0.17** |
| Pyrene | 100 | 10 | 0.10 | d | 1.00 | 0.014 | 0.021 | 40% | 0.023 | 0.020 | 0.0061 | 0.11 |
| Benzo(a)pyrene Total Potency Equivalents | 5.3 | 5.3 | 5.3 | - | - | - | - | nc | - | - | - | - |

All units in ug/g, unless otherwise noted.

**Notes:**

1 = CCME (2010), Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Polycyclic aromatic hydrocarbons (PAHs) Commercial/Industrial Land-use, course-grained soil
2 = CCME (2010), Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Polycyclic aromatic hydrocarbons (PAHs) Residential/Parkland use, course-grained soil
3 = CCME (2010), Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Polycyclic aromatic hydrocarbons (PAHs) Agricultural Land-use, course-grained soil
4 = Ontario Ministry of the Environment (MOE), 2011. Soil, Groundwater, and Sediment Standards for Use Under Part XV. 1 of the Environmental Protection Act (EPA); April 15, 2011. Table 9. Generic Site Condition Standards for Use within 30m of a Water Body in a Non-Potable Ground Water Condition
a = CCME $SQG_E$
b = CCME $SQG_E$ for protection of freshwater life. Also protective for soil and food ingestion residential.
c = CCME $SQG_E$ for soil and food ingestion only.
d = Interim Soil Quality Criteria
TPE - Benzo(a)pyrene Total Potency Equivalents, which is the sum of estimated cancer potency relative to B[a]P for all potentially carcinogenic unsubstituted PAHs. The B[a]P TPE for a soil sample is
20 = Denotes exceedance of CCME SQG for Commercial/Industrial Land-use
20 = Denotes exceedance of MOE Table 9
nc= not calculable

**Table 3: Stockpile Polychlorinated Biphenyls (PCBs)**
**TC Iqaluit 102153-000**
**January 2017**

| Area ID<br>Station ID<br>Date | CCME<br>Soil CL[1] | CCME<br>Soil PL[2] | CCME<br>Soil AL[3] | TWA1<br>TWA1-SP1<br>13-Sep-17 | TWA1<br>DUP1<br>13-Sep-17 | RPD | TWA1<br>TWA1-SP2<br>13-Sep-17 | TWA1<br>TWA1-SP3<br>13-Sep-17 | TWA1<br>TWA1-SP4<br>13-Sep-17 | TWA1<br>TWA1-SP5<br>13-Sep-17 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Pesticides & Herbicides** | | | | | | | | | | |
| Aroclor 1016 | - | - | - | - | - | nc | - | - | - | - |
| Aroclor 1221 | - | - | - | - | - | nc | - | - | - | - |
| Aroclor 1232 | - | - | - | - | - | nc | - | - | - | - |
| Aroclor 1242 | - | - | - | <0.010 | <0.010 | 0% | <0.010 | <0.010 | <0.010 | <0.010 |
| Aroclor 1248 | - | - | - | <0.010 | <0.010 | 0% | <0.010 | <0.010 | <0.010 | <0.010 |
| Aroclor 1254 | - | - | - | <0.010 | <0.010 | 0% | <0.010 | <0.010 | <0.010 | <0.010 |
| Aroclor 1260 | - | - | - | <0.010 | <0.010 | 0% | <0.010 | <0.010 | <0.010 | <0.010 |
| Aroclor 1262 | - | - | - | - | - | nc | - | - | - | - |
| Aroclor 1268 | - | - | - | - | - | nc | - | - | - | - |
| Polychlorinated biphenyls | 33 | 1.3 | 0.5 | <0.010 | <0.010 | 0% | <0.010 | <0.010 | <0.010 | <0.010 |

All units in ug/g, unless otherwise noted.

**Notes:**

1 = CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Commercial/Industrial Land-use, course-grained soil
2 = CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Residential/Parkland Land-use, course-grained soil
3 = CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Agricultural Land-use, course-grained soil
***20 =*** RDL exceeds at least one SQG
20 = Denotes exceedance of CCME SQG for Commercial Land-use
-' = No Guideline/No Result
nc= not calculable

Table 4: Stockpile Petroleum Hydrocarbons (PHCs)
TC Iqaluit 102153-000
January 2017

| Area ID / Station ID / Date | CCME Soil CL[1] | CCME Soil PL[2] | CCME Soil AL[3] | CWS Soil PL[3] | CWS Soil CL[4] | TWA1 TWA1-SP1 13-Sep-17 | TWA1 DUP1 13-Sep-17 | RPD | TWA1 TWA1-SP2 13-Sep-17 | TWA1 TWA1-SP3 13-Sep-17 | TWA1 TWA1-SP4 13-Sep-17 | TWA1 TWA1-SP5 13-Sep-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BTEX & F1 Hydrocarbons** | | | | | | | | | | | | |
| Moisture content | - | - | | - | - | - | - | - | - | - | - | - |
| Benzene | 0.03 | 0.03 | 0.03 | - | - | - | - | - | - | - | - | - |
| Ethylbenzene | 0.082 | 0.082 | 0.082 | - | - | - | - | - | - | - | - | - |
| Toluene | 0.37 | 0.37 | 0.4 | - | - | - | - | - | - | - | - | - |
| m+p-Xylene | - | - | | - | - | - | - | - | - | - | - | - |
| o-Xylene | - | - | | - | - | - | - | - | - | - | - | - |
| Xylenes (total) | 11 | 11 | 11 | - | - | - | - | - | - | - | - | - |
| F1 (C6-C10) | - | - | - | - | - | - | - | - | - | - | - | - |
| F1 (C6-C10) minus BTEX | - | - | - | 30 | 240 | <10 | <10 | 0% | <10 | <10 | <10 | <10 |
| F2 (C10-C16) | - | - | - | 150 | 260 | <10 | 12 | 0% | 14 | 760 | <10 | <10 |
| F3 (C16-C34) | - | - | - | 300 | 1700 | 860 | 1000 | 15% | 1300 | 1100 | 270 | 640 |
| F4 (C34-C50) | - | - | - | 2800 | 3300 | 280 | 340 | 19% | 230 | 650 | 88 | 200 |
| Reached Baseline at C50 | - | - | - | - | - | NO | Yes | nc | Yes | Yes | No | No |

All units in ug/g, unless otherwise noted.

**Notes:**

1 = CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Commercial/Industrial Land-use, course-grained soil
2 = CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Residential/Parkland Land-use, course-grained soil
3 = CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Agricultural Land-use, course-grained soil
4 = CCME (2008) Canadian-Wide Standards for Petroleum Hydrocarbons in Soil - Table 1, Tier 1 levels for PHCs, Residential / Parkland Use in coarse-grained surface soils.
5 = CCME (2008) Canadian-Wide Standards for Petroleum Hydrocarbons in Soil - Table 1, Tier 1 levels for PHCs, Commercial Use in coarse-grained surface soils.
***20 =*** RDL exceeds at least one SQG
20 = Denotes exceedance of CCME SQG for Commercial/Industrial land-use
20 = Denotes exceedance of CWS for Commercial/Industrial land-use
-' = No Guideline
nc= not calcuable

| Area ID<br>Station ID<br>Date | CCME Soil CL[1] | CCME Soil PL[2] | CCME Soil AL[3] | TWA1<br>TWA1-SP1<br>13-Sep-17 | TWA1<br>DUP1<br>13-Sep-17 | RPD | TWA1<br>TWA1-SP2<br>13-Sep-17 | TWA1<br>TWA1-SP3<br>13-Sep-17 | TWA1<br>TWA1-SP4<br>13-Sep-17 | TWA1<br>TWA1-SP5<br>13-Sep-17 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | |
| Acetone | - | - | - | <0.50 | <0.50 | nc | <0.50 | <0.50 | <0.50 | <0.50 |
| Benzene | 0.03 | 0.03 | 0.03 | <0.0060 | <0.0060 | nc | <0.0060 | <0.0060 | <0.0060 | <0.0060 |
| Bromodichloromethane | - | - | - | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| Bromoform | - | - | - | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| Bromomethane | - | - | - | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| Carbon tetrachloride | 50 | 5 | 0.1 | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| Chlorobenzene | 10[a] | 1[a] | 0.1 | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| Chlorodibromomethane | - | - | - | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| Chloroform | 50 | 5 | 0.1 | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| 1,2-Dichlorobenzene | 10[a] | 1[a] | 0.1 | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| 1,3-Dichlorobenzene | 10[a] | 1[a] | 0.1 | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| 1,4-Dichlorobenzene | 10[a] | 1[a] | 0.1 | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| 1,1-Dichloroethane | 50 | 5 | 0.1 | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| 1,2-Dichloroethane | 50 | 5 | 0.1 | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| 1,1-Dichloroethene | 50 | 5 | 0.1 | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| cis-1,2-Dichloroethene | 50 | 5 | 0.1 | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| trans-1,2-Dichloroethene | 50 | 5 | 0.1 | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| Dichloromethane | 50 | 5 | 0.1 | <0.050 | <0.050 | nc | <0.050 | **0.13** | 0.076 | <0.050 |
| 1,2-Dichloropropane | 50 | 5 | 0.1 | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| cis-1,3-Dichloropropene | - | - | 0.1 | <0.030 | <0.030 | nc | <0.030 | <0.030 | <0.030 | <0.030 |
| trans-1,3-Dichloropropene | - | - | 0.1 | <0.040 | <0.040 | nc | <0.040 | <0.040 | <0.040 | <0.040 |
| Ethylbenzene | 0.082 | 0.082 | 0.082 | <0.010 | <0.010 | nc | <0.010 | <0.010 | <0.010 | <0.010 |
| Ethylene dibromide | - | - | - | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| Hexachlorobenzene | 10 | 2 | 0.05 | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| Hexachlorobutadiene | - | - | - | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| Methyl ethyl ketone | - | - | - | <0.50 | <0.50 | nc | <0.50 | <0.50 | <0.50 | <0.50 |
| Methyl isobutyl ketone | - | - | - | <0.50 | <0.50 | nc | <0.50 | <0.50 | <0.50 | <0.50 |
| Methyl-tert-butylether | - | - | - | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| Styrene | 50[a] | 5[a] | 0.1 | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| 1,1,1,2-Tetrachloroethane | - | - | - | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| 1,1,2,2-Tetrachloroethane | 50 | 5 | 0.1 | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| Tetrachloroethene | 0.5 | 0.2 | 0.1 | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| Toluene | 0.37 | 0.37 | 0.37 | <0.020 | <0.020 | nc | <0.020 | <0.020 | <0.020 | <0.020 |
| 1,1,1-Trichloroethane | 50 | 5 | 0.1 | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| 1,1,2-Trichloroethane | 50 | 5 | 0.1 | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | <0.050 |
| Trichloroethene | 0.01 | 0.01 | 0.01 | <0.010 | <0.010 | nc | <0.010 | <0.010 | <0.010 | <0.010 |
| Vinyl chloride | - | - | - | <0.020 | <0.020 | nc | <0.020 | <0.020 | <0.020 | <0.020 |
| m+p-Xylene | - | - | - | <0.020 | <0.020 | nc | <0.020 | <0.020 | <0.020 | <0.020 |
| o-Xylene | - | - | - | <0.020 | <0.020 | nc | <0.020 | <0.020 | <0.020 | <0.020 |
| Xylenes (total) | 11 | 11 | 11 | <0.020 | <0.020 | nc | <0.020 | <0.020 | <0.020 | <0.020 |

All units in ug/g, unless otherwise noted.

**Notes:**

1 = CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Commercial/Industrial Land-use, course-grained soil
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3 = CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Agricultural Land-use, course-grained soil
***20 =*** RDL exceeds at least one SQG
20 = Denotes exceedance of CCME SQG for Commercial Land-use
-' = No Guideline
nc= not calcuable

| Sample ID<br>Description<br>Sampling Date | UNITS | MDL | CCME Soil CL[1] | CCME Soil PL[2] | CCME Soil AL[3] | S01<br>Sediment Stockpile<br>2017-09-28 10:00 | S02<br>Sediment Stockpile<br>2017-09-28 10:15 | S03<br>Sediment Stockpile<br>2017-09-28 10:30 | S04<br>Sediment Stockpile<br>2017-09-28 10:45 | S05<br>Sediment Stockpile<br>2017-09-28 11:00 | S06<br>Sediment Stockpile<br>2017-09-28 11:15 | S07<br>Sediment Stockpile<br>2017-09-28 11:30 | S08<br>Sediment Stockpile<br>2017-09-28 11:45 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metals** | | | | | | | | | | | | | |
| Antimony (Sb) | ug/g | 0.20 | 40 | 20 | 20 | 5 | 2.4 | 0.26 | <0.20 | 8.9 | 1.1 | 3.3 | 2 |
| Arsenic (As) | ug/g | 1.0 | 12[a] | 12[a] | 12 | 2.6 | 2.6 | 1.8 | 2.3 | 1.8 | 2.2 | 2.9 | 2.4 |
| Barium (Ba) | ug/g | 0.50 | 2000 | 500 | 750 | 58 | 56 | 59 | 41 | 50 | 47 | 87 | 51 |
| Beryllium (Be) | ug/g | 0.20 | 8[a] | 4[a] | 4 | 0.32 | 0.34 | 0.37 | 0.42 | 0.23 | 0.22 | 0.32 | 0.35 |
| Boron (B) | ug/g | 5.0 | | | | <5.0 | <5.0 | <5.0 | <5.0 | 6.6 | <5.0 | <5.0 | <5.0 |
| Cadmium (Cd) | ug/g | 0.10 | 22 | 10 | 1.4 | 2.7 | 3.7 | 0.5 | 0.2 | 4.7 | 0.85 | 3.7 | 2.4 |
| Chromium (Cr) | ug/g | 1.0 | 87 | 64 | 64 | 35 | 34 | 20 | 21 | 32 | 33 | 32 | 31 |
| Cobalt (Co) | ug/g | 0.10 | 300[a] | 50[a] | 40 | 11 | 11 | 17 | 13 | 6.4 | 6.5 | 17 | 10 |
| Copper (Cu) | ug/g | 0.50 | 91 | 63 | 63 | 73 | 50 | 13 | 8.3 | 62 | **260** | 36 | **440** |
| Lead (Pb) | ug/g | 1.0 | 260 | 140 | 70 | 110 | 110 | 18 | 6.1 | 170 | 72 | 110 | 100 |
| Molybdenum (Mo) | ug/g | 0.50 | 40[a] | 10[a] | 5 | 2.2 | 2.5 | 3.2 | 3.8 | 2.2 | 2.4 | 3 | 2.1 |
| Nickel (Ni) | ug/g | 0.50 | 89 | 45 | 45 | 13 | 14 | 8.8 | 6.7 | 13 | 11 | 18 | 12 |
| Selenium (Se) | ug/g | 0.50 | 2.9 | 1 | 1 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 |
| Silver (Ag) | ug/g | 0.20 | 40[a] | 20[a] | 20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.32 |
| Thallium (Tl) | ug/g | 0.050 | 1 | 1 | 1 | 0.057 | <0.050 | 0.055 | 0.062 | 0.066 | 0.055 | 0.08 | <0.050 |
| Uranium (U) | ug/g | 0.050 | 300 | 5 | 50 | 1.1 | 1 | 1.1 | 1.3 | 0.72 | 0.67 | 1.2 | 0.93 |
| Vanadium (V) | ug/g | 5.0 | 130 | 130 | 130 | 40 | 44 | 38 | 45 | 41 | 42 | 37 | 46 |
| Zinc (Zn) | ug/g | 5.0 | 360 | 200 | 200 | 160 | 180 | 120 | 100 | 150 | 110 | 200 | 140 |

**Notes:**

| | |
|---|---|
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| 2 = | CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Residential/Parkland Land-use, course-grained soil |
| 3 = | CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Agricultural Land-use, course-grained soil |
| ***20 =*** | RDL exceeds at least one SQG |
| 20 = | Denotes exceedance of CCME SQG for Commercial Land-use |
| -' = | No Guideline |

Table 7: Sediment Polycyclic Aromatic Hydrocarbons (PAHs)
TC Iqaluit 102153-000
January 2017

| Sample ID<br>Description<br>Sampling Date | UNITS | MDL | CCME Soil CL [1] | CCME Soil PL [2] | CCME Soil AL [3] | Notes | MOE Table 9 | S01<br>Sediment Stockpile<br>2017-09-28 10:00 | S02<br>Sediment Stockpile<br>2017-09-28 10:15 | S03<br>Sediment Stockpile<br>2017-09-28 10:30 | S04<br>Sediment Stockpile<br>2017-09-28 10:45 | S05<br>Sediment Stockpile<br>2017-09-28 11:00 | S06<br>Sediment Stockpile<br>2017-09-28 11:15 | S07<br>Sediment Stockpile<br>2017-09-28 11:30 | S08<br>Sediment Stockpile<br>2017-09-28 11:45 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Calculated Parameters** | | | | | | | | | | | | | | | |
| Methylnaphthalene, 2-(1-) | ug/g | 0.014 | | | | | | <0.014 | 0.021 | <0.014 | <0.014 | <0.014 | 0.035 | 0.015 | <0.014 |
| **Polyaromatic Hydrocarbons** | | | | | | | | | | | | | | | |
| Acenaphthene | ug/g | 0.005 | 0.28 | 0.28 | 0.28 | b | 0.072 | 0.0087 | **0.03** | <0.0050 | <0.0050 | <0.0050 | 0.018 | 0.01 | <0.0050 |
| Acenaphthylene | ug/g | 0.005 | 320 | 320 | 320 | b | 0.093 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| Anthracene | ug/g | 0.005 | 32 | 2.5 | 2.5 | a | 0.22 | 0.0099 | 0.035 | <0.0050 | <0.0050 | 0.0056 | 0.023 | 0.015 | <0.0050 |
| Benzo(a)anthracene | ug/g | 0.005 | 10 | 1 | 0.10 | d | - | 0.03 | 0.14 | <0.0050 | <0.0050 | 0.018 | 0.065 | 0.073 | 0.017 |
| Benzo(a)pyrene | ug/g | 0.005 | 72 | 20 | 20.00 | a | - | 0.028 | 0.13 | 0.0089 | <0.0050 | 0.023 | 0.075 | 0.063 | 0.018 |
| Benzo(b/j)fluoranthene | ug/g | 0.005 | --- | --- | --- | - | - | 0.038 | 0.18 | <0.0050 | <0.0050 | 0.033 | 0.093 | 0.1 | 0.029 |
| Benzo(g,h,i)perylene | ug/g | 0.005 | --- | --- | --- | - | 0.68 | 0.02 | 0.069 | 0.0064 | <0.0050 | 0.014 | 0.041 | 0.049 | 0.02 |
| Benzo(k)fluoranthene | ug/g | 0.005 | 10 | 1 | 0.10 | d | - | 0.011 | 0.063 | <0.0050 | <0.0050 | 0.01 | 0.031 | 0.036 | 0.0094 |
| Chrysene | ug/g | 0.005 | --- | --- | --- | - | 2.80 | 0.028 | 0.11 | <0.0050 | <0.0050 | 0.014 | 0.06 | 0.057 | 0.015 |
| Dibenz(a,h)anthracene | ug/g | 0.005 | 10 | 1 | 0.10 | d | - | <0.0050 | 0.02 | <0.0050 | <0.0050 | <0.0050 | 0.0083 | 0.028 | <0.0050 |
| Fluoranthene | ug/g | 0.005 | 180 | 50 | 50.00 | a | 0.69 | 0.077 | 0.25 | 0.0057 | <0.0050 | 0.033 | 0.14 | 0.11 | 0.027 |
| Fluorene | ug/g | 0.005 | 0.25 | 0.25 | 0.25 | b | 0.19 | 0.0093 | 0.03 | <0.0050 | <0.0050 | <0.0050 | 0.022 | 0.011 | <0.0050 |
| Indeno(1,2,3-cd)pyrene | ug/g | 0.005 | 10 | 1 | 0.10 | d | - | 0.022 | 0.085 | <0.0050 | <0.0050 | 0.014 | 0.048 | 0.061 | 0.017 |
| 1-Methylnaphthalene | ug/g | 0.005 | | | | | | <0.0050 | 0.008 | <0.0050 | <0.0050 | <0.0050 | 0.017 | 0.0067 | <0.0050 |
| 2-Methylnaphthalene | ug/g | 0.005 | --- | --- | --- | - | 0.59 | <0.0050 | 0.013 | <0.0050 | <0.0050 | <0.0050 | 0.018 | 0.0087 | <0.0050 |
| Naphthalene | ug/g | 0.005 | 0.013 | 0.013 | 0.013 | b | 0.090 | <0.0050 | **0.035** | <0.0050 | <0.0050 | 0.0056 | **0.017** | 0.011 | <0.0050 |
| Phenanthrene | ug/g | 0.005 | 0.046 | 0.046 | 0.046 | b | 0.690 | **0.058** | **0.14** | <0.0050 | <0.0050 | 0.024 | **0.096** | **0.065** | 0.017 |
| Pyrene | ug/g | 0.005 | 100 | 10 | 0.10 | d | 1.00 | 0.055 | 0.18 | <0.0050 | <0.0050 | 0.022 | 0.092 | 0.082 | 0.02 |

**Notes:**

| | |
|---|---|
| 1 = | CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Commercial/Industrial Land-use, course-grained soil |
| 2 = | CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Residential/Parkland Land-use, course-grained soil |
| 3 = | CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Agricultural Land-use, course-grained soil |
| a | CCME $SQG_E$ |
| b | CCME $SQG_E$ for protection of freshwater life. Also protective for soil and food ingestion residential. |
| c | CCME $SQG_E$ for soil and food ingestion only. |
| d | Interim Soil Quality Criteria |
| | TPE - Benzo(a)pyrene Total Potency Equivalents, which is the sum of estimated cancer potency relative to B[a]P for all potentially carcinogenic unsubstituted PAHs. The B[a]P TPE for a soil sample is calculated by multiplying the concentration of each PAH in the sample by its B[a]P Potency Equivalence Factor (PEF), and summing the products. PEFs are as follows: Benzo(a)anthracene, 0.1; benzo(a)pyrene, 1; benzo(b+j+k)fluoranthene, 0.1; benzo(g,h,i)perylene, 0.01; chrysene, 0.01; dibenzo(a,h)anthracene, 1; ideno(1,2,3-c,d)pyrene, 0.1. |
| ***20 =*** | RDL exceeds at least one SQG |
| 20 = | Denotes exceedance of CCME SQG for Commercial Land-use |
| -' = | No Guideline |

Table 8: Sediment Pesticides and Polychlorinated Biphenols (PCBs)
TC Iqaluit 102153-000
January 2017

| Sample ID<br>Description<br>Sampling Date | UNITS | MDL | CCME Soil CL [1] | CCME Soil PL [2] | CCME Soil AL [3] | S01<br>Sediment Stockpile<br>2017-09-28 10:00 | S02<br>Sediment Stockpile<br>2017-09-28 10:15 | S03<br>Sediment Stockpile<br>2017-09-28 10:30 | S04<br>Sediment Stockpile<br>2017-09-28 10:45 | S05<br>Sediment Stockpile<br>2017-09-28 11:00 | S06<br>Sediment Stockpile<br>2017-09-28 11:15 | S07<br>Sediment Stockpile<br>2017-09-28 11:30 | S08<br>Sediment Stockpile<br>2017-09-28 11:45 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Calculated Parameters** | | | | | | | | | | | | | |
| Chlordane (Total) | ug/g | 0.01 | - | - | - | <0.010 | <0.010 | <0.010 | <0.010 | <0.15 | <0.040 | <0.030 | <0.010 |
| o,p-DDD + p,p-DDD | ug/g | 0.01 | - | - | - | <0.010 | <0.010 | <0.010 | <0.010 | <0.20 | <0.045 | <0.030 | <0.010 |
| o,p-DDE + p,p-DDE | ug/g | 0.01 | - | - | - | <0.010 | <0.010 | <0.010 | <0.010 | <0.15 | <0.040 | <0.030 | <0.010 |
| o,p-DDT + p,p-DDT | ug/g | 0.01 | 0.7 | 0.7 | 12 | 0.077 | 0.098 | 0.02 | 0.014 | 0.68 | <0.22 | 0.077 | 0.1 |
| Total Endosulfan | ug/g | 0.01 | - | - | - | <0.010 | <0.010 | <0.010 | <0.010 | <0.15 | <0.040 | <0.030 | <0.010 |
| Total PCB | ug/g | 0.08 | 33 | 1.3 | 0.5 | 0.35 | 0.32 | 0.13 | <0.075 | 10 | 11 | 0.58 | 0.38 |
| **Pesticides & Herbicides** | | | | | | | | | | | | | |
| o,p-DDD | ug/g | 0.01 | - | - | - | <0.010 | <0.010 | <0.010 | <0.010 | <0.15 | <0.040 | <0.030 | <0.010 |
| p,p-DDD | ug/g | 0.01 | - | - | - | <0.010 | <0.010 | <0.010 | <0.010 | <0.20 | <0.045 | <0.030 | <0.010 |
| o,p-DDE | ug/g | 0.01 | - | - | - | <0.010 | <0.010 | <0.010 | <0.010 | <0.15 | <0.040 | <0.030 | <0.010 |
| p,p-DDE | ug/g | 0.01 | - | - | - | <0.010 | <0.010 | <0.010 | <0.010 | <0.15 | <0.040 | <0.030 | <0.010 |
| o,p-DDT | ug/g | 0.01 | - | - | - | 0.011 | 0.013 | <0.010 | <0.010 | <0.15 | <0.040 | <0.030 | 0.019 |
| p,p-DDT | ug/g | 0.01 | - | - | - | 0.066 | 0.085 | 0.02 | 0.014 | 0.68 | <0.22 | 0.077 | 0.081 |
| Aroclor 1242 | ug/g | 0.08 | - | - | - | <0.075 | <0.075 | <0.075 | <0.075 | <2.0 | <1.5 | <0.23 | <0.075 |
| Aroclor 1248 | ug/g | 0.08 | - | - | - | <0.075 | <0.075 | <0.075 | <0.075 | <2.0 | <1.5 | <0.23 | <0.075 |
| Aroclor 1254 | ug/g | 0.08 | - | - | - | <0.075 | <0.075 | <0.075 | <0.075 | <2.0 | <1.5 | <0.23 | <0.075 |
| Aroclor 1260 | ug/g | 0.08 | - | - | - | 0.35 | 0.32 | 0.13 | <0.075 | 10 | 11 | 0.58 | 0.38 |

**Notes:**

| | |
|---|---|
| 1 = | CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Commercial/Industrial Land-use, course-grained soil |
| 2 = | CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Residential/Parkland Land-use, course-grained soil |
| 3 = | CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Agricultural Land-use, course-grained soil |
| ***20 =*** | RDL exceeds at least one SQG |
| 20 = | Denotes exceedance of CCME SQG for Commercial Land-use |
| -' = | No Guideline |

| Sample ID<br>Description<br>Sampling Date | UNITS | MDL | CCME Soil CL [1] | CCME Soil PL [2] | CCME Soil AL [3] | CWS Soil PL [3] | CWS Soil CL [4] | S01 Sediment Stockpile<br>2017-09-28 10:00 | S02 Sediment Stockpile<br>2017-09-28 10:15 | S03 Sediment Stockpile<br>2017-09-28 10:30 | S04 Sediment Stockpile<br>2017-09-28 10:45 | S05 Sediment Stockpile<br>2017-09-28 11:00 | S06 Sediment Stockpile<br>2017-09-28 11:15 | S07 Sediment Stockpile<br>2017-09-28 11:30 | S08 Sediment Stockpile<br>2017-09-28 11:45 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BTEX & F1 Hydrocarbons** | | | | | | | | | | | | | | | |
| Benzene | ug/g | 0.005 | 0.03 | 0.03 | 0.03 | - | - | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| Toluene | ug/g | 0.02 | 0.082 | 0.082 | 0.082 | - | - | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 |
| Ethylbenzene | ug/g | 0.01 | 0.37 | 0.37 | 0.4 | - | - | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 |
| o-Xylene | ug/g | 0.02 | - | - | | - | - | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 |
| p+m-Xylene | ug/g | 0.04 | - | - | | - | - | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 |
| Total Xylenes | ug/g | 0.04 | 11 | 11 | 11 | - | - | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 |
| F1 (C6-C10) | ug/g | 10 | - | - | - | - | - | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| F1 (C6-C10) - BTEX | ug/g | 10 | - | - | - | 30 | 240 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| F2 (C10-C16 Hydrocarbons) | ug/g | 10 | - | - | - | 150 | 260 | 56 | 33 | 19 | <10 | 30 | 53 | 18 | <10 |
| F3 (C16-C34 Hydrocarbons) | ug/g | 50 | - | - | - | 300 | 1700 | 180 | 620 | 140 | <50 | 240 | 330 | 240 | 120 |
| F4 (C34-C50 Hydrocarbons) | ug/g | 50 | - | - | - | 2800 | 3300 | 100 | 460 | 81 | <50 | <50 | <50 | <50 | <50 |
| Reached Baseline at C50 | ug/g | - | - | - | - | - | - | | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

**Notes:**

| | |
|---|---|
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| 3 = | CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Agricultural Land-use, course-grained soil |
| ***20 =*** | RDL exceeds at least one SQG |
| 20 = | Denotes exceedance of CCME SQG for Commercial Land-use |
| -' = | No Guideline |

| Sample ID<br>Description<br>Sampling Date | UNITS | MDL | CCME Soil CL[1] | CCME Soil PL[2] | CCME Soil AL[3] | S01<br>Sediment Stockpile<br>2017-09-28 10:00 | S02<br>Sediment Stockpile<br>2017-09-28 10:15 | S03<br>Sediment Stockpile<br>2017-09-28 10:30 | S04<br>Sediment Stockpile<br>2017-09-28 10:45 | S05<br>Sediment Stockpile<br>2017-09-28 11:00 | S06<br>Sediment Stockpile<br>2017-09-28 11:15 | S07<br>Sediment Stockpile<br>2017-09-28 11:30 | S08<br>Sediment Stockpile<br>2017-09-28 11:45 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | | | |
| Acetone (2-Propanone) | ug/g | 0.50 | - | - | - | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <1.0 | <0.50 | <0.50 |
| Benzene | ug/g | 0.0060 | 0.03 | 0.03 | 0.03 | <0.0060 | <0.0060 | <0.0060 | <0.0060 | <0.0060 | <0.012 | <0.0060 | <0.0060 |
| Bromodichloromethane | ug/g | 0.050 | - | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| Bromoform | ug/g | 0.050 | - | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| Bromomethane | ug/g | 0.050 | - | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| Carbon Tetrachloride | ug/g | 0.050 | 50 | 5 | 0.1 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| Chlorobenzene | ug/g | 0.050 | 10[a] | 1[a] | 0.1 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| Chloroform | ug/g | 0.050 | 50 | 5 | 0.1 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| Dibromochloromethane | ug/g | 0.050 | 50 | 5 | 0.1 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| 1,2-Dichlorobenzene | ug/g | 0.050 | 10[a] | 1[a] | 0.1 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| 1,3-Dichlorobenzene | ug/g | 0.050 | 10[a] | 1[a] | 0.1 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| 1,4-Dichlorobenzene | ug/g | 0.050 | 10[a] | 1[a] | 0.1 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| Dichlorodifluoromethane (FREON 12) | ug/g | 0.050 | | | | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| 1,1-Dichloroethane | ug/g | 0.050 | 50 | 5 | 0.1 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| 1,2-Dichloroethane | ug/g | 0.050 | 50 | 5 | 0.1 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| 1,1-Dichloroethylene | ug/g | 0.050 | 50 | 5 | 0.1 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| cis-1,2-Dichloroethylene | ug/g | 0.050 | 50 | 5 | 0.1 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| trans-1,2-Dichloroethylene | ug/g | 0.050 | 50 | 5 | 0.1 | 0.11 | 0.064 | 0.096 | <0.050 | 0.085 | 0.10 | 0.11 | 0.063 |
| 1,2-Dichloropropane | ug/g | 0.050 | 50 | 5 | 0.1 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| cis-1,3-Dichloropropene | ug/g | 0.030 | - | - | 0.1 | <0.030 | <0.030 | <0.030 | <0.030 | <0.030 | <0.060 | <0.030 | <0.030 |
| trans-1,3-Dichloropropene | ug/g | 0.040 | - | - | 0.1 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | <0.080 | <0.040 | <0.040 |
| Ethylbenzene | ug/g | 0.010 | 0.082 | 0.082 | 0.082 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.020 | <0.010 | <0.010 |
| Ethylene Dibromide | ug/g | 0.050 | - | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| Hexane | ug/g | 0.050 | | | | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| Methylene Chloride(Dichloromethane) | ug/g | 0.050 | - | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| Methyl Isobutyl Ketone | ug/g | 0.50 | - | - | - | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <1.0 | <0.50 | <0.50 |
| Methyl Ethyl Ketone (2-Butanone) | ug/g | 0.50 | - | - | - | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <1.0 | <0.50 | <0.50 |
| Methyl t-butyl ether (MTBE) | ug/g | 0.050 | - | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| Styrene | ug/g | 0.050 | 50[a] | 5[a] | 0.1 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| 1,1,1,2-Tetrachloroethane | ug/g | 0.050 | - | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| 1,1,2,2-Tetrachloroethane | ug/g | 0.050 | 50 | 5 | 0.1 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| Tetrachloroethylene | ug/g | 0.050 | 0.5 | 0.2 | 0.1 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| Toluene | ug/g | 0.020 | 0.37 | 0.37 | 0.37 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | <0.040 | <0.020 | <0.020 |
| 1,1,1-Trichloroethane | ug/g | 0.050 | 50 | 5 | 0.1 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| 1,1,2-Trichloroethane | ug/g | 0.050 | 50 | 5 | 0.1 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |
| Trichloroethylene | ug/g | 0.010 | 0.01 | 0.01 | 0.01 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.020 | <0.010 | <0.010 |
| Vinyl Chloride | ug/g | 0.020 | - | - | - | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | <0.040 | <0.020 | <0.020 |
| p+m-Xylene | ug/g | 0.020 | - | - | - | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | <0.040 | <0.020 | <0.020 |
| o-Xylene | ug/g | 0.020 | - | - | - | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | <0.040 | <0.020 | <0.020 |
| Total Xylenes | ug/g | 0.020 | 11 | 11 | 11 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | <0.040 | <0.020 | <0.020 |
| Trichlorofluoromethane (FREON 11) | ug/g | 0.050 | | | | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 |

**Notes:**

| | |
|---|---|
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| 2 = | CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Residential/Parkland Land-use, course-grained soil |
| 3 = | CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Agricultural Land-use, course-grained soil |
| ***20 =*** | RDL exceeds at least one SQG |
| 20 = | Denotes exceedance of CCME SQG for Commercial Land-use |
| -' = | No Guideline |

Table 11: TWA Metals and Inorganics
TC Iqaluit 102153-000
January 2017

| Area ID | CCME Soil CL[1] | MDL | Pre-Work Characterization | | | | | Below Sediment Stockpile Area | | Below Lead-amended Paint Processing Area | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | TWA-1 | TWA-1 | TWA-1 | TWA-1 | TWA-1 | TWA-1 | TWA-1 | TWA-1 | TWA-1 |
| Sample ID | | | TWA1-2017-08-10 | TWA2-2017-08-10 | TWA3-2017-08-10 | TWA4-2017-08-10 | DUP-2017-08-10 | TWA10 | TWA11 | TWA12 | TWA13 |
| Date | | | 10-Aug-17 | 10-Aug-17 | 10-Aug-17 | 10-Aug-17 | 10-Aug-17 | 10-Oct-17 | 10-Oct-17 | 10-Oct-17 | 10-Oct-17 |
| Aluminum | - | - | - | - | - | - | - | - | - | - | - |
| Antimony | 40 | 0.2 | 0.23 | 1.3 | 0.52 | <0.20 | 0.42 | <0.20 | <0.20 | 0.28 | 2.2 |
| Arsenic | 12[a] | 1 | <1.0 | ***12*** | 1 | 1 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Barium | 2000 | 0.2 | 25 | 31 | 25 | 20 | 23 | 30 | 21 | 25 | 35 |
| Beryllium | 8[a] | 0.2 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.24 | 0.2 | 0.2 | 0.2 |
| Cadmium | 22 | 0.1 | 0.42 | 0.89 | 0.14 | 0.2 | 0.28 | 0.51 | 0.16 | 0.29 | 1.8 |
| Calcium | - | | - | - | - | - | - | 8500 | 9100 | 8400 | 7900 |
| Chromium | 87 | 1 | 24 | 31 | 21 | 24 | 24 | 13 | 10 | 11 | 21 |
| Chromium (VI) | 1.4 | | - | - | - | - | - | - | - | - | - |
| Cobalt | 300[a] | 0.1 | 4.8 | 5.1 | 4.7 | 4.2 | 4.3 | 4.5 | 2.9 | 3.4 | 4.2 |
| Copper | 91 | 0.5 | 19 | 47 | **120** | 9.8 | 16 | 11 | 7.6 | 10 | 19 |
| Iron | - | | - | - | - | - | - | 30000 | 25000 | 27000 | 30000 |
| Lead | 260 | 1 | 24 | 250 | 53 | 46 | 16 | 16 | 4.1 | 16 | 170 |
| Magnesium | - | | - | - | - | - | - | 3500 | 3300 | 3600 | 3300 |
| Manganese | - | | - | - | - | - | - | 510 | 320 | 330 | 330 |
| Mercury | 24 | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| Molybdenum | 40[a] | 0.5 | 1.3 | 2.2 | 1.1 | 1.2 | 1.2 | 2 | 1.7 | 1.7 | 2.2 |
| Nickel | 89 | 0.5 | 10 | 13 | 7.4 | 7 | 8.8 | 5.8 | 4.3 | 4.8 | 6.6 |
| Phosphorus | - | | - | - | - | - | - | 1000 | 1000 | 1100 | 1100 |
| Potassium | - | | - | - | - | - | - | 680 | 650 | 800 | 720 |
| Selenium | 2.9 | 0.5 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 |
| Silver | 40[a] | 0.2 | <0.20 | 0.27 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 |
| Sodium | - | | - | - | - | - | - | 300 | 290 | 300 | 300 |
| Strontium | - | | - | - | - | - | - | 12 | 11 | 11 | 11 |
| Thallium | 1 | 0.05 | <0.050 | 0.056 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| Tin | 300 | 0.05 | 0.35 | 0.39 | 0.42 | 0.47 | 0.28 | 1 | <1.0 | <1.0 | 3 |
| Vanadium | 130 | 5 | 41 | 57 | 46 | 62 | 39 | 23 | 18 | 19 | 22 |
| Zinc | 360 | 5 | 85 | 350 | 120 | 83 | 71 | 84 | 68 | 79 | 190 |

All units in ug/g, unless otherwise noted.

**Notes:**

1 = CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Commercial/Industrial Land-use, course-grained soil

***20 =*** RDL exceeds at least one SQG

20 = Denotes exceedance of CCME SQG for Commercial Land-use

-' = No Guideline

**Table 12: TWA Polycyclic Aromatic Hydrocarbons (PAHs)**
**TC Iqaluit 102153-000**
**January 2017**

| Area ID | CCME Soil CL[1] | Notes | MOE Table 9[2] | MDL | Pre-Work Characterization | | | | | Beneath PHC Liquid Processing Area | Below Sediment Stockpile Area | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TWA-1 | TWA-1 | TWA-1 | TWA-1 | TWA-1 | TWA-1 | TWA-1 | TWA-1 |
| Station ID | | | | | TWA1-2017-08-10 | TWA2-2017-08-10 | TWA3-2017-08-10 | TWA4-2017-08-10 | DUP-2017-08-10 | TWA7-20171004 | TWA8 | TWA9 |
| Date | | | | | 10-Aug-17 | 10-Aug-17 | 10-Aug-17 | 10-Aug-17 | 10-Aug-17 | 04-Oct-17 | 10-Oct-17 | 10-Oct-17 |
| Acenaphthene | 0.28 | b | 0.072 | 0.005 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| Acenaphthylene | 320 | b | 0.093 | 0.005 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| Anthracene | 32 | a | 0.22 | 0.005 | <0.0050 | <0.0050 | 0.0078 | 0.0075 | 0.0051 | <0.0050 | <0.0050 | <0.0050 |
| Benzo(a)anthracene | 10 | d | - | 0.005 | <0.0050 | 0.01 | 0.02 | 0.016 | 0.013 | 0.005 | <0.0050 | 0.01 |
| Benzo(a)pyrene | 72 | a | - | 0.005 | 0.0054 | 0.0086 | 0.014 | 0.013 | 0.01 | 0.007 | <0.0050 | 0.0092 |
| Benzo(b/j)fluoranthene | --- | - | - | 0.005 | 0.0099 | 0.014 | 0.022 | 0.014 | 0.017 | 0.007 | <0.0050 | 0.018 |
| Benzo(g,h,i)perylene | --- | - | 0.68 | 0.005 | 0.0081 | 0.009 | 0.012 | 0.013 | 0.013 | 0.009 | <0.0050 | 0.045 |
| Benzo(k)fluoranthene | 10 | d | - | 0.005 | <0.0050 | 0.0052 | 0.0083 | <0.0050 | 0.0059 | <0.0050 | <0.0050 | <0.0050 |
| Chrysene | --- | - | 2.80 | 0.005 | <0.0050 | 0.0081 | 0.016 | 0.01 | 0.0089 | <0.0050 | <0.0050 | 0.035 |
| Dibenz(a,h)anthracene | 10 | d | - | 0.005 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| Fluoranthene | 180 | a | 0.69 | 0.005 | 0.0076 | 0.02 | 0.051 | 0.013 | 0.023 | 0.0075 | <0.0050 | 0.0056 |
| Fluorene | 0.25 | b | 0.19 | 0.005 | <0.0050 | <0.0050 | 0.0099 | 0.01 | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| Indeno(1,2,3-cd)pyrene | 10 | d | - | 0.005 | 0.0072 | 0.0086 | 0.011 | 0.011 | 0.011 | <0.0050 | <0.0050 | 0.011 |
| 2-Methylnaphthalene | --- | - | 0.59 | 0.005 | <0.0050 | 0.0076 | 0.023 | 0.011 | <0.0050 | 0.0092 | <0.0050 | <0.0050 |
| Naphthalene | 0.013 | b | 0.090 | 0.005 | <0.0050 | 0.0057 | 0.014 | 0.0063 | <0.0050 | 0.0053 | <0.0050 | <0.0050 |
| Phenanthrene | 0.046 | b | 0.690 | 0.005 | <0.0050 | 0.012 | 0.024 | 0.016 | 0.011 | 0.005 | <0.0050 | <0.0050 |
| Pyrene | 100 | d | 1.00 | 0.005 | 0.0099 | 0.028 | 0.051 | 0.041 | 0.023 | 0.013 | <0.0050 | 0.031 |
| Benzo(a)pyrene Total Potency Equivalents | 5.3 | - | - | - | - | - | - | - | - | - | - | - |

All units in ug/g, unless otherwise noted.

**Notes:**

1 = CCME (2010), Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Polycyclic aromatic hydrocarbons (PAHs) Commercial/Industrial Land-use, course-grained soil

2 = Ontario Ministry of the Environment (MOE), 2011. Soil, Groundwater, and Sediment Standards for Use Under Part XV. 1 of the Environmental Protection Act (EPA); April 15, 2011. Table 9. Generic Site Condition Standards for Use within 30m of a Water Body in a Non-Potable Ground Water Condition

a CCME $SQG_E$

b CCME $SQG_E$ for protection of freshwater life. Also protective for soil and food ingestion residential.

c CCME $SQG_E$ for soil and food ingestion only.

d Interim Soil Quality Criteria

TPE - Benzo(a)pyrene Total Potency Equivalents, which is the sum of estimated cancer potency relative to B[a]P for all potentially carcinogenic unsubstituted PAHs. The B[a]P TPE for a soil sample is calculated by multiplying the concentration of each PAH in the sample by its B[a]P Potency Equivalence Factor (PEF), and summing the products. PEFs are as follows: Benzo(a)anthracene, 0.1; benzo(a)pyrene, 1; benzo(b+j+k)fluoranthene, 0.1; benzo(g,h,i)perylene, 0.01; chrysene, 0.01; dibenzo(a,h)anthracene, 1; ideno(1,2,3-c,d)pyrene, 0.1.

20 = Denotes exceedance of CCME SQG for Commercial/Industrial Land-use

20 = Denotes exceedance of MOE Table 9

Table 13: TWA Polychlorinated Biphenyls
TC Iqaluit 102153-000
January 2017

| | | | Pre-Work Characterization | | | | | Beneath PHC Liquid Processing Area |
|---|---|---|---|---|---|---|---|---|
| Area ID | CCME | MDL | TWA-1 | TWA-1 | TWA-1 | TWA-1 | TWA-1 | TWA-1 |
| Station ID | Soil CL[1] | | TWA1-2017-08-10 | TWA2-2017-08-10 | TWA3-2017-08-10 | TWA4-2017-08-10 | DUP-2017-08-10 | TWA7-20171004 |
| Date | | | 10-Aug-17 | 10-Aug-17 | 10-Aug-17 | 10-Aug-17 | 10-Aug-17 | 04-Oct-17 |
| Aroclor 1242 | - | 0.01 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 |
| Aroclor 1248 | - | 0.01 | <0.010 | 0.14 | 0.27 | 0.018 | 0.019 | <0.010 |
| Aroclor 1254 | - | 0.01 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 |
| Aroclor 1260 | - | 0.01 | <0.010 | 0.019 | 0.7 | <0.010 | <0.010 | 0.022 |
| Total PCB | 33 | 0.01 | <0.010 | 0.16 | 0.97 | 0.074 | 0.019 | 0.022 |

All units in ug/g, unless otherwise noted.

**Notes:**

| | |
|---|---|
| 1 = | CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Commercial/Industrial Land-use, course-grained soil |
| 2 = | CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Residential/Parkland Land-use, course-grained soil |
| **20** = | Denotes exceedance of CCME SQG for Commercial Land-use |
| -' = | No Guideline |

**Table 14: TWA Petroleum Hydrocarbons**
**TC Iqaluit 102153-000**
**January 2017**

| Area ID | CCME Soil CL [1] | CWS Soil CL [2] | MDL | Pre-Work Characterization | | | | | Beneath PHC Stockpiles | | Beneath PHC Liquid Processing Area |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | TWA-1 | TWA-1 | TWA-1 | TWA-1 | TWA-1 | TWA-1 | TWA-1 | TWA-1 |
| Station ID | | | | TWA1-2017-08-10 | TWA2-2017-08-10 | TWA3-2017-08-10 | TWA4-2017-08-10 | DUP-2017-08-10 | TWA5-20171004 | TWA6-20171004 | TWA7-20171004 |
| Date | | | | 10-Aug-17 | 10-Aug-17 | 10-Aug-17 | 10-Aug-17 | 10-Aug-17 | 04-Oct-17 | 04-Oct-17 | 04-Oct-17 |
| Moisture content | - | - | - | - | - | - | - | - | - | - | - |
| Benzene | 0.03 | - | 0.005 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0060 | <0.0060 | 0.011 |
| Ethylbenzene | 0.082 | - | 0.02 | <0.020 | **0.17** | <0.020 | 0.046 | <0.020 | <0.010 | <0.010 | 0.024 |
| Toluene | 0.37 | - | 0.01 | <0.010 | 0.038 | <0.010 | 0.018 | <0.010 | <0.020 | <0.020 | 0.023 |
| m+p-Xylene | - | - | 0.02 | <0.020 | 0.052 | <0.020 | 0.067 | <0.020 | <0.020 | <0.020 | 0.073 |
| o-Xylene | - | - | 0.04 | <0.040 | 0.14 | <0.040 | 0.12 | <0.040 | <0.020 | <0.020 | 0.024 |
| Xylenes (total) | 11 | - | 0.04 | <0.040 | 0.19 | <0.040 | 0.19 | <0.040 | <0.020 | <0.020 | 0.097 |
| F1 (C6-C10) | - | - | 10 | <10 | <10 | <10 | 58 | <10 | <10 | <10 | <10 |
| F1 (C6-C10) minus BTEX | - | 240 | 10 | <10 | <10 | <10 | 57 | <10 | <10 | <10 | <10 |
| F2 (C10-C16) | - | 260 | 10 | 27 | 79 | 94 | 100 | 15 | 17 | <10 | 12 |
| F3 (C16-C34) | - | 1700 | 50 | 250 | 540 | 470 | 1400 | 240 | 560 | <50 | 120 |
| F4 (C34-C50) | - | 3300 | 50 | 100 | 130 | 110 | 300 | <50 | 160 | <50 | 62 |
| Reached Baseline at C50 | - | - | - | Yes | Yes | Yes | Yes | Yes | No | Yes | No |

All units in ug/g, unless otherwise noted.

**Notes:**

1 = CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Commercial/Industrial Land-use, course-grained soil
2 = CCME (2008) Canadian-Wide Standards for Petroleum Hydrocarbons in Soil - Table 1, Tier 1 levels for PHCs, Commercial Use in coarse-grained surface soils.
***20 =*** RDL exceeds at least one SQG
20 = Denotes exceedance of CCME SQG for Commercial/Industrial land-use
20 = Denotes exceedance of CWS for Commercial/Industrial land-use
-' = No Guideline

Table 15: TWA Volatile Organic Compounds (VOCs)
TC Iqaluit 102153-000
January 2017

| | CCME Soil CL[1] | MDL | Pre-Work Characterization | | | | |
|---|---|---|---|---|---|---|---|
| Area ID | | | TWA-1 | TWA-1 | TWA-1 | TWA-1 | TWA-1 |
| Station ID | | | TWA1-2017-08-10 | TWA2-2017-08-10 | TWA3-2017-08-10 | TWA4-2017-08-10 | DUP-2017-08-10 |
| Date | | | 10-Aug-17 | 10-Aug-17 | 10-Aug-17 | 10-Aug-17 | 10-Aug-17 |
| Acetone | - | 0.5 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 |
| Benzene | 0.03 | 0.006 | <0.0060 | 0.0076 | <0.0060 | <0.0060 | <0.0060 |
| Bromodichloromethane | - | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| Bromoform | - | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| Bromomethane | - | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| Carbon tetrachloride | 50 | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| Chlorobenzene | 10[a] | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| Chlorodibromomethane | - | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| Chloroform | 50 | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| 1,2-Dichlorobenzene | 10[a] | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| 1,3-Dichlorobenzene | 10[a] | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| 1,4-Dichlorobenzene | 10[a] | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| 1,1-Dichloroethane | 50 | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| 1,2-Dichloroethane | 50 | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| 1,1-Dichloroethene | 50 | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| cis-1,2-Dichloroethene | 50 | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| trans-1,2-Dichloroethene | 50 | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| Dichloromethane | 50 | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| 1,2-Dichloropropane | 50 | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| cis-1,3-Dichloropropene | - | 0.03 | <0.030 | <0.030 | <0.030 | <0.030 | <0.030 |
| trans-1,3-Dichloropropene | - | 0.04 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 |
| Ethylbenzene | 0.082 | 0.01 | <0.010 | 0.015 | <0.010 | <0.010 | <0.010 |
| Ethylene dibromide | - | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| Hexachlorobenzene | 10 | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| Hexachlorobutadiene | - | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| Methyl ethyl ketone | - | 0.5 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 |
| Methyl isobutyl ketone | - | 0.5 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 |
| Methyl-tert-butylether | - | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| Styrene | 50[a] | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| 1,1,1,2-Tetrachloroethane | - | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| 1,1,2,2-Tetrachloroethane | 50 | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| Tetrachloroethene | 0.5 | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| Toluene | 0.37 | 0.02 | <0.020 | 0.088 | <0.020 | 0.032 | <0.020 |
| 1,1,1-Trichloroethane | 50 | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| 1,1,2-Trichloroethane | 50 | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| Trichloroethene | 0.01 | 0.01 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 |
| Vinyl chloride | - | 0.02 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 |
| m+p-Xylene | - | 0.02 | <0.020 | 0.06 | <0.020 | 0.059 | <0.020 |
| o-Xylene | - | 0.02 | <0.020 | 0.023 | <0.020 | 0.035 | <0.020 |
| Xylenes (total) | 11 | 0.02 | <0.020 | 0.083 | <0.020 | 0.095 | <0.020 |

All units in ug/g, unless otherwise noted.

**Notes:**

| | |
|---|---|
| 1 = | CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Commercial/Industrial Land-use, course-grained soil |
| ***20 =*** | RDL exceeds at least one SQG |
| 20 = | Denotes exceedance of CCME SQG for Commercial Land-use |
| -' = | No Guideline |

| Area ID | Units | CCME Soil CL [1] | CCME Soil PL [2] | CCME Soil AL [3] | MDL | Beneath PHC Liquid Processing Area |
|---|---|---|---|---|---|---|
| Station ID | | | | | | TWA-7 |
| Date | | | | | | TWA7-20171004 |
| | | | | | | 04-Oct-17 |
| Propylene Glycol | mg/kg | - | - | - | - | <0.010 |
| Ethylene Glycol | mg/kg | - | - | - | - | <0.010 |
| Diethylene Glycol | mg/kg | - | - | - | - | <0.010 |
| Total Glycol | mg/kg | - | - | - | - | 0.022 |

All units in ug/g, unless otherwise noted.

**Notes:**

1 = CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Commercial/Industrial Land-use, course-grained soil
2 = CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Residential/Parkland Land-use, course-grained soil
3 = CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Agricultural Land-use, course-grained soil

***20*** = RDL exceeds at least one SQG
**20** = Denotes exceedance of CCME SQG for Commercial Land-use
-' = No Guideline

| Area ID | CCME Soil CL[1] | CCME Soil PL[2] | CCME AL[3] | MDL | Area of Environmental Concern | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | AEC1 | AEC1 | AEC1 | AEC1 |
| Sample ID | | | | | AEC1-EX02-WALL1 | AEC1-EX02-WALL2 | AEC1-EX02-WALL3 | AEC1-EX02-WALL4 |
| Date | | | | | 13-Sep-17 | 13-Sep-17 | 13-Sep-17 | 13-Sep-17 |
| **Inorganics** | | | | | | | | |
| Moisture | - | - | - | - | 9.7 | 15 | 11 | 12 |
| **Metals** | | | | | | | | |
| Hot Water Extractable Boron | - | - | - | - | 0.064 | 0.12 | 0.17 | 0.097 |
| Aluminum | - | - | - | | - | - | - | - |
| Antimony | 40 | 20 | 20 | 0.2 | 1.0 | 0.81 | 1.6 | 0.60 |
| Arsenic | 12[a] | 12[a] | 12 | 1 | <1.0 | 1.2 | 1.3 | <1.0 |
| Barium | 2000 | 500 | 750 | 0.2 | 27 | 42 | 42 | 30 |
| Beryllium | 8[a] | 4[a] | 4 | 0.2 | <0.20 | 0.26 | 0.25 | 0.20 |
| Boron | | | | | <5.0 | <5.0 | <5.0 | <5.0 |
| Cadmium | 22 | 10 | 1.4 | 0.1 | 0.19 | 0.17 | 0.27 | 0.22 |
| Calcium | - | - | - | | - | - | - | - |
| Chromium | 87 | 64 | 64 | 1 | 25 | 26 | 27 | 23 |
| Chromium (VI) | 1.4 | 0.4 | 0.4 | | <0.2 | <0.2 | <0.2 | <0.2 |
| Cobalt | 300[a] | 50[a] | 40 | 0.1 | 5.5 | 7.4 | 7.2 | 5.0 |
| Copper | 91 | 63 | 63 | 0.5 | 13 | 15 | 16 | 13 |
| Iron | - | - | - | | - | - | - | - |
| Lead | 260 | 140 | 70 | 1 | 91 | 70 | 190 | 62 |
| Magnesium | - | - | - | | - | - | - | - |
| Manganese | - | - | - | | - | - | - | - |
| Mercury | 24 | 6.6 | 6.6 | 0.05 | <0.050 | <0.050 | <0.050 | <0.050 |
| Molybdenum | 40[a] | 10[a] | 5 | 0.5 | 0.88 | 1.2 | 1.2 | 0.92 |
| Nickel | 89 | 45 | 45 | 0.5 | 8.4 | 10 | 9.8 | 8.0 |
| Phosphorus | - | - | - | | - | - | - | - |
| Potassium | - | - | - | | - | - | - | - |
| Selenium | 2.9 | 1 | 1 | 0.5 | <0.50 | <0.50 | <0.50 | <0.50 |
| Silver | 40[a] | 20[a] | 20 | 0.2 | <0.20 | <0.20 | <0.20 | <0.20 |
| Sodium | - | - | - | | - | - | - | - |
| Strontium | - | - | - | | - | - | - | - |
| Thallium | 1 | 1 | 1 | 0.05 | <0.050 | 0.061 | 0.072 | 0.054 |
| Tin | 300 | 5 | 50 | 0.05 | - | - | - | - |
| Vanadium | 130 | 130 | 130 | 5 | 58 | 55 | 59 | 50 |
| Zinc | 360 | 200 | 200 | 5 | 51 | 54 | 58 | 50 |

All units in ug/g, unless otherwise noted.

**Notes:**

| | |
|---|---|
| 1 = | CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Commercial/Industrial Land-use, course-grained soil |
| 2 = | CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Residential/Parkland Land-use, course-grained soil |
| 3 = | CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Agricultural Land-use, course-grained soil |
| ***20 =*** | RDL exceeds at least one SQG |
| 20 = | Denotes exceedance of CCME SQG for Commercial/Industrial land-use |
| 20 = | Denotes exceedance of CWS for Commercial/Industrial land-use |
| -' = | No Guideline |

**Table 18: Excavation Petroleum Hydrocarbons**
**TC Iqaluit 102153-000**
**January 2017**

| Area ID | CCME Soil CL [1] | CCME Soil PL [2] | CCME Soil AL [3] | CWS Soil PL [4] | CWS Soil CL [5] | Area of Environmental Concern | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | AEC1 | AEC1 | AEC1 | AEC1 |
| Station ID | | | | | | AEC1-EX03-WALL1 | AEC1-EX03-WALL2 | AEC1-EX03-WALL3 | AEC1-EX03-WALL4 |
| Date | | | | | | 13-Sep-17 | 13-Sep-17 | 13-Sep-17 | 13-Sep-17 |
| Moisture content | - | - | | - | - | - | - | - | - |
| Benzene | 0.03 | 0.03 | 0.03 | - | - | <0.012 | <0.0060 | <0.0060 | <0.0060 |
| Ethylbenzene | 0.082 | 0.082 | 0.082 | - | - | <0.020 | <0.010 | <0.010 | <0.010 |
| Toluene | 0.37 | 0.37 | 0.4 | - | - | <0.040 | <0.020 | <0.020 | <0.020 |
| m+p-Xylene | - | - | | - | - | <0.040 | <0.020 | <0.020 | <0.020 |
| o-Xylene | - | - | | - | - | <0.040 | <0.020 | <0.020 | <0.020 |
| Xylenes (total) | 11 | 11 | 11 | - | - | <0.040 | <0.020 | <0.020 | <0.020 |
| F1 (C6-C10) | - | - | - | - | - | <20 | <10 | <10 | <10 |
| F1 (C6-C10) minus BTEX | - | - | - | 30 | 240 | <20 | <10 | <10 | <10 |
| F2 (C10-C16) | - | - | - | 150 | 260 | 23 | <10 | 12 | 13 |
| F3 (C16-C34) | - | - | - | 300 | 1700 | <100 | 53 | <50 | 130 |
| F4 (C34-C50) | - | - | - | 2800 | 3300 | <100 | 56 | <50 | 53 |
| Reached Baseline at C50 | - | - | - | - | - | Yes | No | Yes | Yes |

All units in ug/g, unless otherwise noted.

**Notes:**

1 = CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Commercial/Industrial Land-use, course-grained soil
2 = CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Residential/Parkland Land-use, course-grained soil
3 = CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Updated 2015. Agricultural Land-use, course-grained soil
4 = CCME (2008) Canadian-Wide Standards for Petroleum Hydrocarbons in Soil - Table 1, Tier 1 levels for PHCs, Residential / Parkland Use in coarse-grained surface soils.
5 = CCME (2008) Canadian-Wide Standards for Petroleum Hydrocarbons in Soil - Table 1, Tier 1 levels for PHCs, Commercial Use in coarse-grained surface soils.
***20 =*** RDL exceeds at least one SQG
20 = Denotes exceedance of CCME SQG for Commercial/Industrial land-use
20 = Denotes exceedance of CWS for Commercial/Industrial land-use
-' = No Guideline

| Area ID | CCME | CCME | Long Term Monitoring | | RPD (%) | Long Term Monitoring | | | | | | | | | | | | RPD (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Station ID | Freshwater[1] | Marine[2] | LTM1 | DUP 1 | | LTM2 | LTM2 | LTM3 | LTM3 | LTM4 | LTM4 | LTM5 | LTM5 | LTM6 | LTM6 | LTM7 | LTM7 | DUP2 | |
| Date | | | 21-Sep-17 | | | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | | |
| Parameter (ug/L) | | | | | | | | | | | | | | | | | | | |
| Total Ammonia-N* | 73,000-3,260 | - | <0.050 | <0.050 | nc | <0.050 | <0.050 | <0.050 | 0.16 | <0.050 | <0.050 | 0.05 | <0.050 | <0.050 | <0.050 | 0.44 | 0.46 | 0.45 | 2.2% |
| Fluoride (F-) | | - | 0.23 | 0.22 | 4.4% | 0.1 | 0.1 | 0.18 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | nc |
| pH (field) | 6.5-9 | 7-8.7 | 7.67 | 7.63 | 0.5% | 7.67 | 6.64 | 7.54 | 6.79 | 7.64 | 7.43 | 7.61 | 7.41 | 7.63 | 7.37 | 7.31 | 7.23 | 7.22 | 0.1% |
| Dissolved Sulphate (SO4) | - | - | 480 | 490 | 2.1% | 46 | 83 | 280 | 420 | 39 | 5 | 5.1 | 5.7 | 3.5 | 3.4 | 5 | 7.8 | 7.7 | 1.3% |
| Sulphide | - | - | - | - | nc | - | <0.020 | - | <0.020 | - | <0.020 | - | <0.020 | - | <0.020 | - | <0.020 | <0.020 | nc |
| Total Cyanide (CN) | - | - | - | - | nc | - | <0.0050 | - | <0.0050 | - | <0.0050 | - | <0.0050 | - | <0.0050 | - | <0.0050 | <0.0050 | nc |
| WAD Cyanide (Free) | 5 | - | <1 | <1 | nc | <1 | - | <1 | - | <1 | - | <1 | - | <1 | - | <1 | - | - | nc |
| Dissolved Chloride (Cl) | 120000 | - | 3600 | 3700 | 2.7% | 280 | 47 | 1600 | 63 | 240 | 9.6 | 8.1 | 11 | 7.7 | 10 | 5.5 | 14 | 15 | 6.9% |
| Nitrite (N) | - | - | <0.010 | <0.010 | nc | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | nc |
| Nitrate (N) | 60 | - | 0.13 | <0.10 | nc | <0.10 | 0.18 | <0.10 | 2.06 | 0.31 | 0.5 | 0.35 | 0.45 | 0.11 | <0.10 | 0.36 | 0.23 | 0.23 | 0% |
| Nitrate + Nitrite (N) | - | - | 0.13 | <0.10 | nc | <0.10 | 0.18 | <0.10 | 2.06 | 0.31 | 0.5 | 0.35 | 0.45 | 0.11 | <0.10 | 0.36 | 0.23 | 0.23 | 0% |
| Mercury | 0.026 | 0.016 | <0.01 | <0.01 | nc | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | nc |

All units in ug/L, unless otherwise noted.

**Notes:**

1 = Canadian Council of Ministers of the Environment (CCME), Water Quality Guidelines for the Protection of Aquatic Life. Freshwater.
2 = Canadian Council of Ministers of the Environment (CCME), Water Quality Guidelines for the Protection of Aquatic Life. Marine.
3 = Guideline is hardness dependent
* Total Ammonia Guideline varies based on pH and temperature of sample. See table in CCME, Water Quality Guidelines for the Protection of Aquatic Life. Freshwater. No guideline for marine waters.
nc not calculable

Table 20: Surface Water Polycyclic Aromatic Hydrocarbons (PAHs)
TC Iqaluit 102153-000
January 2017

| Area ID | CCME AW | CCME AW | Long Term Monitoring | | RPD (%) | Long Term Monitoring | | | | | | | | | | | | | RPD (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Station ID | Freshwater[1] | Marine[2] | LTM1 | DUP 1 | | LTM2 | LTM2 | LTM3 | LTM3 | LTM4 | LTM4 | LTM5 | LTM5 | LTM6 | LTM6 | LTM7 | LTM7 | DUP2 | |
| Date | | | 21-Sep-17 | | | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | | |
| Parameter (ug/L) | | | | | | | | | | | | | | | | | | | |
| Acenaphthene | 5.8 | - | <0.010 | <0.010 | nc | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | nc |
| Acridine | 4.4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Anthracene | 0.012 | - | <0.010 | <0.010 | nc | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | nc |
| Benzo(a)anthracene | 0.018 | - | <0.010 | <0.010 | nc | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | nc |
| Benzo(a)pyrene | 0.015 | - | <0.010 | <0.010 | nc | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | nc |
| Fluoranthene | 0.04 | - | <0.010 | <0.010 | nc | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | nc |
| Fluorene | 3 | - | <0.010 | <0.010 | nc | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | nc |
| Naphthalene | 1.1 | 1.4 | <0.010 | <0.010 | nc | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | nc |
| Phenanthrene | 0.4 | - | <0.010 | <0.010 | nc | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | nc |
| Pyrene | 0.025 | - | <0.010 | <0.010 | nc | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | nc |

All units in ug/L, unless otherwise noted.

**Notes:**

1 = Canadian Council of Ministers of the Environment (CCME), Water Quality Guidelines for the Protection of Aquatic Life. Freshwater.
2 = Canadian Council of Ministers of the Environment (CCME), Water Quality Guidelines for the Protection of Aquatic Life. Marine.
3 = Guideline is hardness dependent
nc= not calculable

| Area ID | | | Long Term Monitoring | | | Long Term Monitoring | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Station ID | CCME AW | CCME AW | LTM1 | DUP 1 | RPD (%) | LTM2 | LTM2 | LTM3 | LTM3 | LTM4 | LTM4 | LTM5 | LTM5 | LTM6 | LTM6 | LTM7 | LTM7 | DUP2 | RPD (%) |
| Date | Freshwater[1] | Marine[2] | 21-Sep-17 | | | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | | |
| Parameter (ug/L) | | | | | | | | | | | | | | | | | | | |
| Aroclor 1016 | - | - | <0.05 | <0.05 | nc | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | nc |
| Aroclor 1221 | - | - | <0.05 | <0.05 | nc | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | nc |
| Aroclor 1232 | - | - | <0.05 | <0.05 | nc | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | nc |
| Aroclor 1242 | - | - | <0.05 | <0.05 | nc | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | nc |
| Aroclor 1248 | - | - | <0.05 | <0.05 | nc | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | nc |
| Aroclor 1254 | - | - | <0.05 | <0.05 | nc | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | nc |
| Aroclor 1260 | - | - | <0.05 | <0.05 | nc | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | nc |
| Aroclor 1262 | - | - | - | - | nc | - | - | - | - | - | - | - | - | - | - | - | - | - | nc |
| Aroclor 1268 | - | - | - | - | nc | - | - | - | - | - | - | - | - | - | - | - | - | - | nc |
| Polychlorinated biphenyls | * | * | <0.05 | <0.05 | nc | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | nc |

All units in ug/L, unless otherwise noted.

**Notes:**

1 = Canadian Council of Ministers of the Environment (CCME), Water Quality Guidelines for the Protection of Aquatic Life. Freshwater.
2 = Canadian Council of Ministers of the Environment (CCME), Water Quality Guidelines for the Protection of Aquatic Life. Marine.
3 = Guideline is hardness dependent
* This guideline has been withdrawn. A water quality guideline is not recommended. Environmental exposure is predominantly via sediment, soil, and/or tissue, therefore, the reader is referred to the respective guidelines for these media.
* Indicates detection.
nc not calculable

Table 22: Surface Water Petroleum Hydrocarbons
TC Iqaluit 102153-000
January 2017

| Maxxam ID | CCME | CCME Marine[2] | Long Term Monitoring | | RPD (%) | Long Term Monitoring | | | | | | | | | | | | | RPD (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Station ID | Freshwater[1] | | LTM1 | DUP 1 | | LTM2 | LTM2 | LTM3 | LTM3 | LTM4 | LTM4 | LTM5 | LTM5 | LTM6 | LTM6 | LTM7 | LTM7 | DUP2 | |
| Date | | | 21-Sep-17 | | | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | | |
| Parameter (ug/L) | | | | | | | | | | | | | | | | | | | |
| Benzene | 370 | 110 | <0.20 | <0.20 | nc | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | nc |
| Ethylbenzene | 90 | 25 | <0.20 | <0.20 | nc | <0.20 | <0.20 | <0.20 | 0.69 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | nc |
| Toluene | 2 | 215 | <0.20 | <0.20 | nc | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | nc |
| o-Xylene | - | - | <0.20 | <0.20 | nc | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | nc |
| m+p-Xylene | - | - | <0.40 | <0.40 | nc | <0.40 | <0.40 | <0.40 | <0.40 | <0.40 | <0.40 | <0.40 | <0.40 | <0.40 | <0.40 | <0.40 | <0.40 | <0.40 | nc |
| Xylenes (total) | - | - | <0.40 | <0.40 | nc | <0.40 | <0.40 | <0.40 | <0.40 | <0.40 | <0.40 | <0.40 | <0.40 | <0.40 | <0.40 | <0.40 | <0.40 | <0.40 | nc |
| F1 (C6-C10) | - | - | <25 | <25 | nc | <25 | <25 | <25 | 56 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | nc |
| F1 (C6-C10) minus BTEX | - | - | <25 | <25 | nc | <25 | <25 | <25 | 56 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | nc |
| F2 (C10-C16) | - | - | <100 | <100 | nc | <100 | <100 | <100 | 220 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | nc |
| F3 (C16-C34) | - | - | <200 | <200 | nc | <200 | <200 | <200 | <200 | <200 | <200 | <200 | <200 | <200 | <200 | <200 | <200 | <200 | nc |
| F4 (C34-C50) | - | - | <200 | <200 | nc | <200 | <200 | <200 | <200 | <200 | <200 | <200 | <200 | <200 | <200 | <200 | <200 | <200 | nc |
| Reached Baseline at C50 | - | - | Yes | Yes | nc | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | nc |

All units in ug/L, unless otherwise noted.

**Notes:**

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3 = Guideline is hardness dependent
nc not calculable

Table 23: Surface Water Volatile Organic Compounds (VOCs)
TC Iqaluit 102153-000
January 2017

| Maxxam ID | CCME AW | CCME AW | Long Term Monitoring | | RPD (%) | Long Term Monitoring | | | | | | | | | | | | | RPD (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Station ID | Freshwater[1] | Marine[2] | LTM1 | DUP 1 | | LTM2 | LTM2 | LTM3 | LTM3 | LTM4 | LTM4 | LTM5 | LTM5 | LTM6 | LTM6 | LTM7 | LTM7 | DUP2 | |
| Date | | | 21-Sep-17 | | | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | 21-Sep-17 | 3-Oct-17 | 3-Oct-17 | |
| Parameter (ug/L) | | | | | | | | | | | | | | | | | | | |
| Acetone | - | - | <10 | <10 | nc | <10 | - | <10 | - | <10 | - | <10 | - | <10 | - | <10 | - | - | nc |
| Benzene | 370 | 110 | <0.1 | <0.1 | nc | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | - | nc |
| Bromodichloromethane | - | - | <0.1 | <0.1 | nc | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | - | nc |
| Bromoform | - | - | <0.2 | <0.20 | nc | 0.26 | - | 0.3 | - | 0.26 | - | <0.20 | - | <0.20 | - | <0.20 | - | - | nc |
| Bromomethane | - | - | <0.5 | <0.5 | nc | <0.5 | - | <0.5 | - | <0.5 | - | <0.5 | - | <0.5 | - | <0.5 | - | - | nc |
| Carbon tetrachloride | 13.3 | - | <0.1 | <0.1 | nc | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | - | nc |
| Chlorobenzene | 1.3 | 25 | <0.1 | <0.1 | nc | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | - | nc |
| Chloroform | 1.8 | - | <0.1 | <0.1 | nc | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | - | nc |
| 1,2-Dichlorobenzene | 0.7 | 42 | <0.2 | <0.2 | nc | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | - | nc |
| 1,3-Dichlorobenzene | 150 | - | <0.2 | <0.2 | nc | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | - | nc |
| 1,4-Dichlorobenzene | 26 | - | <0.2 | <0.2 | nc | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | - | nc |
| 1,1-Dichloroethane | - | - | <0.1 | <0.1 | nc | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | - | nc |
| 1,2-Dichloroethane | 100 | - | <0.2 | <0.2 | nc | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | - | nc |
| 1,1-Dichloroethene | - | - | <0.1 | <0.1 | nc | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | - | nc |
| cis-1,2-Dichloroethene | - | - | <0.1 | <0.1 | nc | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | - | nc |
| trans-1,2-Dichloroethene | - | - | <0.1 | <0.1 | nc | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | - | nc |
| Dichloromethane | 98.1 | - | <0.5 | <0.5 | nc | <0.5 | - | <0.5 | - | <0.5 | - | <0.5 | - | <0.5 | - | <0.5 | - | - | nc |
| 1,2-Dichloropropane | - | - | <0.1 | <0.1 | nc | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | - | nc |
| cis-1,3-Dichloropropene | - | - | <0.2 | <0.2 | nc | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | - | nc |
| trans-1,3-Dichloropropene | - | - | <0.2 | <0.2 | nc | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | - | nc |
| Ethylbenzene | 90 | 25 | <0.1 | <0.1 | nc | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | - | nc |
| Ethylene dibromide | - | - | <0.2 | <0.2 | nc | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | - | nc |
| Hexachlorobenzene | - | - | <0.03 | <0.03 | nc | <0.03 | - | <0.03 | - | <0.03 | - | <0.03 | - | <0.03 | - | <0.03 | - | - | nc |
| Methyl ethyl ketone | - | - | <5 | <5 | nc | <5 | - | <5 | - | <5 | - | <5 | - | <5 | - | <5 | - | - | nc |
| Methyl isobutyl ketone | - | - | <5 | <5 | nc | <5 | - | <5 | - | <5 | - | <5 | - | <5 | - | <5 | - | - | nc |
| Methyl-tert-butylether | 10000 | 5000 | <0.2 | <0.2 | nc | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | - | nc |
| Styrene | 72 | - | <0.2 | <0.2 | nc | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | - | nc |
| 1,1,1,2-Tetrachloroethane | - | - | <0.1 | <0.1 | nc | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | - | nc |
| 1,1,2,2-Tetrachloroethane | - | - | <0.2 | <0.2 | nc | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | - | nc |
| Tetrachloroethene | 111 | - | 1.4 | <0.10 | nc | <0.10 | - | <0.10 | - | <0.10 | - | <0.10 | - | <0.10 | - | <0.10 | - | - | nc |
| Toluene | 2 | 215 | <0.2 | <0.2 | nc | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | - | nc |
| 1,1,1-Trichloroethane | - | - | <0.1 | <0.1 | nc | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | - | nc |
| 1,1,2-Trichloroethane | - | - | <0.2 | <0.2 | nc | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | - | nc |
| Trichloroethene | 21 | - | <0.1 | <0.1 | nc | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | - | nc |
| Vinyl chloride | - | - | <0.2 | <0.2 | nc | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | <0.2 | - | - | nc |
| m+p-Xylene | - | - | <0.1 | <0.1 | nc | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | - | nc |
| o-Xylene | - | - | <0.1 | <0.1 | nc | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | - | nc |
| Xylenes (total) | - | - | <0.1 | <0.1 | nc | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | - | - | nc |

All units in ug/L, unless otherwise noted.

**Notes:**

1 = Canadian Council of Ministers of the Environment (CCME), Water Quality Guidelines for the Protection of Aquatic Life. Freshwater.
2 = Canadian Council of Ministers of the Environment (CCME), Water Quality Guidelines for the Protection of Aquatic Life. Marine.
3 = Guideline is hardness dependent
nc not calculable

| Area ID | CCME | CCME | LTM1 | | | LTM2 | | LTM3 | | LTM4 | | LTM5 | | LTM6 | | LTM7 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Station ID | Freshwater [1] | Marine [2] | LTM 1 | DUP 1 | RPD | LTM 2 | LTM2 | LTM 3 | LTM3 | LTM 4 | LTM4 | LTM 5 | LTM5 | LTM 6 | LTM6 | LTM 7 | LTM7 | DUP2 | RPD |
| Date | | | 2017-09-21 | 2017-09-21 | | 2017-09-21 | 2017-10-03 | 2017-09-21 | 2017-10-03 | 2017-09-21 | 2017-10-03 | 2017-09-21 | 2017-10-03 | 2017-09-21 | 2017-10-03 | 2017-09-21 | 2017-10-03 | 2017-10-03 | |
| Aluminum pH>6.5 | 100 | - | 149 | 157 | 5.2% | 62.9 | 50.7 | <15 | 122 | 9.9 | 14.4 | 17.5 | 20.8 | 9.4 | 34.7 | 26.3 | 60.9 | 66.2 | 8.3% |
| Antimony | - | - | <5.0 | <5.0 | nc | <0.50 | <0.50 | <2.5 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | nc |
| Arsenic | 5 | 12.5 | <1.0 | <1.0 | nc | <0.10 | <0.10 | <0.50 | 0.6 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | 0.15 | 0.17 | 0.17 | 0.0% |
| Beryllium | - | - | <1.0 | <1.0 | nc | <0.10 | <0.10 | <0.50 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | nc |
| Boron | - | 1500 | 797 | 886 | 10.6% | 113 | 195 | 482 | 588 | 71 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | nc |
| Cadmium | See Note 3 | | <0.10 | <0.10 | nc | <0.010 | 0.111 | <0.050 | 0.017 | 0.021 | 0.04 | 0.035 | 0.043 | 0.025 | 0.043 | <0.010 | 0.013 | 0.019 | 37.5% |
| Chromium | 8.9 | 56 | <10 | <10 | nc | <1.0 | <1.0 | <5.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | nc |
| Cobalt | - | - | <2.0 | <2.0 | nc | <0.20 | 0.33 | <1.0 | 0.54 | <0.20 | <0.20 | <0.20 | 0.22 | <0.20 | 0.26 | <0.20 | 0.56 | 0.62 | 10.2% |
| Copper | See Note 3 | | <5.0 | <5.0 | nc | 2.75 | 3.31 | <2.5 | 2.52 | 0.53 | 0.72 | 0.68 | 0.77 | <0.50 | 0.74 | 0.82 | 1.3 | 1.38 | 6.0% |
| Iron | 300 | - | **6070** | **5140** | 16.6% | 197 | 162 | **337** | **4440** | **484** | **488** | **793** | **463** | **679** | **740** | **1140** | **1830** | **1880** | 2.7% |
| Lead | See Note 3 | | <2.0 | <2.0 | nc | 0.64 | 2.31 | <1.0 | 12.9 | <0.20 | <0.20 | 0.26 | <0.20 | <0.20 | <0.20 | 0.21 | 0.61 | 0.62 | 1.6% |
| Manganese | | | 49 | 27 | **57.9%** | 9.7 | 123 | 32.6 | 764 | 35.5 | 63.7 | 47.3 | 76.5 | 32.3 | 69.6 | 53.1 | 230 | 237 | 3.0% |
| Molybdenum | 73 | - | <10 | <10 | nc | <1.0 | <1.0 | <5.0 | 1.8 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | nc |
| Nickel | See Note 3 | | <10 | <10 | nc | <1.0 | 1.3 | <5.0 | 2.5 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.3 | nc |
| Selenium | 1 | - | <1.0 | <1.0 | nc | <0.10 | <0.10 | <0.50 | 0.11 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | nc |
| Silver | 0.25 | - | <0.20 | <0.20 | nc | <0.020 | <0.020 | <0.10 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | nc |
| Strontium | | | 1370 | 1450 | 5.7% | 114 | 113 | 640 | 575 | 109 | 32.8 | 30.1 | 53.9 | 29.4 | 32.8 | 50.6 | 73.5 | 83.2 | 12.4% |
| Thallium | 0.8 | - | <0.10 | <0.10 | nc | <0.010 | <0.010 | <0.050 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | nc |
| Tin | | | <50 | <50 | nc | <5.0 | <5.0 | <25 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | nc |
| Titanium | | | <50 | <50 | nc | <5.0 | <5.0 | <25 | 8.7 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | nc |
| Uranium | 15 | - | <1.0 | <1.0 | nc | 0.11 | <0.10 | <0.50 | 0.29 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | nc |
| Vanadium | - | - | <50 | <50 | nc | <5.0 | <5.0 | <25 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | nc |
| Zinc | 30 | - | <50 | <50 | nc | <5.0 | 14.7 | **68** | 18.4 | <5.0 | 5.3 | 5.7 | 28 | 14.4 | 9.1 | **40.8** | **223** | **254** | 13.0% |
| Zirconium | - | - | <1.0 | <1.0 | nc | <0.10 | <0.10 | <0.50 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | nc |
| Calcium | | | 86.1 | 89 | 3.3% | 11.3 | 17.7 | 45.1 | 111 | 14.7 | 14.3 | 11.3 | 14.3 | 11.1 | 12.4 | 13.2 | 21.7 | 22.5 | 3.6% |
| Magnesium | | | 194 | 208 | 7.0% | 16.4 | 9.6 | 90.9 | 29.8 | 14.7 | 3.07 | 2.49 | 3.26 | 2.17 | 2.82 | 2.77 | 4.44 | 4.61 | 3.8% |
| Potassium | | | 70.2 | 75.1 | 6.7% | 6.87 | 4.69 | 34.3 | 11.8 | 5.13 | 0.75 | 0.481 | 0.852 | 0.454 | 0.732 | 0.77 | 3.11 | 3.14 | 1.0% |
| Sodium | | | 1570 | 1670 | 6.2% | 147 | 62.2 | 764 | 91.3 | 122 | 5.54 | 4.22 | 7.01 | 4.03 | 4.95 | 3.79 | 6.97 | 7.35 | 5.3% |
| Sulphur | | | 186 | 188 | 1.1% | 19.4 | 27.4 | 106 | 155 | 14.2 | <3.0 | <3.0 | <3.0 | <3.0 | <3.0 | <3.0 | <3.0 | 3.1 | nc |

All units in ug/L, unless otherwise noted.

**Notes:**

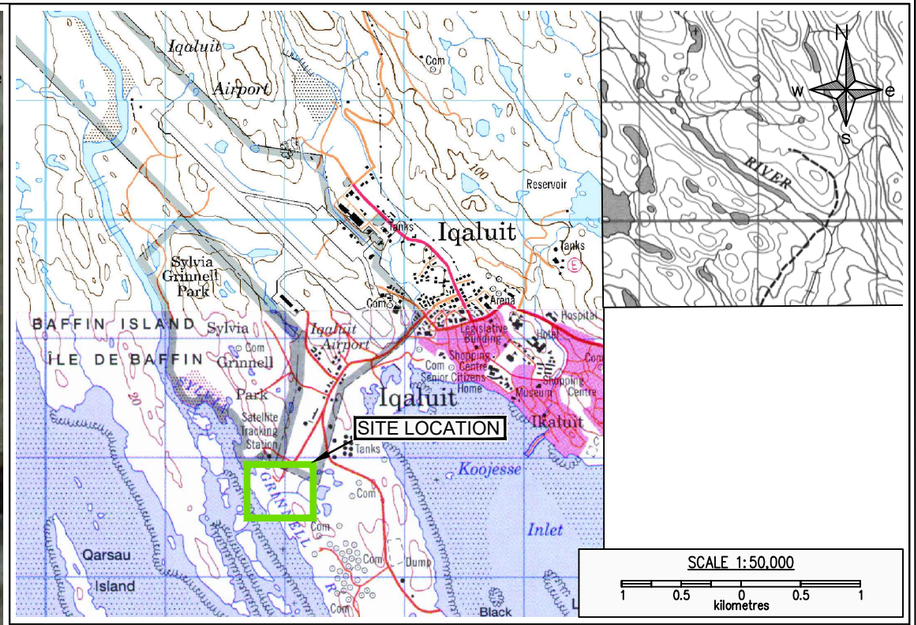
1 = Canadian Council of Ministers of the Environment (CCME), Water Quality Guidelines for the Protection of Aquatic Life. Freshwater.

2 = Canadian Council of Ministers of the Environment (CCME), Water Quality Guidelines for the Protection of Aquatic Life. Marine.

3 = Guideline is hardness dependent

20 = Indicates freshwater. Exceedance of freshwater CCME WQG

# FIGURES




References:

(above) Google Earth satellite image, 2008.

(right)
Natural Resources Canada NTS Sheet: 25-N/9 Burton Bay, Nunavut, Edition 3, NAD 83, Series A 713, 2001.
Natural Resources Canada NTS Sheet: 25-N/10 Hill Island, Nunavut, Edition 2, NAD 83, Series A 713, 2001.
Natural Resources Canada NTS Sheet: 25-N/15 Iqaluit, Nunavut, Edition 2, NAD 83, Series A 713, 2001.
Natural Resources Canada NTS Sheet: 25-N/16 [No Title] Nunavut, Edition 2, NAD 83, Series A 701, 2001.
(Note: ground elevations shown in metres above mean sea level).

Title: SITE LOCATION

ARCADIS

Project: FORMER IQALUIT METAL DUMP AND COMMUNITY LANDFILL SITE REMEDIATION SUMMARY REPORT

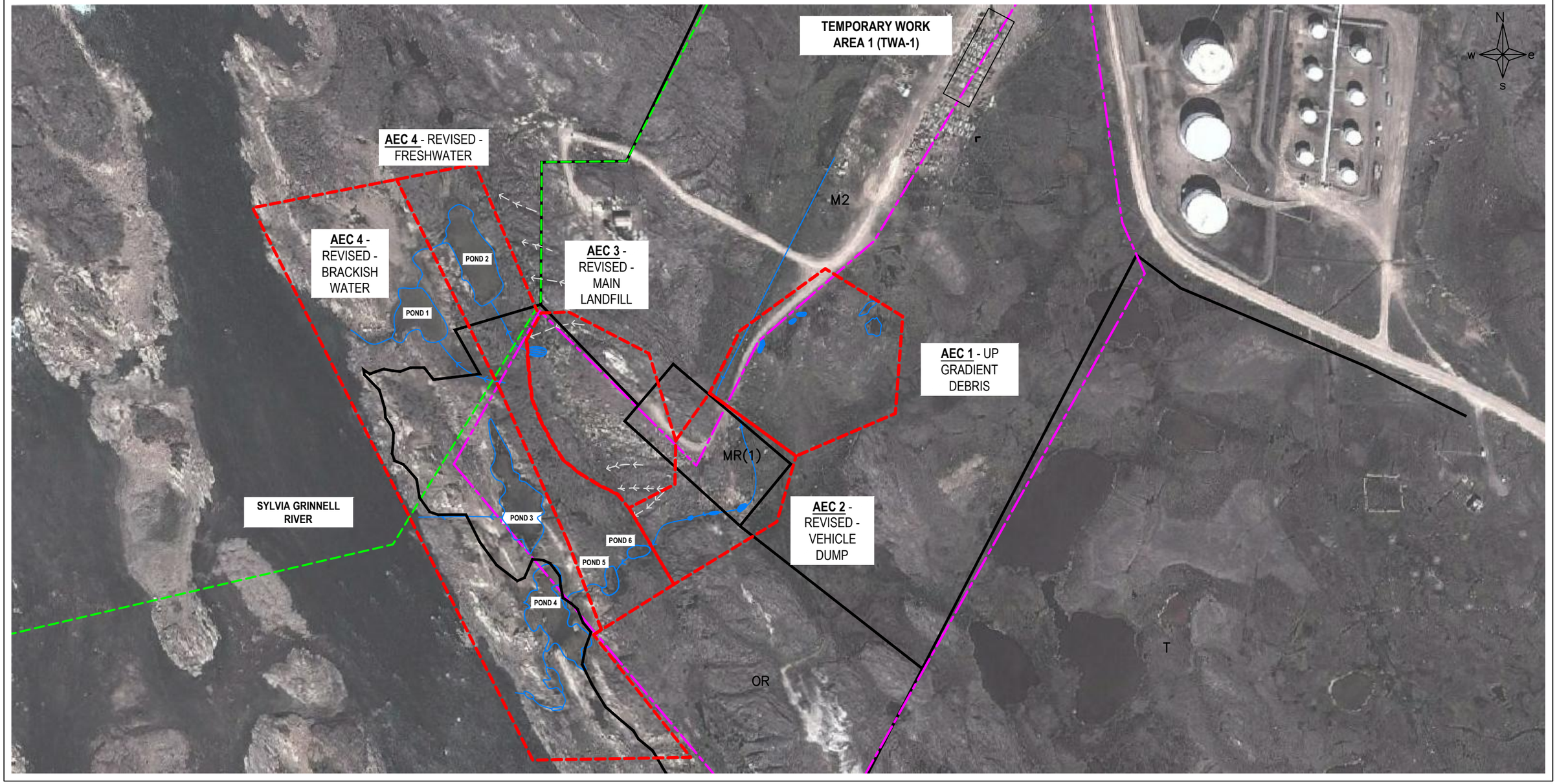
Date: FEBRUARY 2018

Client: PSPC - TRANSPORT CANADA

SCALES AS SHOWN

FIGURE 1

Z:\Projects\2009\1584-0901 TC Iqaluit Landfill\Figures\102153-000 Location.dwg




LEGEND:

- PROPERTY BOUNDARY
- PARK BOUNDARY
- IQALUIT ZONING OVERLAY
  - OR = OPEN AREA ZONE
  - MR1 = MUNICIPAL RESERVE ZONE (FORMER DISPOSAL SITE ALLOWANCE)
  - M2 = HEAVY INDUSTRIAL ZONE
  - T = TRANSPORTATION ZONE
- WATER
- ADJUSTED FORMER AREAS OF ENVIRONMENTAL CONCERN (AEC)

*REFERENCE: BACKGROUND IMAGE OBTAINED FROM GOOGLE EARTH, 2008*

Metres
75 0 75 150
1:3600

*Original in colour

Title: FORMER AEC BOUNDARIES

Project: FORMER IQALUIT METAL DUMP AND COMMUNITY LANDFILL SITE REMEDIATION SUMMARY REPORT

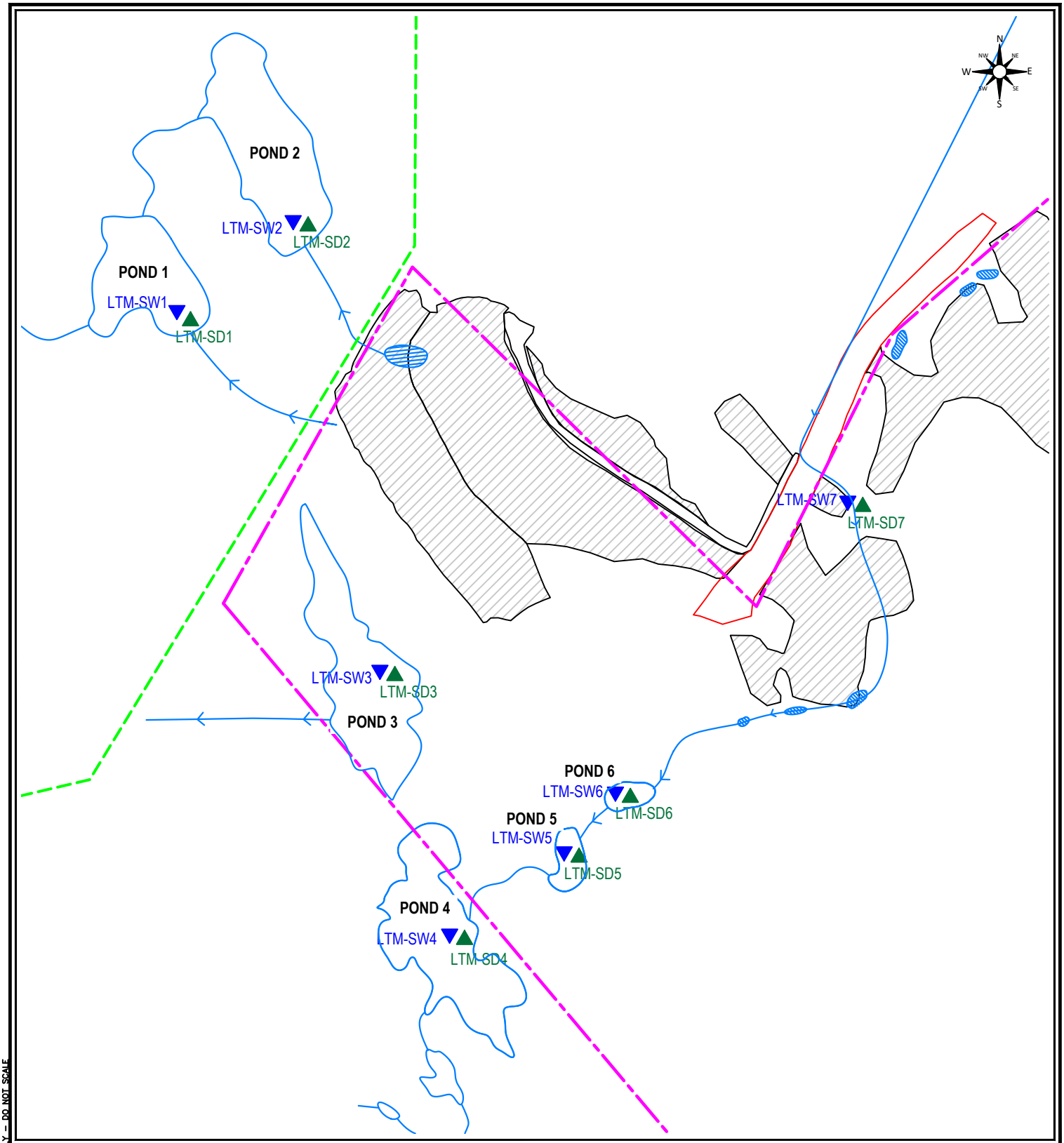
Client: PSPC - TRANSPORT CANADA

ARCADIS

Date: FEBRUARY 2018

FIGURE 2

Z:\Projects\2009\1584-0901 TC Iqaluit Landfill\Figures\102153-000_remediation_report_2018-01-02.dwg




Legend

- POOLING WATER
- PROPERTY BOUNDARY
- PARK BOUNDARY
- STREAM/DRAINAGE
- EXTENT OF COMPLETED LANDFILL & CAPPING
- ACCESS ROAD

LONG TERM MONITORING SAMPLES

- LTM-SW4 ▼ SURFACE WATER SAMPLE STATION
- LTM-SD4 ▲ SEDIMENT SAMPLE STATION

Metres
25 0 25 50
1:2250

Title: LONG TERM MONITORING SAMPLE LOCATIONS

Project: FORMER IQALUIT METAL DUMP AND COMMUNITY LANDFILL SITE REMEDIATION SUMMARY REPORT

Client: PSPC - TRANSPORT CANADA

ARCADIS

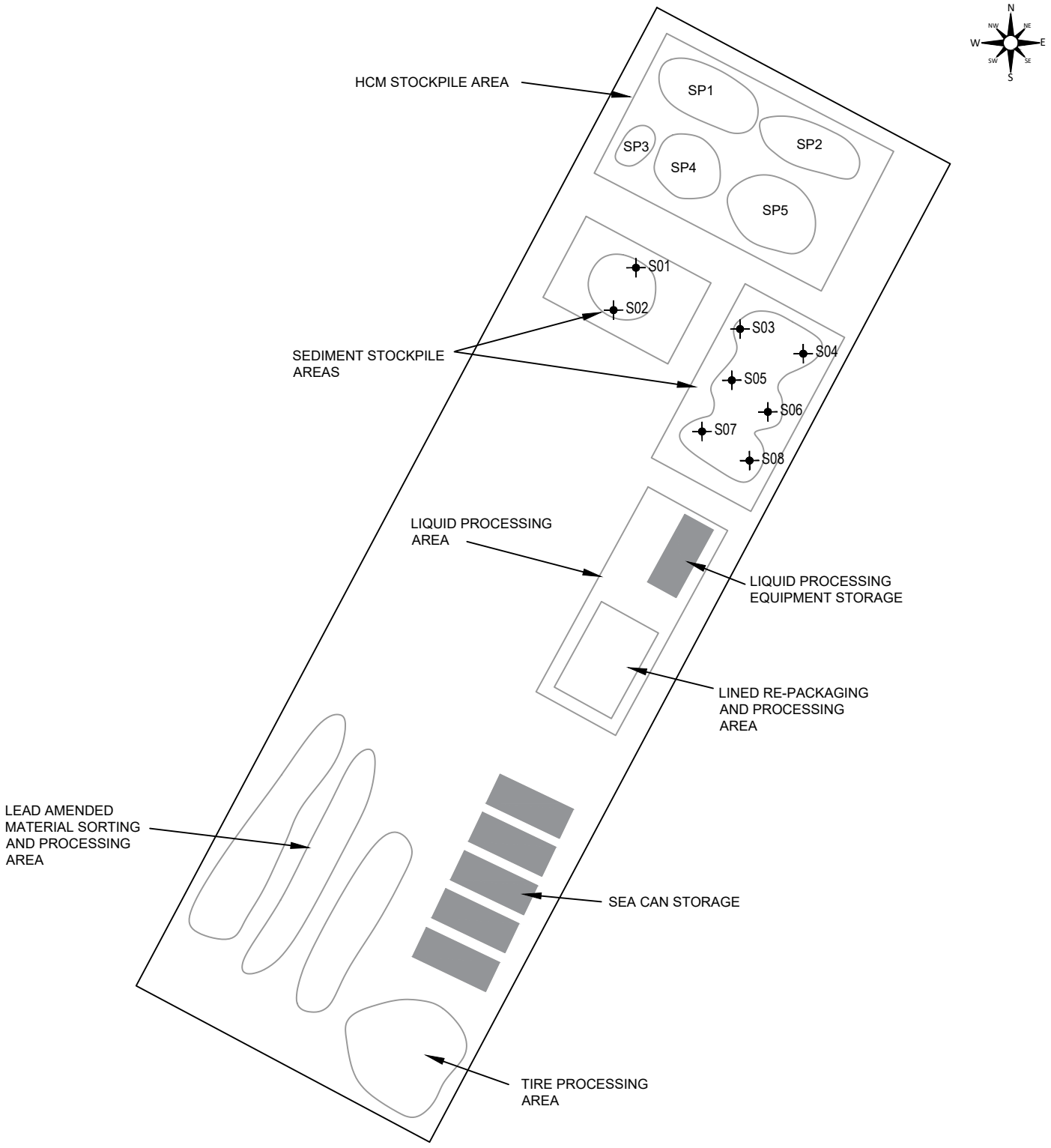
Date: FEBRUARY 2018

FIGURE 3

TO BE PRINTED IN COLOUR ON 8.5"X11" PAPER ONLY – DO NOT SCALE

updated on: 3-Jan-18 by rfletcher

C:\Users\rfletcher\Desktop\Remedial Reporting\102153-000_remediation_report_2018-01-02.dwg(layout)




Legend

GRAB SAMPLE LOCATION

Metres
5 0 5 10
1:460

Note: HCM stockpile sampling was conducted by collecting five discrete grab samples and creating one composite sample for each stockpile

| | |
|---|---|
| Title: | HCM & SEDIMENT STOCKPILES |
| Project: | **FORMER IQALUIT METAL DUMP AND COMMUNITY LANDFILL SITE REMEDIATION SUMMARY REPORT** |
| Client: | PSPC - TRANSPORT CANADA |
| | FEBRUARY 2018 |
| | FIGURE 4 |

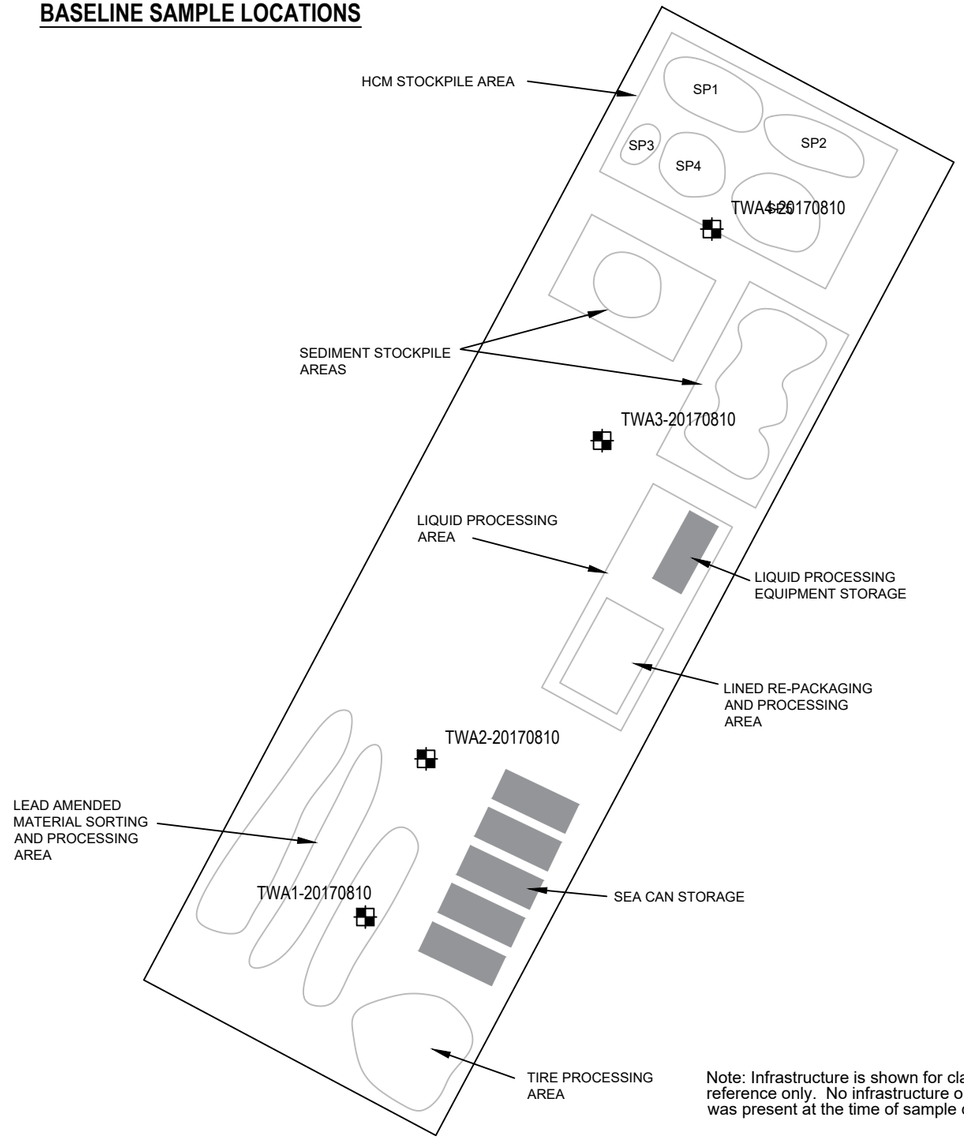
ARCADIS

TO BE PRINTED IN COLOUR ON 8.5"X11" PAPER ONLY - DO NOT SCALE

updated on: 3-Jan-18 by rfletcher

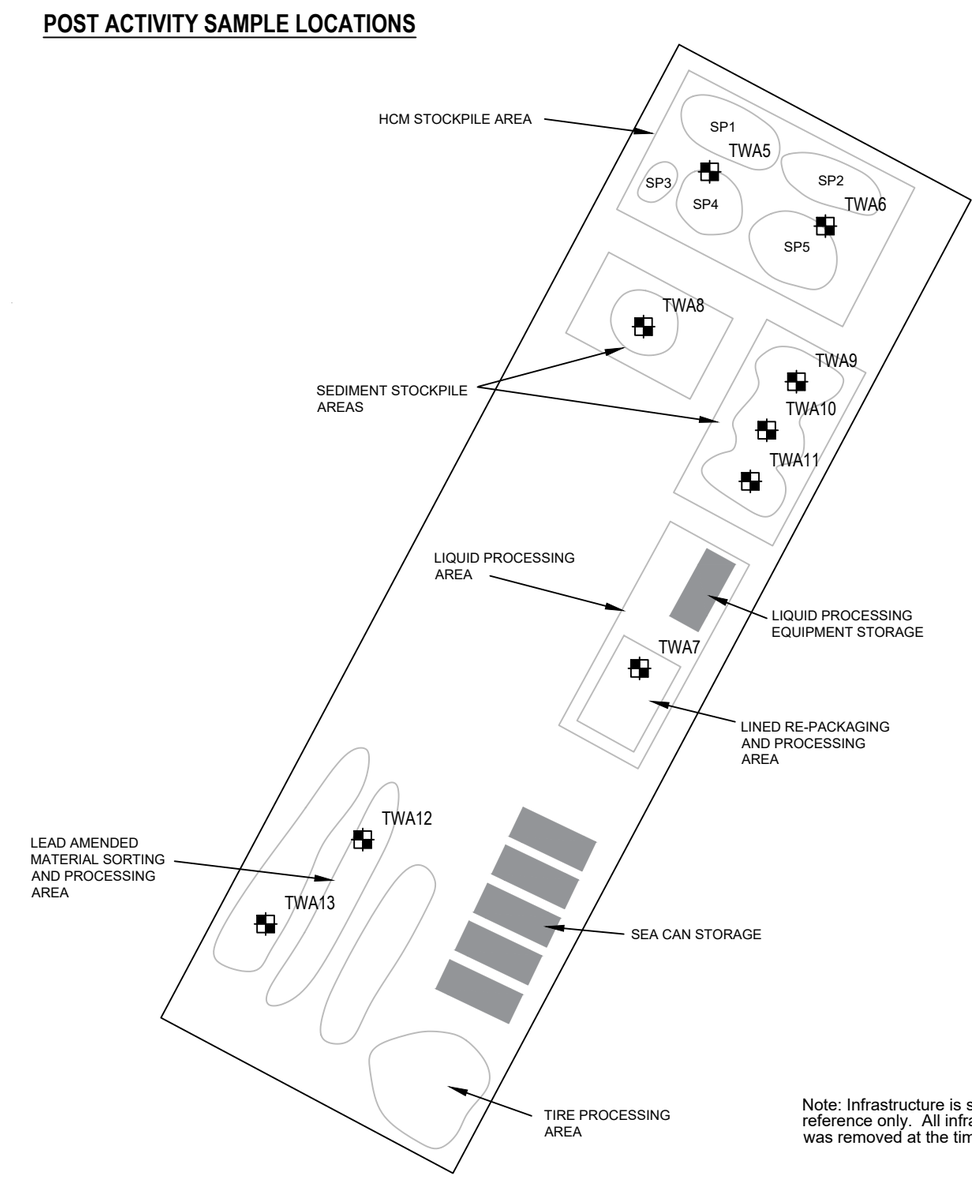
C:\Users\rfletcher\Desktop\Remedial Reporting\102153-000_remediation_report_2018-01-02.dwg(layout)

## BASELINE SAMPLE LOCATIONS




Note: Infrastructure is shown for clarity and reference only. No infrastructure or material was present at the time of sample collection.

## POST ACTIVITY SAMPLE LOCATIONS




Note: Infrastructure is shown for clarity and reference only. All infrastructure and material was removed at the time of sample collection.

LEGEND:

TEST PIT LOCATION

Metres

10 0 10 20

Approximately 1:490

Title: TEMPORARY WORK AREA SAMPLE LOCATIONS

Project: **FORMER IQALUIT METAL DUMP AND COMMUNITY LANDFILL SITE REMEDIATION SUMMARY REPORT**

Client: PSPC - TRANSPORT CANADA

ARCADIS

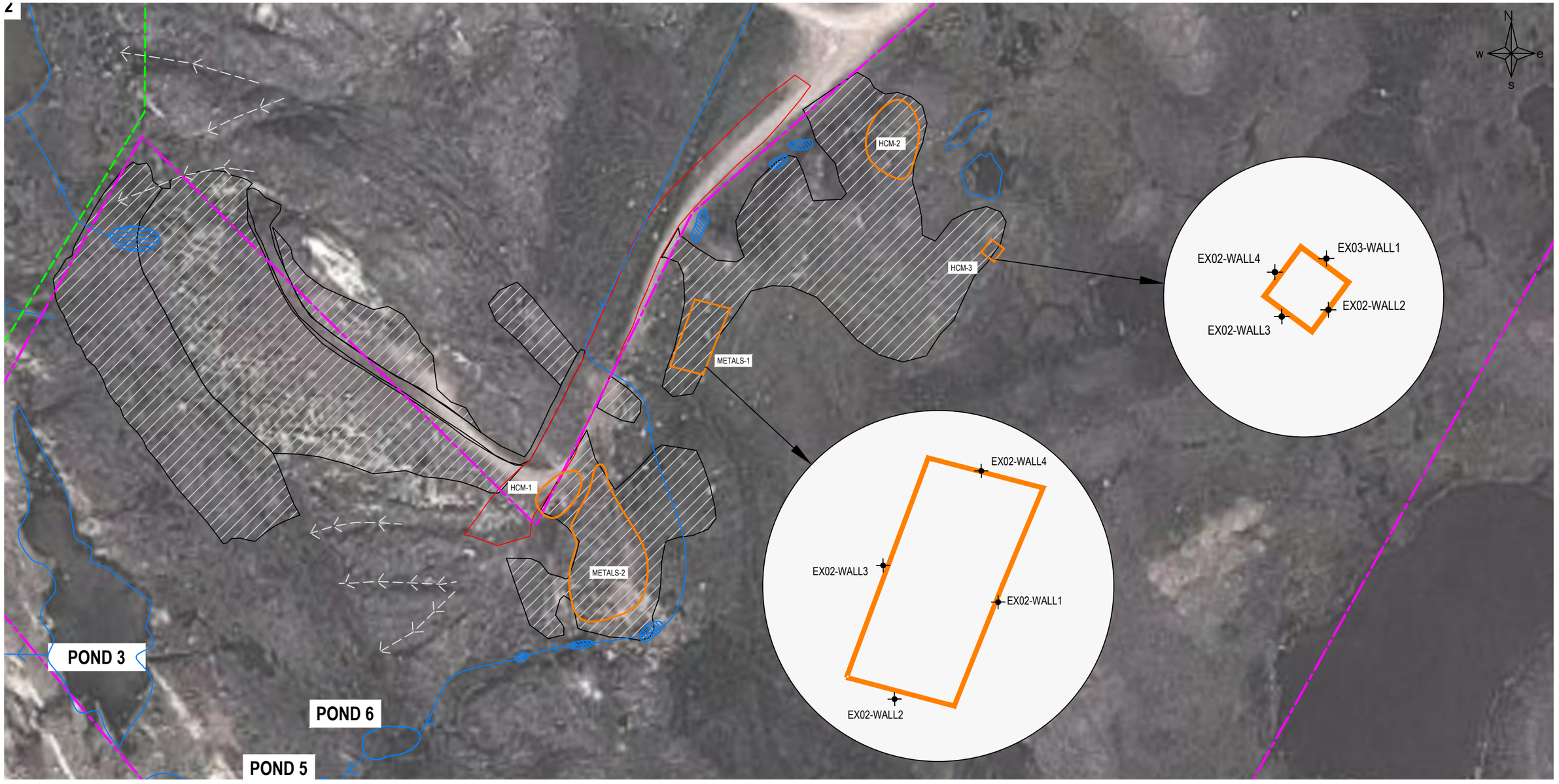
Date: FEBRUARY2018

FIGURE 5

*Original in colour

updated on: 3-Jan-18

Z:\Projects\2009\1584-0901 TC Iqaluit Landfill\Figures\102153-000_remediation_report_2018-01-02.dwg




LEGEND:

- POOLING WATER
- PROPERTY BOUNDARY
- PARK BOUNDARY
- STREAM/DRAINAGE
- EXTENT OF COMPLETED LANDFILL & CAPPING
- ACCESS ROAD
- EXCAVATION OUTLINE
- GRAB SAMPLE LOCATION

Notes:
1 - All excavations were excavated to either bedrock (HCM-1 and Metals-2) or permafrost (HCM-2, HCM-3 and Metals-1); therefore, no excavation confirmatory floor sampling was required.

2 - Excavations HCM-1, HCM-2 and Metal-2 were all excavated with wall that tapered to bedrock contours; therefore, no confirmatory excavation wall sampling was required.

*REFERENCE: BACKGROUND IMAGE OBTAINED FROM GOOGLE EARTH, 2008*

Metres
25 0 25 50
1:1445

Title: FORMER AEC BOUNDARIES

Project: **FORMER IQALUIT METAL DUMP AND COMMUNITY LANDFILL SITE REMEDIATION SUMMARY REPORT**

Client: PSPC - TRANSPORT CANADA

ARCADIS

Date: FEBRUARY 2018

FIGURE 6

*Original in colour

updated on: 3-Jan-18

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# APPENDIX A

## Health and Safety Plan

# Description of Accidental Event

Kudlik Construction Ltd.

## 1. Identification

Hitachi 350 excavator with shear #90-47

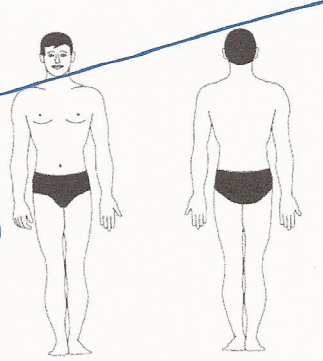
| | | | |
|---|---|---|---|
| Name (Block letters) | Garneau | Date of event | 2017-08-19 |
| First name | Yvan | Time of event | 13h30 |
| Id. number | | Body injury | ☐ yes ☒ no |
| Function, posting | Excavator operator | Material Damage | ☒ yes ☐ no |

## 2. First Aid Provided

Section to be filled by the first-aid worker

| | |
|---|---|
| First aid provided? | ☐ yes ☐ no |
| Type of injury | |
| Part of body affected | |
| Description of first aid provided | |
| Medical follow-up suggested | ☐ yes ☐ no |
| Name of First aid worker | |
| Signature of First aid worker | |
| Date and time | |

Environnement incident
Minor discharge of 4 liters of hydraulic oil with excavator (shear)



## 3. Worker

Section to be filled by the worker

| | |
|---|---|
| Exact location of event | Zone 1 - Ace 2 Metal Dump Remediation |
| Activity at time of event | Sorting Metal |

Description of the event or task that caused (or could have caused) an accident - Activity, equipment, material, locale, etc.

Broken o-ring
Minor spill.

Can you suggest any recommendation to prevent a reoccurence of this event? Please explain

No

| | | | |
|---|---|---|---|
| Signature of worker | | Name of witnesses (if any) | Sylvain St-Onge Volvo operator |
| Date and time | 2017 19 08 1:30 pm | | |

## 4. Employer

Section to be filled by the employer

| | | | |
|---|---|---|---|
| Temporary assignment form handed out to worker? | ☐ yes ☒ no | Has stopped working on the day of event | ☐ yes ☒ no |
| Accident report received by | Melissa Parent | Date | 2017-08-19 |
| Title or department | Safety Agent | | |

Immediate corrective measure(s) taken (i.e. immediately, before the investigation)

→ Stopping the oil leak
→ Picking up the minor spill
→ Shear excavator repair.

| | | |
|---|---|---|
| Signature of employer | Melissa Parent | |
| Date and time | 2017-08-20 | 13h15 |

Fill in the **Accident Investigation Report** when the accidental event:

- ☒ has caused injuries or damages, *or*
- ☐ might have caused severe injuries or damages, *or*
- ☐ is likely to happen again.

Give a copy of this report to: management • worker • health and safety committee other person: MP.

# Description de l'événement accidentel

Kudlik Construction Ltd.

## 1. Identification

Pelle Hitachi 350 #90-47 avec shear

| | | | | | | |
|---|---|---|---|---|---|---|
| Nom (Lettres moulées) | Garneau | Date de l'événement | 2017-08-19 | | | |
| Prénom | Yvan | Heure de l'événement | 13h 30 | | | |
| N° identification | | Blessure Corporelle | | oui | X | non |
| Poste, fonction | Operateur | Dommage Matériel | X | oui | | non |

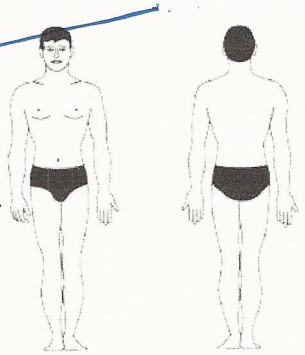
## 2. Premiers secours

Section remplie par le secouriste

| | |
|---|---|
| Premiers secours dispensés | ☐ oui ☐ non |
| Nature de la lésion | |
| Partie du corps affectée | |
| Nature des premiers secours dispensés | |
| Consultation médicale suggérée | ☐ oui ☐ non |
| Nom du secouriste (Lettres moulées) | |
| Signature du secouriste | |
| Date et heure | |

Incident Environnement

Déversement mineur ± 4 litres d'huile hydraulique avec la pelle shear #90-47.



## 3. Le travailleur

Section remplie par le travailleur

| | |
|---|---|
| Lieu précis de l'événement | ZONE 1 ACE 2 DEPLACEMENT REMEDIATION METAL DUMPE |
| Activité ou tâche exercée | TRIAGE DE METAL SHEAR |

Description de l'événement ou de la situation à risque - Tâche, gestes, équipements, matériel (poids et dimension), lieux, etc.

UN O RING BRISÉ 3-4 GOUTE CEGONDE

Avez-vous des recommandations pour éviter qu'un autre événement du genre ne se reproduise ? Expliquez

NON

| | | | |
|---|---|---|---|
| Signature du travailleur | | Nom des témoins (s'il y a lieu) | Sylvain St-Onge Operateur du Volvo. |
| Date et heure | 2017 19 08 | 1:30 pm | |

## 4. L'employeur

Section remplie par l'employeur

| | | | |
|---|---|---|---|
| Formulaire d'assignation temporaire remis au travailleur | ☐ oui ☒ non | Abandon du travail le jour de l'événement | ☐ oui ☒ non |
| Déclaration reçue par | Mélissa Parent | Date | 2017-08-19 |
| Poste ou fonction | Safety agent | | |

Mesure(s) immédiate(s) apportée(s) en attendant les résultats de l'enquête

- Arrêt de la fuite d'huile
- Rammassage du déversement mineur
- Réparation de la pelle

| | | |
|---|---|---|
| Signature de l'employeur | Mélissa Parent | |
| Date et heure | 2017-08-20 | 13h15 |

Remplir le rapport **Enquête et analyse d'accident** lorsque l'événement accidentel :

- ☒ a causé des blessures ou des dommages,
  OU
- ☐ aurait pu causer des blessures ou des dommages importants,
  OU
- ☐ pourrait se reproduire.

Remettre une copie à : la direction • le travailleur • le comité de santé et de sécurité
autre personne : MP.

# Investigation and Analysis of Accident

Kudlik Construction Ltd.

| | | | |
|---|---|---|---|
| Name | Garneau | Date of event | 2017-08-19 |
| First name | Yvan | Attached documents | ☐ drawings ☒ photos ☐ _____ |

## 1. Fact Collection and Identification of Causes

Section to be filled by inquirers (add sheets if needed)

| | Identify facts. Tell how was the... | Why? |
|---|---|---|
| **Individual** Personal protective equipment, experience, clothing, etc. | All PPE - OK | When moving excavator on site, a hydraulic hose leak. Defect oring : conclusion after |
| **Task** Procedures and methods used, actions and movements, etc. | Excavator operator | mechanical repair. The excavator has moved on a short distance. (See plan below) |
| **Premises** Locale, work environment, floor, lightning, noise, temperature, etc. | Remediation Metal Dump Iqaluit NU. | A worker on site warned the excavator operator about the leak. The excavator operator |
| **Equipment** Tools, material, machines, furniture, etc. | Hitachi 350 excavator with shear # 90-47 } Hitachi Hydraulic Oil. | stopped immediatly. The spill was picked-up. Absorbants were placed below |
| **Moment** Day and date, shift, cadence, overtime, etc. | Beginning of the afternoon. | the leak on the excavator. The superintendant on site and the mechanic was notified. |
| **Organization** Procedures, supervision, training, standards, safety procedures, etc. | | |

## 2. Investigation Results

Summarize the fact collection

Accidental spill of hydraulic oil because a mechanical break on the excavator. The contaminated soil is collected and stored in a pan. The material will be treated with other contaminated materials on site. (4 liters of gravel and contaminated sand)

## 3. Safety Measures to be Implemented

| Mandatory Corrective measures and Recommendations | Responsible | Deadline | Follow-up |
|---|---|---|---|
| → Spill Collect | | | |
| → Treatment of contaminated material ... with other material on site. | | | |
| → Repair of mechanical breakage on the excavator - D. Rioux - 2017-08-20. | | | |
| | | | |
| | | | |

| | | | |
|---|---|---|---|
| Investigator | Mélissa Parent | Asst. Investigator | — |
| Signature | Mélissa Parent | Signature | — |
| Date | 2017-08-20 | Date | — |

Give a co

MP.

# Enquête et analyse d'accident

Kudlik Construction Ltd.

| | | | |
|---|---|---|---|
| Nom | Garneau | Date de l'événement | 2017-08-19 |
| Prénom | Yvan | Documents joints | ☐ croquis ☒ photos ☐ ____ |

## 1. Cueillette des faits et identification des causes

Section remplie par les enquêteurs (ajouter des feuilles au besoin)

| | Identifiez les faits. Indiquez comment était... | Pourquoi ? |
|---|---|---|
| **Individu** Équipement de protection individuelle, expérience, habillement, etc. | Tous les PPE ok | Lors du déplacement en traction avec la pelle sur le site, une ose hydraulique fuit. |
| **Tâche** Procédures, méthodes, gestes, mouvements, etc. | Operateur de pelle | (O-ring défectueux : constat après les réparation mécanique) La pelle s'est déplacée sur |
| **Lieu** État des lieux, sol, éclairage, température, bruit, etc. | Remediation Metal Dump Iqaluit NU | une courte distance. Voir plan ci-joint. Un travailleur sur le site a averti l'opérateur |
| **Équipement** Outils, matériel, machine, mobilier, etc. | Pelle Hitachi 350 avec shear #90-47 ⇒ Huile Hydraulique Hitachi | de la pelle au sujet de la fuite. L'operateur a arrêté la pelle immédiatement. |
| **Moment** Journée, quart de travail, rythme de travail, temps supplémentaire, etc. | Début de l'après-midi | Le déversement fut ramassé Des absorbants ont été placés en dessous de la fuite sur |
| **Organisation** Directives, supervision, formation, normes, méthodes sécuritaires, etc. | | la pelle. Le surintendant sur le site a été avisé ainsi que le mécanicien. |

## 2. Résultats de l'enquête

Résumer la cueillette des faits

Déversement accidentel d'huile hydraulique due a un bris mécanique sur la pelle. Le sol contaminé est ramassé et emmagasiné dans une chaudière. Le matériel sera traité avec les autres matériaux contaminés sur le site. (± 4 litres de gravier et sable contaminé)

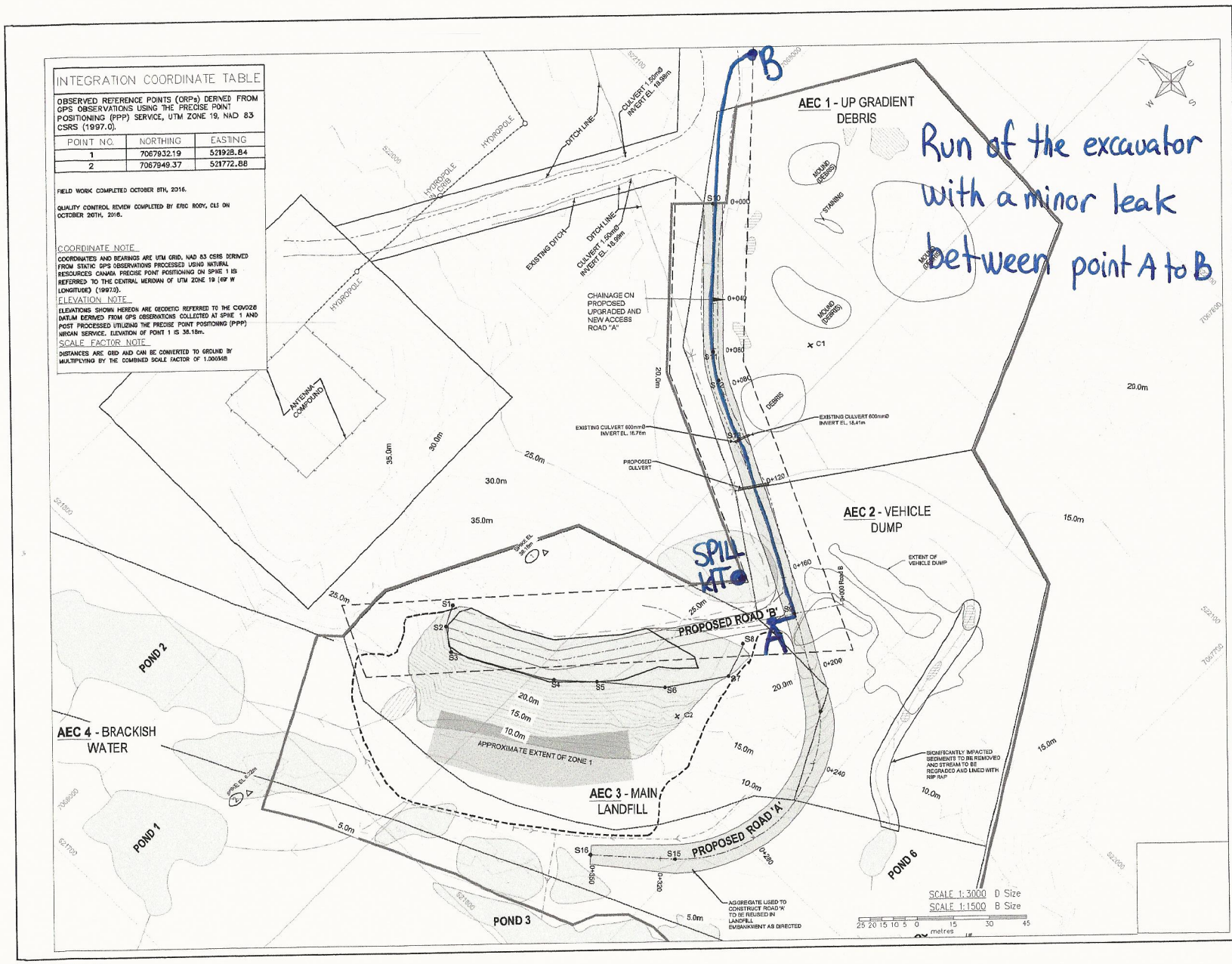
## 3. Mesures de sécurité à apporter

| Correctifs et recommandations | Responsable | Échéancier | Suivi |
|---|---|---|---|
| - Ramassage du déversement | Y. Garneau | Immédiatement | |
| - Traitement du matériel contaminé ... | avec les | autres materiaux du site. | |
| - Réparation du bris mécanique sur la pelle | D. Rioux | 20-08-2017 | |
| | | | |
| | | | |

| | | | |
|---|---|---|---|
| Enquêteur | Mélissa Parent | Assistant enquêteur | — |
| Signature | Melissa Parent | Signature | — |
| Date | 2017-08-20 | Date | — |

Remettre une copie à : la direction • le travailleur • le comité de santé et de sécurité
autre personne : MP.

Rév. 2014-02-05




Public Works and Government Services Canada | Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES
Western Region
SERVICES IMMOBILIERS
Région de l'ouest

**PRELIMINARY**
**NOT FOR CONSTRUCTION**

- AREA OF PROPOSED WORK
- FENCE
- EXTENT OF EXPOSED LANDFILL
- EDGE OF EXISTING ROAD
- ROAD ALLOWANCE
- PROPOSED ROAD - EDGE
- PROPOSED ROAD - CENTRELINE
- TOE/EDGE OF PROPOSED LANDFILL EMBANKMENT
- EXISTING GROUND SURFACE CONTOUR
- PROPOSED DITCHES/SWALES
- EXISTING DITCHES
- ROCK OUTCROP
- LIMITS OF EXISTING WASTE
- SURFACE WATER POOL
- AREA OF DEBRIS/STAINING TO BE CLEANED UP AND CAPPED
- SETTING OUT POINT (S1)

| Revision | Description | Date |
|---|---|---|
| 5 | | |
| 4 | | |
| 3 | | |
| 2 | | |
| 1 | Issued for Tender | May 2017 |
| 0 | Design Completion | April 2017 |

Client
**PWGSC for Transport Canada**

Project title
**REMEDIATION AT FORMER METAL DUMP AND COMMUNITY LANDFILL AT IQALUIT, NUNAVUT**

Drawn by: **PAF**
Designed by: **GFP**
Approved by: **SL/CG**
PWGSC Project Manager: **Michael Brownlee**

Drawing title
**OVERVIEW OF PROPOSED WORKS**

| Project no. | Sheet | Revision |
|---|---|---|
| R.083118 | C02 | 0 |

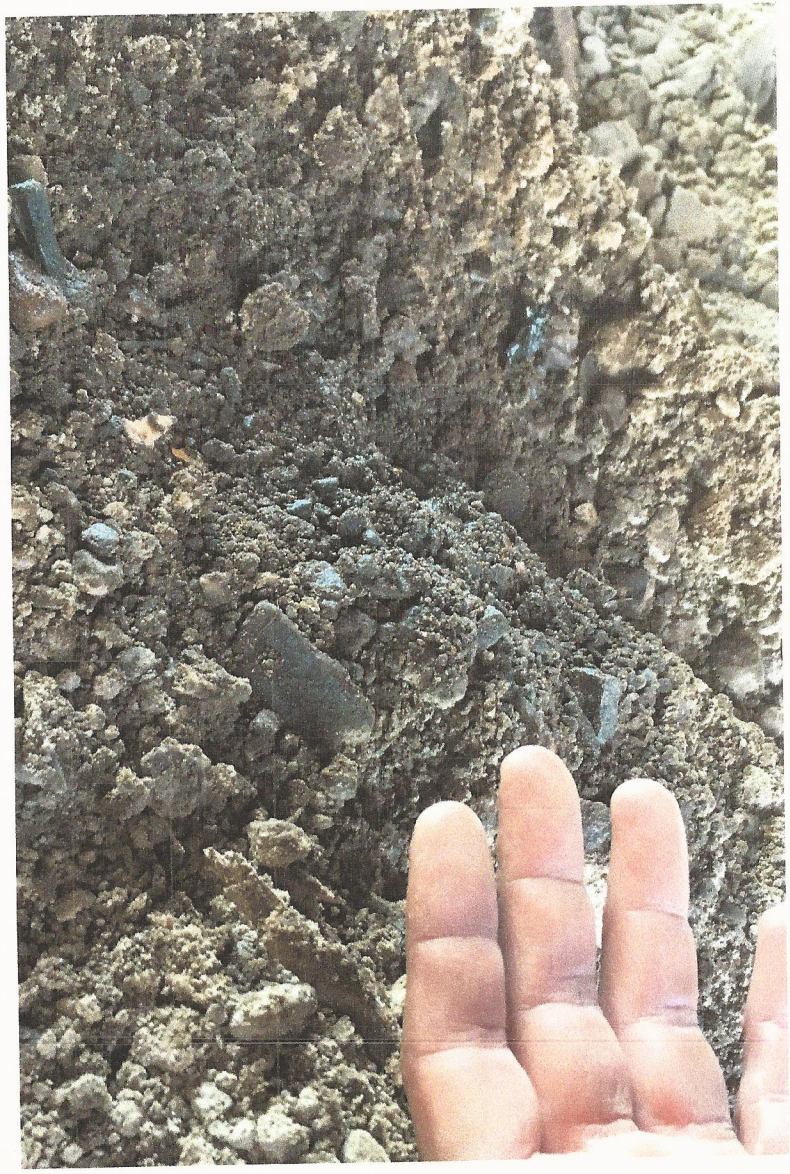
A000

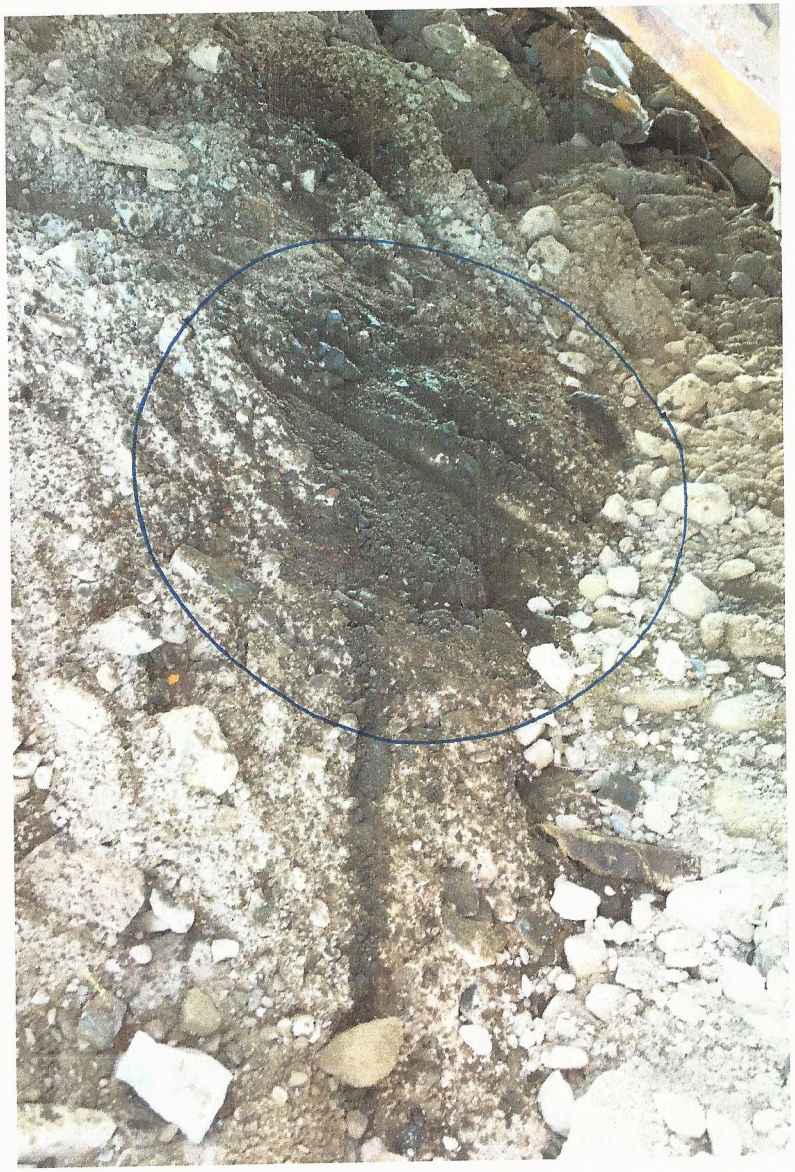
PWGSC – ANSI B–L1 – 11X17

p.5/9

2017-08-19 Spill with Hitachi 350 excavator Metal Dump Remediation 2017-093

2017-08-19 Spill with Hitachi 350 excavator Metal Dump Remediation 2017-093





Spill below the excavator.

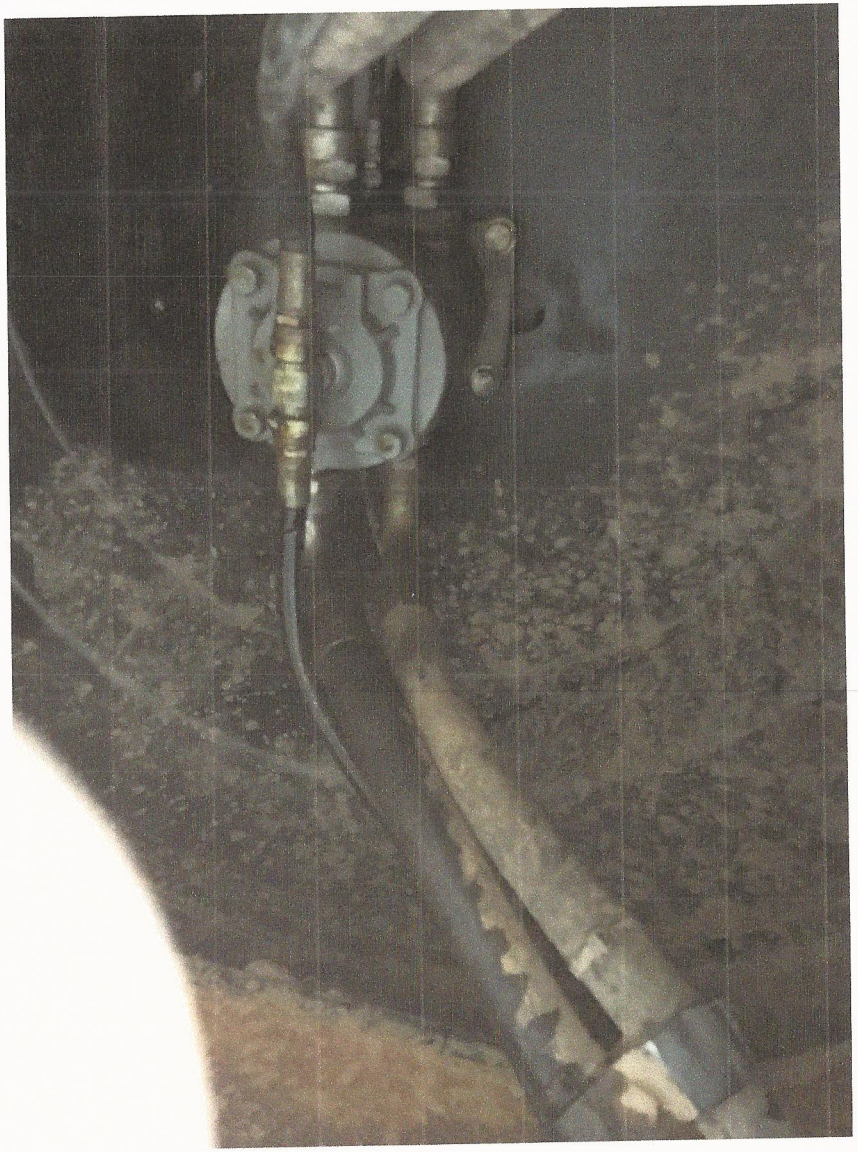
2017-08-19 Spill with Hitachi 350 excavator

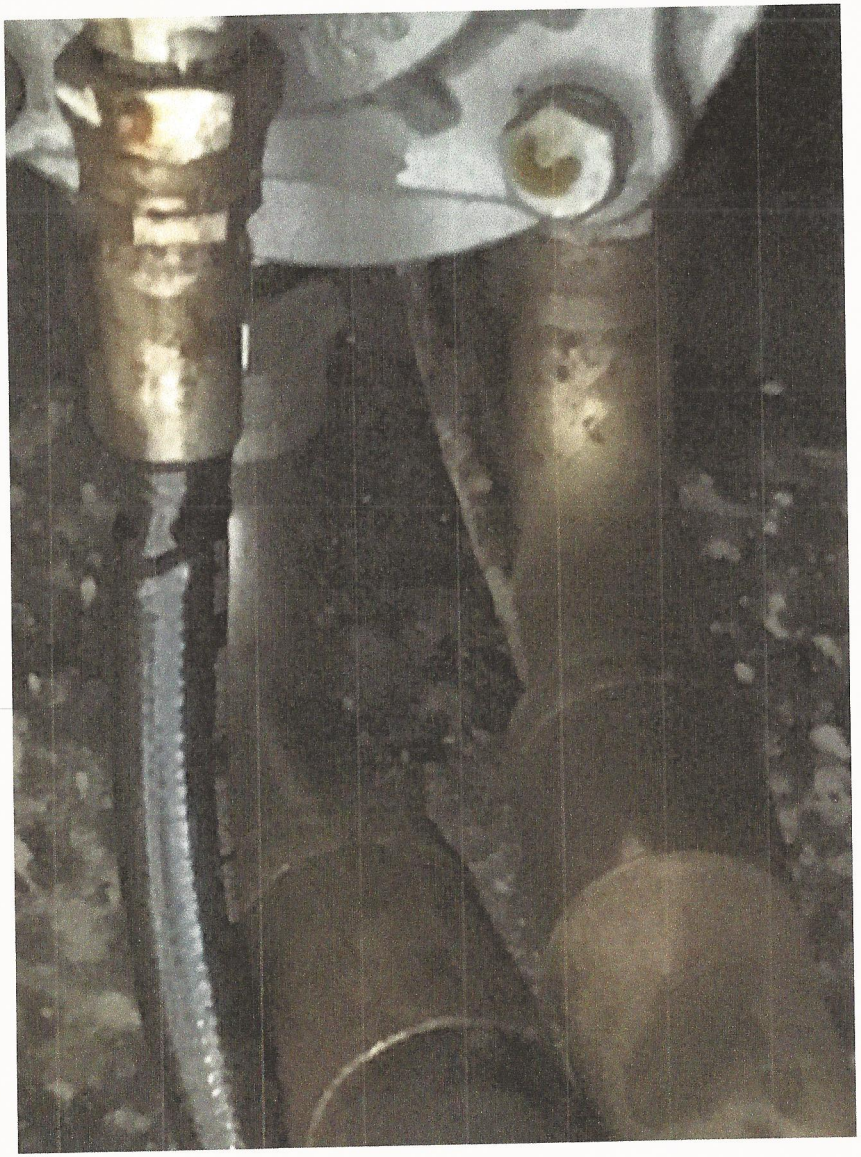
Contaminated soil.

Metal Dump Remediation 2017-093

Spill at point A

2017-08-19 Spill with Hitachi 350 excavator Metal Dump Remediation 2017-093





Origin of the spill on the excavator.
Broken "O-ring" on the hose of the traction of the excavator.

# Field Safety Inspection

| FIED SAFETY INSPECTION (VISIBLE FIELD LEADERSHIP) | To Standard / Safe | | | Rectified | |
|---|---|---|---|---|---|
| Kudlik Construction Ltd. | NA | No | Yes | No | Yes |
| **A. WORKING HABITS / COMPETENCY / BEHAVIOURS** | | | | | |
| PPE (well worn) | | | X | | |
| Risk awareness | | | X | | |
| Positions of people | | | X | | |
| Competency & training | | | | | |
| Attention / understand task | | | | | |
| Emergency procedure | | | X | | |
| **B. HOUSEKEEPING / WORK ENVIRONMENT** | | | | | |
| Access / egress | | | X | | |
| Safe working platforms | X | | | | |
| Trips / slips / falls / tidy | | | X | | |
| Lighting | X | | | | |
| Scaffolding | X | | | | |
| Hygiene lunch room | | | X | | |
| **C. COMMUNICATION & PROCEDURES / JHA / RA** | | | | | |
| Signage (posters) | | | | | |
| Toolbox talks / Tailboard | | | X | | |
| JSA covering job (subcontractor) | X | | | | |
| Advised workers around (risks) | | | X | | |
| Non-verbal / verbal attitude | | | X | | |
| **D. MANUAL HANDLING & ERGONOMICS** | | | | | |
| Awkward positions / posture | | | | | |
| Repetitive motions | | | | | |
| Over exertion | | | | | |
| **E. PROTECTION & ELEVATED WORK / RESCUE** | | | | | |
| Attached at all times | X | | | | |
| Barricading | X | | | | |
| Overhead protection | X | | | | |
| Lanyards on all tools | X | | | | |
| Stacking & storage | X | | | | |
| Rescue plan / procedures | X | | | | |
| **F. PLANT & EQUIPMENT** | | | | | |
| Mechanical | | | | | |
| Electrical / energy | | | | | |
| Tools & portable equipment | X | | | | |
| Mobile / transport | | | X | | |
| Lifting & rigging (daily inspection) | | | | | |
| **G. HAZARDS & HAZARDOUS WORK** | | | | | |
| Physical | | | | | |
| Chemical | | | | | |
| Biological | | | | | |
| Environmental | | | X | | |
| Confined space | X | | | | |
| Hot work | X | | | | |
| TOTAL SCORE (out of 38) | | | | | |

*Red - Indicates Critical Few*

| | | |
|---|---|---|
| Audit Date : | 2017-09-10 | Time : PM |
| Project Number : | 2017-093 | |
| Project Name : | Remediation Metal Dump | |
| Audit Location : | Iqaluit NU | |
| Contractor : | Kudlik Constructions ltd. | |
| | Name | Personnal ID |
| Auditor : | Melissa Parent | Safety Agent |
| Audit Team : | | |
| | | |
| | | |
| | Observed | Spoken to |
| Number persons : | Plusieurs camionneurs + 2 | |
| Number persons working safety : | travailleurs sur site. | |
| Number persons working unsafety : | ~~0~~ | |

**SAFE ACTS OBSERVED & COMMENDATIONS**

- All PPE for workers on site.
- Break container is clean.
- Refill of safety equipments First Aid kit (qt. 2), refill bottles of cleaning glasses.
- Give tinted glasses to Ralph. Give new gloves.
- Reminder on safe driving for truckers at the tailboard meeting.

**AT RISK BEHAVIOURS OBSERVED**

Nothing.

**CORRECTIVE ACTIONS REQUIRED**

| Action | Assigned to | Priority * | Due Date |
|---|---|---|---|
| Refill safety equipment | M. Parent | Low | Immediatly. |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Entered by : Melissa Parent Date : 2017-09-10

(Priority* H = high M = medium L = low)

Notes :

# Field Safety Inspection

| FIED SAFETY INSPECTION (VISIBLE FIELD LEADERSHIP) | To Standard / Safe | | | Rectified | |
|---|---|---|---|---|---|
| Kudlik Construction Ltd. | NA | No | Yes | No | Yes |
| **A. WORKING HABITS / COMPETENCY / BEHAVIOURS** | | | | | |
| PPE (well worn) | | | X | | |
| Risk awareness | | | X | | |
| Positions of people | | | X | | |
| Competency & training | | | | | |
| Attention / understand task | | | | | |
| Emergency procedure | | | X | | |
| **B. HOUSEKEEPING / WORK ENVIRONMENT** | | | | | |
| Access / egress | | | X | | |
| Safe working platforms | X | | | | |
| Trips / slips / falls / tidy | | | X | | |
| Lighting | X | | | | |
| Scaffolding | X | | | | |
| Hygiene lunch room | | | X | | |
| **C. COMMUNICATION & PROCEDURES / JHA / RA** | | | | | |
| Signage (posters) | | | | | |
| Toolbox talks / Tailboard | | | X | | |
| JSA covering job (subcontractor) | X | | | | |
| Advised workers around (risks) | | | X | | |
| Non-verbal / verbal attitude | | | X | | |
| **D. MANUAL HANDLING & ERGONOMICS** | | | | | |
| Awkward positions / posture | | | | | |
| Repetitive motions | | | | | |
| Over exertion | | | | | |
| **E. PROTECTION & ELEVATED WORK / RESCUE** | | | | | |
| Attached at all times | X | | | | |
| Barricading | X | | | | |
| Overhead protection | X | | | | |
| Lanyards on all tools | X | | | | |
| Stacking & storage | X | | | | |
| Rescue plan / procedures | X | | | | |
| **F. PLANT & EQUIPMENT** | | | | | |
| Mechanical | | | | | |
| Electrical / energy | | | | | |
| Tools & portable equipment | X | | | | |
| Mobile / transport | | | X | | |
| Lifting & rigging (daily inspection) | | | | | |
| **G. HAZARDS & HAZARDOUS WORK** | | | | | |
| Physical | | | | | |
| Chemical | | | | | |
| Biological | | | | | |
| Environmental | | | X | | |
| Confined space | X | | | | |
| Hot work | X | | | | |
| TOTAL SCORE (out of 38) | | | | | |

*Red - Indicates Critical Few*

| | | |
|---|---|---|
| Audit Date : | 2017-09-10 | Time : PM |
| Project Number : | 2017-093 | |
| Project Name : | Remediation Metal Dump | |
| Audit Location : | Iqaluit NU | |
| Contractor : | Kudlik Constructions ltd. | |
| | Name | Personnal ID |
| Auditor : | Melissa Parent | Safety Agent |
| Audit Team : | | |
| | | |
| | | |
| | Observed | Spoken to |
| Number persons : | Plusieurs camionneurs + 2 | |
| Number persons working safety : | travailleurs sur site. | |
| Number persons working unsafety : | ~~0~~ | |

**SAFE ACTS OBSERVED & COMMENDATIONS**

- All PPE for workers on site.
- Break container is clean.
- Refill of safety equipments First Aid kit (qt. 2), refill bottles of cleaning glasses.
- Give tinted glasses to Ralph. Give new gloves.
- Reminder on safe driving for truckers at the tailboard meeting.

**AT RISK BEHAVIOURS OBSERVED**

Nothing.

**CORRECTIVE ACTIONS REQUIRED**

| Action | Assigned to | Priority * | Due Date |
|---|---|---|---|
| Refill safety equipment | M. Parent | Low | Immediatly. |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Entered by : Melissa Parent Date : 2017-09-10

(Priority* H = high M = medium L = low)

Notes :

# Field Safety Inspection

**FIED SAFETY INSPECTION**
(VISIBLE FIELD LEADERSHIP)

Kudlik Construction Ltd.

| | To Standard / Safe | | | Rectified | |
|---|---|---|---|---|---|
| | NA | No | Yes | No | Yes |
| **A. WORKING HABITS / COMPETENCY / BEHAVIOURS** | | | | | |
| PPE (well worn) | | | X | | |
| Risk awareness | | | X | | |
| Positions of people | | | X | | |
| Competency & training | | | | | |
| Attention / understand task | | | X | | |
| Emergency procedure | | | X | | |
| **B. HOUSEKEEPING / WORK ENVIRONMENT** | | | | | |
| Access / egress | | | X | | |
| Safe working platforms | X | | | | |
| Trips / slips / falls / tidy | | | X | | |
| Lighting Outside works | X | | | | |
| Scaffolding | X | | | | |
| Hygiene lunch room Hygiene Break room and office | | | X | | |
| **C. COMMUNICATION & PROCEDURES / JHA / RA** | | | | | |
| Signage (posters) | | | X | | |
| Toolbox talks / Tailboard | | | X | | |
| JSA covering job (subcontractor) | X | | | | |
| Advised workers around (risks) | | | X | | |
| Non-verbal / verbal attitude | | | X | | |
| **D. MANUAL HANDLING & ERGONOMICS** | | | | | |
| Awkward positions / posture | | | X | | |
| Repetitive motions | | | X | | |
| Over exertion | | | X | | |
| **E. PROTECTION & ELEVATED WORK / RESCUE** | | | | | |
| Attached at all times | X | | | | |
| Barricading | X | | | | |
| Overhead protection | X | | | | |
| Lanyards on all tools | X | | | | |
| Stacking & storage | X | | | | |
| Rescue plan / procedures | X | | | | |
| **F. PLANT & EQUIPMENT** | | | | | |
| Mechanical | | | | | |
| Electrical / energy | | | | | |
| Tools & portable equipment | X | | | | |
| Mobile / transport | | | | | |
| Lifting & rigging (daily inspection) | X | | | | |
| **G. HAZARDS & HAZARDOUS WORK** | | | | | |
| Physical | | | | | |
| Chemical | | | | | |
| Biological | | | | | |
| Environmental | | | X | | |
| Confined space | X | | | | |
| Hot work | | | X | | |
| TOTAL SCORE (out of 38) | | | | | |

*Red - Indicates Critical Few*

Audit Date : 2017-08-12 Time : PM

Project Number : 2017-093

Project Name : Metal Dump Remediation

Audit Location : Iqaluit Nunavut

Contractor : Kudlik Constructions ltd.

| | Name | Personnal ID |
|---|---|---|
| Auditor : | Mélissa Parent | Safety Agent |
| Audit Team : | | |
| | | |
| | | |

| | Observed | Spoken to |
|---|---|---|
| Number persons : | 6 - variable | 3 |
| Number persons working safety : | 6 | because truck |
| Number persons working unsafety : | 0 | transport. |

**SAFE ACTS OBSERVED & COMMENDATIONS**

- PPE
- Refill of safety equipments.
First Aid kit check, refill of bottles of cleaning glasses
Bring toilet paper for guys.
Bring tinted visor and welder's gloves.

**AT RISK BEHAVIOURS OBSERVED**

- Nothing.

**CORRECTIVE ACTIONS REQUIRED**

| Action | Assigned to | Priority * | Due Date |
|---|---|---|---|
| Refill des items manquants. | M. Parent | Low | Immediatly. |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Entered by : Mélissa Parent Date : 2017-08-12

(Priority* H = high M = medium L = low)

Notes : Cloudy and rainy day.

p.1/1 mp

# Description de l'événement accidentel

Kudlik Construction Ltd.

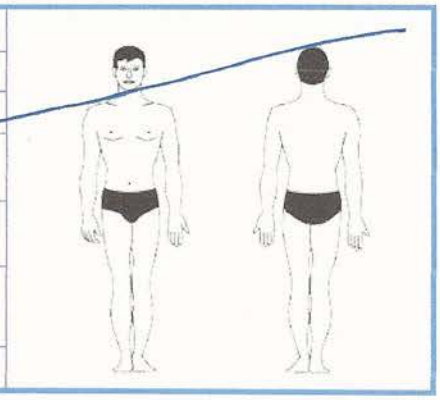
## 1. Identification

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Nom (Lettres moulées) | Aubry | Date de l'événement | 2017-09-01 | | | | |
| Prénom | André | Heure de l'événement | 8h00 am | | | | |
| N° identification | | Blessure Corporelle | | oui | X | non |
| Poste, fonction | Opérateur | Dommage Matériel | X | oui | | non |

## 2. Premiers secours

Section remplie par le secouriste

| | |
|---|---|
| Premiers secours dispensés | ☐ oui ☐ non |
| Nature de la lésion | |
| Partie du corps affectée | |
| Nature des premiers secours dispensés | |
| Consultation médicale suggérée | ☐ oui ☐ non |
| Nom du secouriste (Lettres moulées) | N/A |
| Signature du secouriste | |
| Date et heure | |



## 3. Le travailleur

Section remplie par le travailleur

| | |
|---|---|
| Lieu précis de l'événement | Remediation Metal Dump, Iqaluit |
| Activité ou tâche exercée | Compactage de la couche de finition 0-5mm (poussière de pierre) |

Description de l'événement ou de la situation à risque - Tâche, gestes, équipements, matériel (poids et dimension), lieux, etc.

André compactait le matériel avec le compacteur #10-023. En reculant il a accroché une immense roche sur le coté de la butte. avec le capot arrière.

Avez-vous des recommandations pour éviter qu'un autre événement du genre ne se reproduise ? Expliquez

Rester vigilant.

| | | | |
|---|---|---|---|
| Signature du travailleur | pour ANDRÉ AUBRY | Nom des témoins (s'il y a lieu) | — |
| Date et heure | 2017/09/02 9:12 | | — |

## 4. L'employeur

Section remplie par l'employeur

| | | | |
|---|---|---|---|
| Formulaire d'assignation temporaire remis au travailleur | ☐ oui ☒ non | Abandon du travail le jour de l'événement | ☐ oui ☒ non |
| Déclaration reçue par | Melissa Parent | Date | 2017-09-01 |
| Poste ou fonction | Safety Agent | | |

Mesure(s) immédiate(s) apportée(s) en attendant les résultats de l'enquête

N/A

| | |
|---|---|
| Signature de l'employeur | Melissa Parent |
| Date et heure | 2017-09-02 9h15. |

Remplir le rapport **Enquête et analyse d'accident** lorsque l'événement accidentel :

- ☒ a causé des blessures ou des dommages,
  *OU*
- ☐ aurait pu causer des blessures ou des dommages importants,
  *OU*
- ☐ pourrait se reproduire.

Remettre une copie à : la direction • le travailleur • le comité de santé et de sécurité
autre personne : MP

# Enquête et analyse d'accident

Kudlik Construction Ltd.

| | | | |
|---|---|---|---|
| Nom | Aubry | Date de l'événement | 2017-09-01 |
| Prénom | André | Documents joints | ☐ croquis ☒ photos ☐ _____ |

## 1. Cueillette des faits et identification des causes

Section remplie par les enquêteurs (ajouter des feuilles au besoin)

| | Identifiez les faits. Indiquez comment était... | Pourquoi ? |
|---|---|---|
| **Individu** Équipement de protection individuelle, expérience, habillement, etc. | | |
| **Tâche** Procédures, méthodes, gestes, mouvements, etc. | Compactage de poussiere de pierre avec le Compacteur 10-023 | |
| **Lieu** État des lieux, sol, éclairage, température, bruit, etc. | Journée nuageuse et pluvieuse Remediation Metal Dump Zone 1, au bas de la montagne. | |
| **Équipement** Outils, matériel, machine, mobilier, etc. | | |
| **Moment** Journée, quart de travail, rythme de travail, temps supplémentaire, etc. | Au début de la journée 8h00 AM En fin de rotation, le travailleur quittait la journée même pour son congé. | |
| **Organisation** Directives, supervision, formation, normes, méthodes sécuritaires, etc. | La déclaration est reçu par Gaston Martin après l'événement vers 9h00 (Avant le départ de André pour l'avion) | |

## 2. Résultats de l'enquête

Résumer la cueillette des faits

Un manque de vigilance avec la fatigue a probablement causé cet accident. L'opérateur du compacteur a accroché une roche sur le côté de la butte. Le capôt arrière du compacteur est brisé.

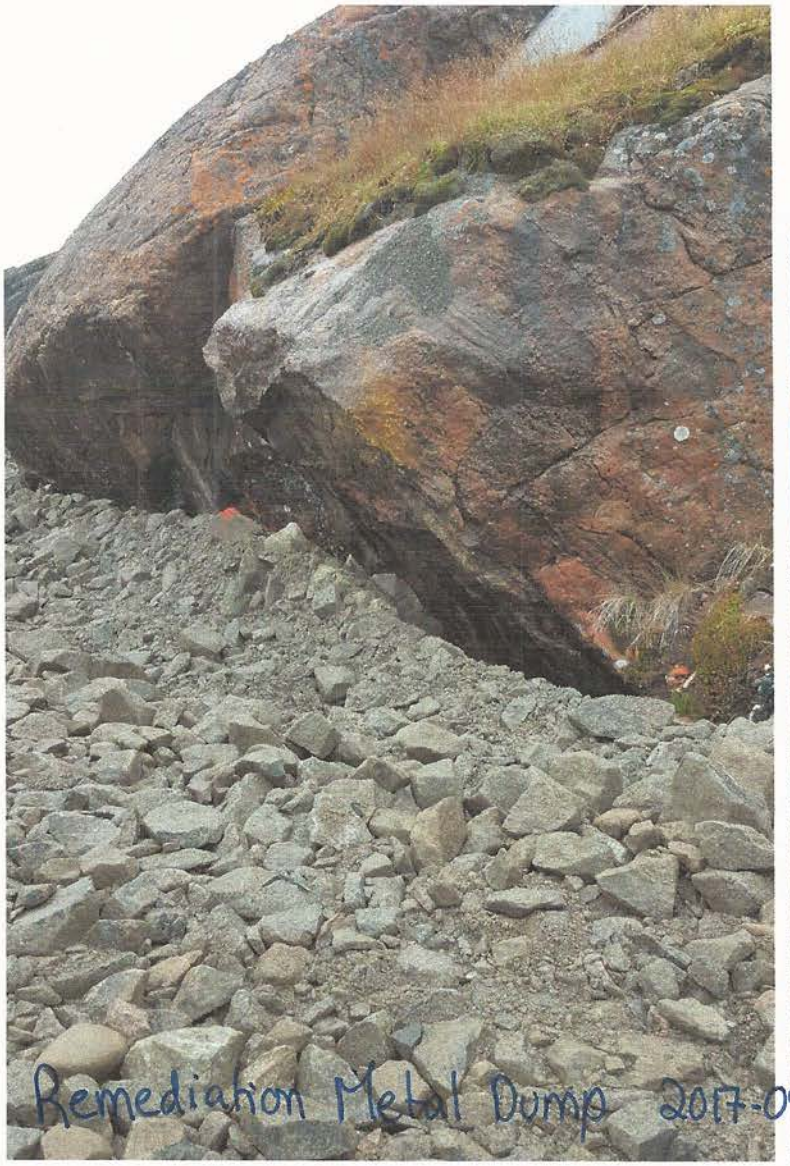
## 3. Mesures de sécurité à apporter

| Correctifs et recommandations | Responsable | Échéancier | Suivi |
|---|---|---|---|
| Rester vigilant. | | | |
| Regarder dans les miroirs en reculant. | | | |
| | | | |
| | | | |
| | | | |

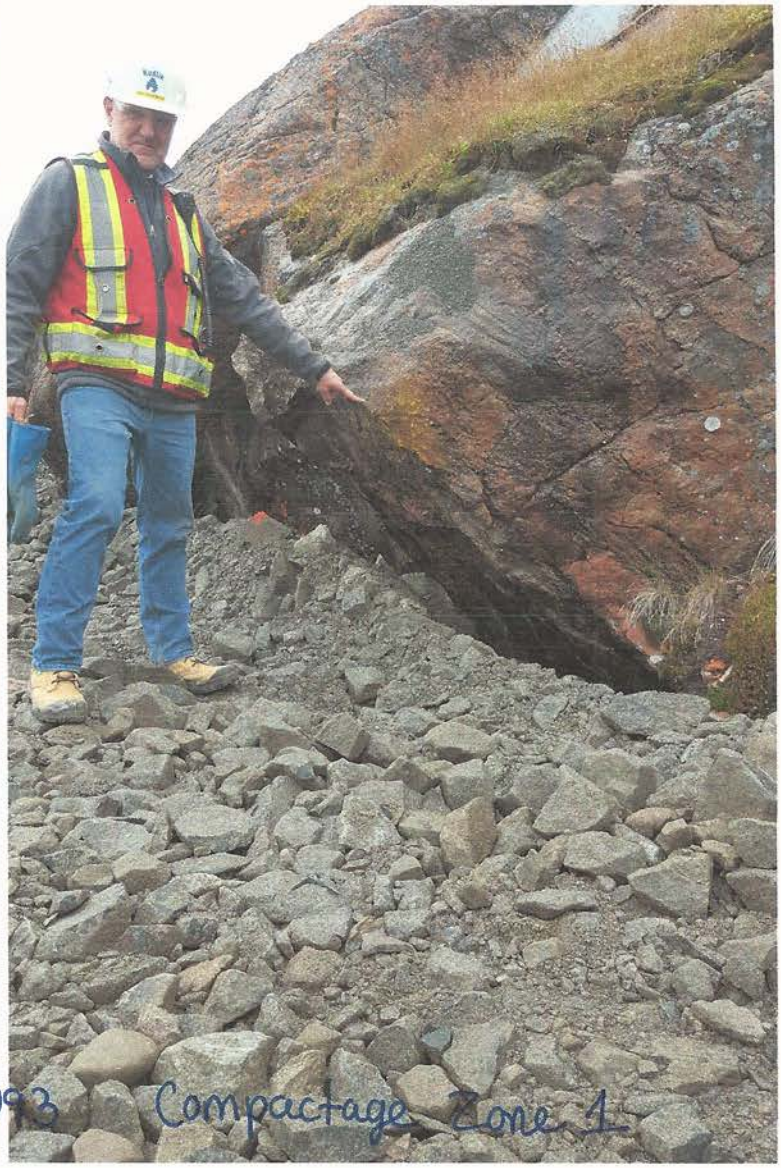
| | | | |
|---|---|---|---|
| Enquêteur | Mélissa Parent | Assistant enquêteur | GASTON / MARTIN |
| Signature | Mélissa Parent | Signature | |
| Date | 2017-09-08 | Date | 2017/09/03 |

Remettre une copie à : la direction • le travailleur • le comité de santé et de sécurité
autre personne : MP.

Rév. 2014-02-05



Remediation Metal Dump 2017-093



Compactage Zone 1

# Field Safety Inspection

| FIED SAFETY INSPECTION (VISIBLE FIELD LEADERSHIP) | To Standard / Safe | | | Rectified | |
|---|---|---|---|---|---|
| Kudlik Construction Ltd. | NA | No | Yes | No | Yes |
| **A. WORKING HABITS / COMPETENCY / BEHAVIOURS** | | | | | |
| PPE (well worn) | | | X | | |
| Risk awareness | | | X | | |
| Positions of people | | | X | | |
| Competency & training | | | X | | |
| Attention / understand task | | | X | | |
| Emergency procedure | | | X | | |
| **B. HOUSEKEEPING / WORK ENVIRONMENT** | | | | | |
| Access / egress | | | X | | |
| Safe working platforms | X | | | | |
| Trips / slips / falls / tidy | | | X | | |
| Lighting Travaux extérieurs | | | X | | |
| Scaffolding | X | | | | |
| Hygiene lunch room Office Kudlik | | | X | | |
| **C. COMMUNICATION & PROCEDURES / JHA / RA** | | | | | |
| Signage (posters) | | | X | | |
| Toolbox talks / Tailboard | | | X | | |
| JSA covering job (subcontractor) | X | | | | |
| Advised workers around (risks) | | | X | | |
| Non-verbal / verbal attitude | | | X | | |
| **D. MANUAL HANDLING & ERGONOMICS** | | | | | |
| Awkward positions / posture | | | X | | |
| Repetitive motions | | | X | | |
| Over exertion | | | X | | |
| **E. PROTECTION & ELEVATED WORK / RESCUE** | | | | | |
| Attached at all times | X | | | | |
| Barricading | X | | | | |
| Overhead protection | X | | | | |
| Lanyards on all tools | X | | | | |
| Stacking & storage | X | | | | |
| Rescue plan / procedures | | | X | | |
| **F. PLANT & EQUIPMENT** | | | | | |
| Mechanical | X | | | | |
| Electrical / energy | X | | | | |
| Tools & portable equipment | X | | | | |
| Mobile / transport | X | | | | |
| Lifting & rigging (daily inspection) | X | | | | |
| **G. HAZARDS & HAZARDOUS WORK** | | | | | |
| Physical | | | | | |
| Chemical | | | | | |
| Biological | | | | | |
| Environmental | | | X | | |
| Confined space | X | | | | |
| Hot work | X | | | | |
| TOTAL SCORE (out of 38) | | | | | |

*Red - Indicates Critical Few*

| | | |
|---|---|---|
| Audit Date : 2017-07-26 / 27 | Time : All day | |
| Project Number : 2017-093 | | |
| Project Name : Metal dump Remediation | | |
| Audit Location : Iqaluit Nunavut | | |
| Contractor : Kudlik Constructions ltd. | | |
| | Name | Personnal ID |
| Auditor : Melissa Parent | | Safety Agent |
| Audit Team : | | |
| | | |
| | | |
| | Observed | Spoken to |
| Number persons : | Variable | |
| Number persons working safety : | Plusieurs. | |
| Number persons working unsafety : | | |

**SAFE ACTS OBSERVED & COMMENDATIONS**

Implantation du materiel de SST dans le conteneur office (avant début des travaux)
→ Detecteur chaleur/fumée
→ Affiche - HASP - Documentation
→ Trousse de premiers soins - Liste secouriste
→ Lave-yeux - Lave-lunette - Gants nitrile
→ Ruban barricade Rouge/Jaune
→ Casque avec visière au besoin.

**AT RISK BEHAVIOURS OBSERVED**

→ Procedure d'urgence - organigramme et liste téléphone d'urgence.
→ Spill kit avec pancarte.

Reste à installer une génératrice...

**CORRECTIVE ACTIONS REQUIRED**

| Action | Assigned to | Priority * | Due Date |
|---|---|---|---|
| Implantation kit safety | M. Parent | Low | Before starting the project 26/27 juillet |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Entered by : Mélissa Parent Date : 2017-07-27

(Priority* H = high M = medium L = low)

Notes :

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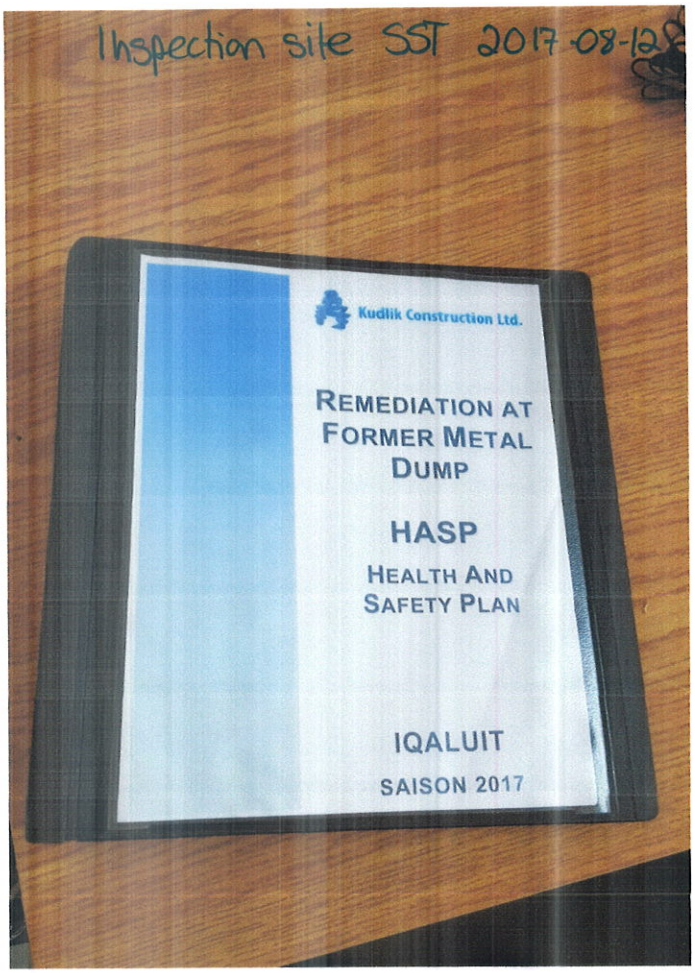
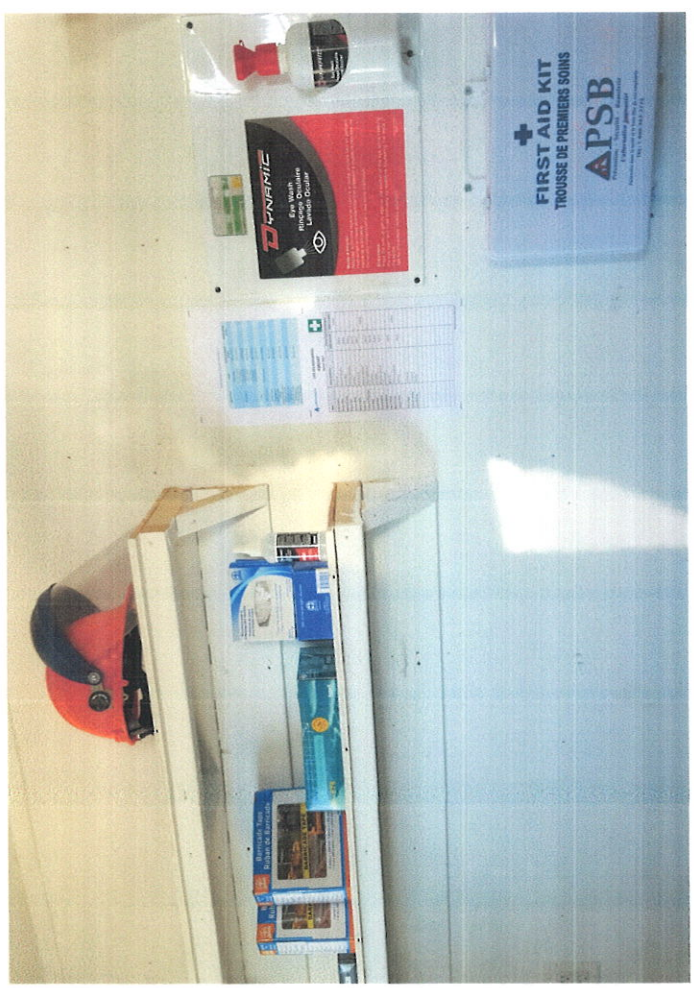
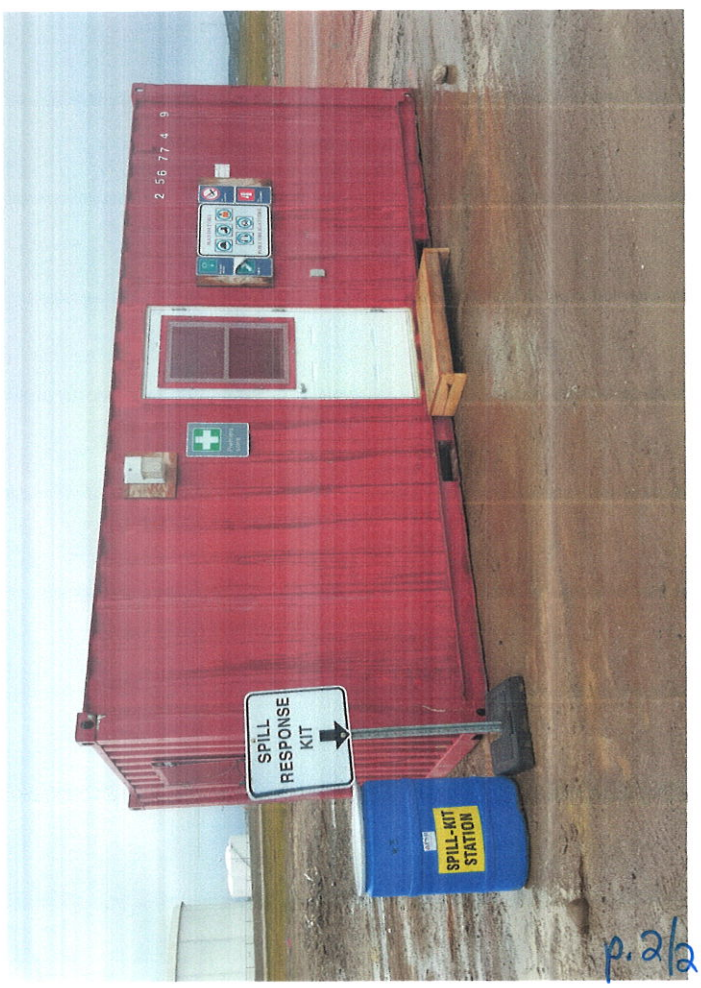
Metal Dump Remediation 2017-093

Inspection site SST 2017-08-12

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Kudlik Construction Ltd.
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# HEALTH AND SAFETY PLAN

Remediation at Former Metal Dump and Community Landfill

Iqaluit, Nunavut

Project No R.083118.001

Contract No: EW699-180040/001/NCS

Submitted to

Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

*July 2017*

# HEALTH AND SAFETY PLAN

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**Safety Officer**

# Table of Contents

**Table of Contents** ..... i

**List of Figures** ..... iii

**List of Tables** ..... iii

**1 Introduction** ..... 4

1.1 Objectives ..... 4

1.2 Project Description ..... 4

1.3 Project location ..... 5

**2 Policies and Workplace Rights** ..... 6

2.1 Health & Safety Policy ..... 6

2.2 Harassment Policy ..... 7

2.3 Disciplinary Policy ..... 8

2.4 Workplace Rights ..... 8

2.4.1 Right to know ..... 8

2.4.2 Right to participate ..... 9

2.4.3 Right to refuse unsafe work ..... 9

**3 Safety Responsibilities and Communications** ..... 9

3.1 Line of communications ..... 9

3.2 Safety Responsibilities ..... 10

3.3 Emergency phone numbers ..... 11

**4 Camp Rules** ..... 12

4.1 General Regulations ..... 12

4.2 Rooms ..... 12

4.3 Special diet, health problem and medical support ..... 12

4.4 Telephone and Internet ..... 13
4.5 Meal schedule ..... 13
4.6 Pastimes ..... 13
4.7 Environment ..... 13
4.8 Safety ..... 13
**5 Risk assessment ..... 14**
**6 Personal Protective Equipment and Training ..... 15**
6.1 General Site requirements ..... 15
6.2 Specific requirements ..... 16
6.3 Dressing and undressing protocol ..... 16
6.4 Training on PPE ..... 17
**7 Emergency Equipment ..... 18**
7.1 First Aid ..... 18
7.1.1 First Aid kit ..... 18
7.1.2 Eye wash station ..... 18
7.2 Fire Protection ..... 18
7.2.1 Smoke detector ..... 18
7.2.2 Fire extinguisher ..... 18
7.2.3 Fire Blanket ..... 19
7.3 Environmental Protection ..... 19
7.3.1 Spill kit ..... 19
**8 Safety Meetings, Inspections and Reports ..... 20**
8.1 Worker orientation seminar ..... 20
8.2 Task Hazard Analysis ..... 20

8.3 Weekly Toolbox Safety Meetings ..... 20
8.4 General Joint Work Site Health and Safety Committee ..... 20
8.5 Site Inspections ..... 21
8.6 Incident & Accident Reports ..... 21
**Appendix A: [Forms] ..... I**
**Appendix B: [Safe Practice Guides] ..... XII**

## List of Figures

Figure 1: Line of communication diagram ..... 10
Figure 2: Hiring Checklist ..... I
Figure 3: On-site training Checklist ..... II
Figure 5: Toolbox Safety Meeting Form for Civil Project ..... III
Figure 6: Joint Work site Health & Safety Committee Minutes Form ..... VIII
Figure 7: Safety Inspection Recording Form ..... IX
Figure 8: Site Inspection Checklist ..... XI

## List of Tables

Table 1: Emergency phone numbers ..... 11
Table 2: Meal service schedule ..... 13
Table 3: Risk assessment ..... 14

# 1 Introduction

This plan describes Kudlik Construction's Health and Safety Program, applicable to the Remediation at the Former Metal Dump and Community Landfill, Iqaluit, Nunavut.

## 1.1 Objectives

The objective of this health and safety program is to inform and protect all personnel and visitors who will gain access to the work site regarding potential and known hazards on the site. In particular, the intent of the health and safety program is to prevent and minimize exposure of workers to hazardous situation and to protect the public against any hazards or nuisance originating from the site.

The actual health and safety program describes the potential hazards, identifies the personnel and qualification of personnel in charge on site and outlines the procedures to be followed during the project.

The activities planned are subject to the "Nunavut Safety Act and Regulations", the "Canada Labour Code, Part II" and the "Occupational Health and Safety Regulations". Quality of the workplace must conform to the Public Health Act (Nunavut), General Sanitation Regulations and Camp Sanitation Regulations. All latest revisions of the federal, provincial and territorial regulations must be respected.

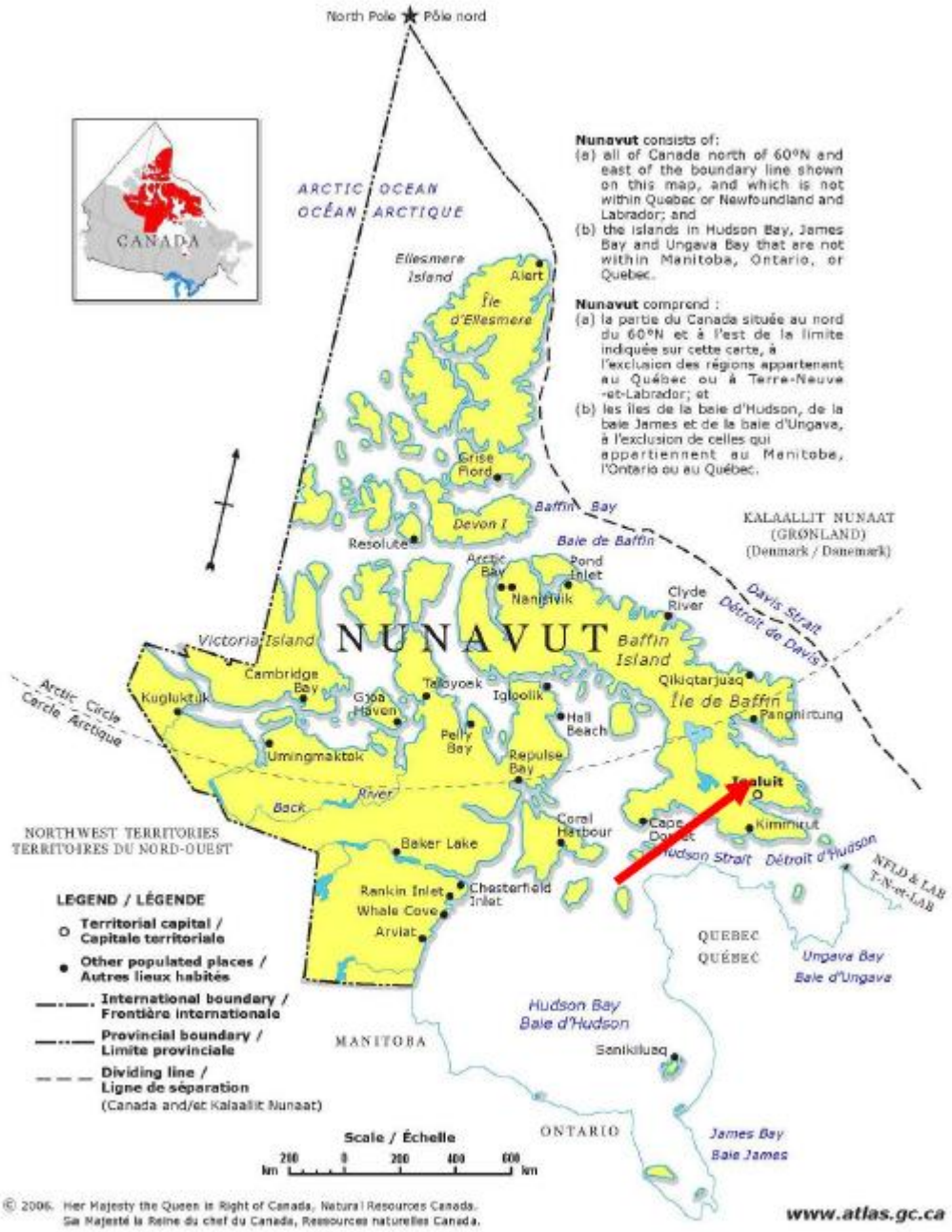
The procedures and requirements in this document regarding health and security are based on a review of available information and on the evaluation of potential hazards on site. This document specifies the procedures and the level of personal protection equipment (PPE) to be used, to minimize the potential for accidents and to minimize the exposure of personnel during the activities on site.

All personnel on site, including client representatives, the employees of Kudlik Construction Ltd and sub-contractors involved in the activities on site, as well as visitors, are to comply with the content of this document. Each person working on site must read and understand the health and safety policy.

## 1.2 Project Description

Remediation program of a former landfill, a former vehicle storage area and upgradient area where buried debris has been found in Iqaluit, Nunavut.

## 1.3 Project location



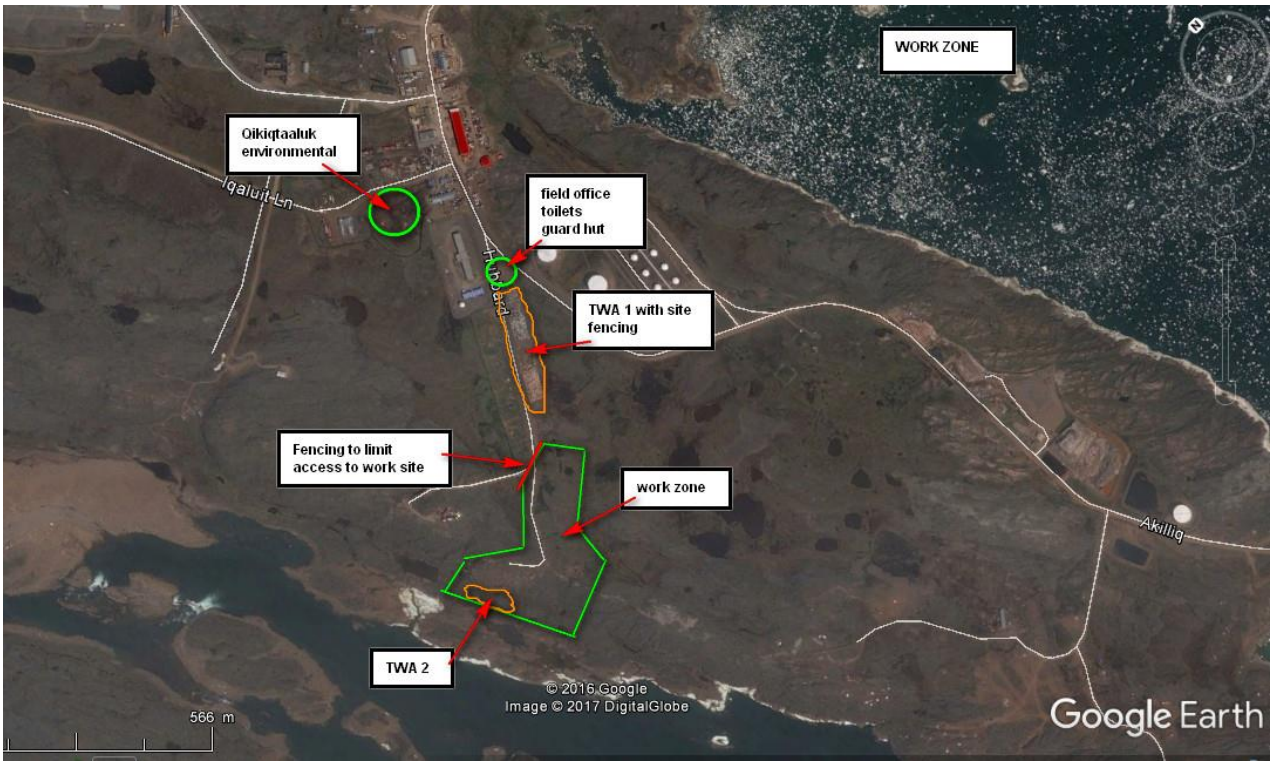



Figure 1: Location of Project

# 2 Policies and Workplace Rights

## 2.1 Health & Safety Policy

In performance of its activities, Kudlik Construction Ltd. is fundamentally concerned with:

- The safety and health of our employees, subcontractors, customers and the public.
- The protection of the environment.
- The protection of property.

Moreover, Kudlik Construction Ltd. is committed to:

- Abide by Safety, Health and Environment Acts and Regulations.
- Integrate Safety, Health and Environment matters in every organizational level and every field of activities of the Company.
- Maintain a safe and sound workplace and strive to eliminate preventable hazards that could result in injuries, illnesses, material damages, loss of production or environmental disturbance.
- Ascertain that all levels of management are accountable for the respect of this Safety, Health and Environment Policy

- Ascertain that all employees perform their duties in compliance with the company's Safety, Health and Environment Policy and rules. Every employee must work safely and care for the safety and health of co-workers.
- Verify that this Policy is complied with throughout the Company.

Kudlik Construction Ltd. philosophy is to create an atmosphere that results in NO RISK to our workers, the public, the environment and our client. To fulfill this goal, Kudlik Construction Ltd. senior management expects every employee to work to the highest degree of excellence in performing each job task safely.

To reduce the risk of incidents/accidents, all employees must work together in planning, analysing and identifying hazards before a job starts. Every employee must keep safety in mind, every day and all year long. By doing this, we will achieve our goal of no lost time injuries for any particular year. Kudlik Construction Ltd. feels confident that with the management and labour working together, we can succeed.

It is imperative that senior management, supervisor and every worker demonstrates a proactive approach to health and safety.

## 2.2 Harassment Policy

Kudlik Construction Ltd. (KCL) employees are entitled to a harassment-free environment at all activities, events and meetings.

There are two fundamental principles to the labour movement: human rights and solidarity. Harassment strikes at the heart of both.

KCL will not tolerate nor condone behaviour that is likely to undermine the dignity or self-esteem of an individual, or which creates an intimidating, hostile or offensive environment. We must speak out against harassment and stand together to protect human rights.

Harassment is not a joke, it is an expression of perceived power by the harasser over another person, usually for reasons, over which the victim has little or no control. Prohibited grounds under Human Rights Codes across Canada can include sex, race, age, marital status, sexual orientation, disability, political or religious beliefs, and place of national origin.

Harassment can be defined as any action (verbal, psychological or physical) on a single or repeated basis which humiliates, insults or degrades and is known or ought reasonably to be known to be unwelcome by the victim of the harassment.

Harassment can include but is not limited to: unwanted comments, slurs, racist or sexist jokes, pictures or posters, bullying or intimidation, graffiti, physical contact of any kind, remarks about a person's appearance or personal life, unwelcome sexual advances or demands, suggestive looks or gestures.

KCL takes harassment complaints seriously. Complaints of harassment at KCL activities will be investigated by the site superintendent and reported to the project manager for any necessary follow-up. A substantiated complaint will result in action by KCL which could include the removal of the harasser from the site.

## 2.3 Disciplinary Policy

Kudlik Construction Ltd. has a zero tolerance policy in regard to procedure violations or the performance of unsafe actions. The acceptance policy must be signed by every KCL's employees and subcontractor's employees.

The following disciplinary measures will be applied in case of violations:

*1st SAFETY VIOLATION:*

- Verbal reprimand with retraining as required.
- Documentation in the employee's file.

*2nd SAFETY VIOLATION:*

- Written reprimand
- Retraining as required
- Documentation in the employee's file

*3rd SAFETY VIOLATION:*

- Termination (the employee will be sent off-site)
- Documentation in the employee's file

All pertinent facts will be carefully reviewed, and the employee will be given a full opportunity to explain his or her conduct before any decision is reached. The project manager will give a second opinion concerning the unacceptable behaviour before termination occurs.

At any point, an employee displaying disregard for safety, or incorrigibility after violations, may be terminated at the discretion of management.

Employees working with the offender may be subject to the same reprimands as the offender, as determined by the superintendent. The voluntary protection intent requires them to report unsafe behaviour and all employees have STOP WORK authority.

## 2.4 Workplace Rights

Workers can ensure safety is a priority in the workplace by means of their rights. The workers' rights are briefly explained hereunder.

### 2.4.1 Right to know

By knowing about workplace hazards, workers can make sure employers make work safer, provide protection to workers, and give training so that workers can work with the smallest possibility of injury or illness.

### 2.4.2 Right to participate

Workers have the right to participate in decisions affecting workplace health and safety. Federal, provincial, and territorial laws state that workers can get elected as paid worker representatives on workplace health and safety committees. Workers participate in the health and safety program to work with management on controlling or eliminating dangers in the workplace.

Workers and management on health and safety committees jointly find workplace hazards and recommend actions to make the workplace safer. The work of worker representatives is to act on behalf of workers' well-being, and the work of committees is to give the employer advice on improving worker health and safety.

### 2.4.3 Right to refuse unsafe work

The right to refuse allows a worker to step away from work she or he believes is unsafe. The right allows the worker to have the refused work investigated, and repaired if it's dangerous. During the investigation and repair, the right provides that the worker receives pay. And with the right to refuse, a worker is protected from an employer's possible reprisal, since it's illegal for an employer to fire or discipline a worker who refuses work she or he believes is unsafe.

# 3 Safety Responsibilities and Communications

The responsibility of health and safety for all workers begins with the attitude of each individual towards himself and fellow workers. Each employee must use all the precautions and judgement necessary to protect his health and safety and the health and safety of others. All employees have the responsibility to report any potentially hazardous situation to other workers involved, and to the site superintendent.

In the event that an employee finds himself in a potentially dangerous situation, he has the responsibility to stop immediately his activities. Work can resume only once the situation has been corrected and when the superintendent has given his approval. Under no circumstances will dangerous working conditions be tolerated.

## 3.1 Line of communications

Even if the safety is the responsibility of everyone, the following communication chart must be followed on site to report any health and safety issue:

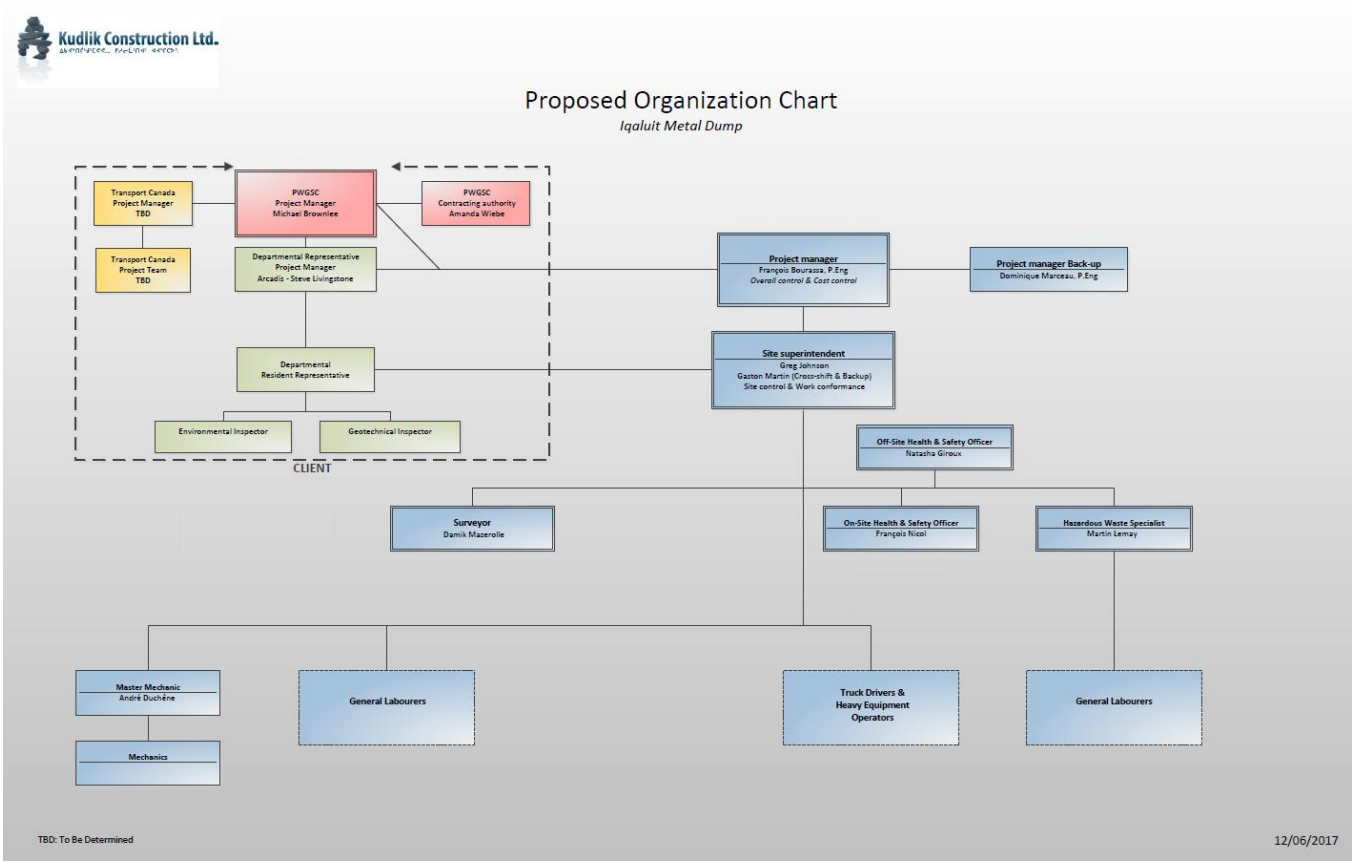



**Figure 1: Line of communication diagram**

## 3.2 Safety Responsibilities

The main safety responsibilities of the following individuals are:

- KCL management is responsible to provide all material, resources and site supports to ascertain that operations are conducted in compliance with all acts and regulations in force;
- KCL project manager and superintendent are responsible for the implementation and the application of the Health and Safety Program on site. The superintendent is also the site coordinator for any emergency situation;
- KCL site safety representative is responsible for helping the superintendent for the application of the health and safety program. He is in charge of achieving all site safety inspections, filling all safety reports, keeping all records, organizing the health and safety committee and strongly consider their recommendations;

- All KCL employees and subcontractors must follow and respect the Health and Safety Plan. They must also report any health and safety issue to the health and safety representative or directly to the site superintendent;
- The client, as everybody else on site, must follow the health and safety plan, unless something different is dictated by his own safety policy.

## 3.3 Emergency phone numbers

In case of emergency, the following phone numbers will be posted at the camp, the garage and the kitchen. The site superintendent is the on-site coordinator for any emergency situation. The ***Emergency Response Plan (ERP)*** must be consulted for further information regarding the management of emergency situations. The emergency list of phone numbers shown on the next page will be updated before starting each construction season. Some phone numbers, as the camp phone number, will be included later in this list

**Table 1: Emergency phone numbers**

| ORGANISATION | NAME | PHONE (BUSINESS HOURS) | PHONE (AFTER HOURS) |
|---|---|---|---|
| KUDLIK IQALUIT | Main office | (867) 979-1166 | |
| | François Bourassa Project Manager | (418) 930-0850 | |
| | Melissa Parent supervisor | (418) 953-2910 | |
| | Gaston Martin, Superintendent | (867) 979-1166 | |
| RCMP | | (867) 979-0123 | |
| HEALTH CENTRE | Qikitani hospital | (867) 975-8600 | |
| FIRE DEPARTMENT | | (867) 979-4422 | |
| CITY OF IQALUIT REPRESENTATIVE | | 867-979-6363 | |
| WORKERS COMPENSATION BOARD NUNAVUT AND NWT | | (867) 979-8500 | |
| 24 HOUR SPILL LINE NW/NUNAVUT | | (867) 920-8130 | |
| ENVIRONMENT CANADA, ENVIRONMENTAL PROTECTION BRANCH, IQALUIT, SID BRUINSMA | | (867) 645-3739 | |

# 4 Camp Rules

Any concerns or issues regarding the camp rules must be addressed to the on-site safety representative or to the site superintendent. For any repairs or maintenance, please contact the camp manager.

## 4.1 General Regulations

Behaviour: Mutual respect amongst camp residents must be adhered to, at all times. Any person showing a lack of respect, towards a fellow resident will be advised immediately by the site superintendent. Inappropriate behaviour will not be tolerated.

Male, Female Washroom/Shower Time: Privacy during male/female use of camp washrooms and showers must be respected at all times. Camp personnel are encouraged to keep shower time to a minimum, by utilizing both shower facilities, at the same time whenever possible.

Cleanliness: All camp personnel are required to keep shower and washroom facilities clean after usage. The same principal applies to individual rooms which may eventually be transferred to other personnel arriving on site.

Smoking: It is strictly forbidden to smoke anywhere in the camp and on the construction sites

Alcohol and Drugs: All alcohol and drugs are forbidden in the camp and on the construction sites.

Use of Vehicles In and Around Camp Site: Vehicle parking should take place in an orderly fashion, as to minimize the amount of space required.

Personal effects: Kudlik Construction Ltd. is not responsible for lost, stolen or damaged personal effects.

Laundry: Washers and dryers are at your disposal for your clothes. However, please use them reasonably; they are not made for clothes covered with mud. At least one identified washer is available for washing coveralls.

## 4.2 Rooms

When you arrive, the camp manager will assign you a room. The door key will be given to you and you shall return it before you leave. If you wish to have your room cleaned up, you must leave the door unlocked. On your arrival, the bed will have clean sheets and blankets. If you want new sheets and pillows, just put the dirty sheets in the laundry basket and get new ones.

## 4.3 Special diet, health problem and medical support

For your own safety, allergies, food intolerance or special diet and any medical problem must be indicated on your hiring form and reported to your supervisor and the site safety representative when you arrive on site. If you feel sick or you need medical assistance, you must advise your supervisor right away.

## 4.4 Telephone and Internet

Telephone use is available for everyone living at the camp outside working hours. To keep things fare and simple for everyone, long distance call can be performed using a prepaid calling card.

Internet is also accessible through a wireless network. Please use your common sense while using internet, downloading or sending heavy files is penalizing everyone.

## 4.5 Meal schedule

It is really important to respect the meal schedule. If you cannot make it on time, please advise the cook.

Table 2: Meal service schedule

| | | | |
|---|---|---|---|
| Breakfast: | **6 :00** | to | **7 :00** |
| Lunch: | **12 :00** | to | **13 :00** |
| Dinner: | **18 :00** | to | **19 :00** |
| Lunch night shift: | **24 :00** | to | **1 :00** |

## 4.6 Pastimes

The use of company's vehicles for pastime activities is not permitted. For any past time activities outside of the camp perimeter, the following safety rules must be taken:

- Advise the safety representative or a camp resident of your destination and the length of your absence;
- Advise the same person when you are back at the camp;
- Never leave alone;
- Always bring with you the proper communication device (portable radio or satellite phone).
- Hunting on and off site is strictly prohibited. Fishing on and off site is permitted with proper licence.
- A search party will be organized, in the event of a prolonged absence.

## 4.7 Environment

Practice proper and responsible waste and resource management, whenever possible, this includes proper garbage disposal and water management. Excessive wasting and open fires are prohibited.

Since all domestic garbage will be incinerated, it is really important to place any hazardous debris as batteries and printer ink cartridges into the pre-identified container. For any question regarding the special waste management, please consult the camp manager.

## 4.8 Safety

Everyone at the camp site must adhere to all safety and regulatory signage as well as the health and safety policies. You must be familiar with all emergency procedures, exits, signals and alarms. Keep accesses to

fire equipment clear at all times and immediately report any damaged fire or safety apparatus to your supervisor. Keep clothing or other flammable goods away from baseboard heaters.

# 5 Risk assessment

To ensure a safe work environment, safe work practices and site rules must be applied at all times.

Risk assessment forms covering the most common task on our projects will be provided to each employee according to their trades:

- Crusher Operator;
- Heavy Equipment Operator;
- Labourer:
- Truck Driver.

There are also specific fascicles for activities that are potentially hazardous and a brief summary of each fascicle forms is included Appendix B: [Safe Practice Guides]. The following table presents the different fascicles that cover activities that are part of the REMEDIATION OF THE METAL DUMP IN IQALUIT.

Table 3: Risk assessment

| Activities including Potential Hazard | Applicable to project. | # of Fascicules |
|---|---|---|
| Civil Work | ☒ | 6, 7, 10 |
| Hand Tool | ☒ | 1 |
| Heavy Equipment Lifting | ☒ | 1, 2, 3, 8 |
| Manual Material Handling | ☒ | 2, 4, 6, 7 |
| Mechanical & Garage Work | ☒ | 3, 10 |
| Powered Hand Tool | ☒ | 1 |
| Welding | ☒ | 4 |
| Work at Height | ☒ | 1, 3, 4, 6 |
| Work in Cold Environment | ☒ | 1 |
| Cliquez ici pour taper du texte. | ☐ | |

The work items that are involving hazardous waste or contaminated soils will be done under the direct supervision of the hazardous waste technician. The potential hazards for activities involving hazardous material and contaminated soils are:

- Vapour inhalation;
- Skin exposure and contaminants absorption by the skin;
- Accidental ingestion (mouth) of contaminants or of food accidentally contaminated by hazardous substances;
- Dangers inherent to excavation work;
- Common accidents on a work site.

The most significant factors leading to an exposure are related to direct skin contact with hazardous material, and inhalation during work. Any activity that may result in such a situation is to be controlled by the following measures:

- Use of work methods that minimize potential hazards;
- Appropriate use of personal protective equipment (PPE);
- Personal hygiene measures;
- Air monitoring

In view of the required tasks for this project, hazardous situations for the workers are minimized when every employee is familiar with and respects all regulations and procedures, by wearing prescribed PPE and by following monitoring information. Nevertheless, everyone must be alert at all times to variations in working conditions since exposure to the mentioned contaminants, at high concentrations may be harmful. This is outlined in the Material Safety Data Sheets, (MSDS) which are available at KCL site office.

# 6 Personal Protective Equipment and Training

All employees must wear the appropriate personal protective equipment (PPE) while on site. The goal is to protect and isolate individuals from physical and chemical hazards present on site. According to the work hazards, the selection and careful use of PPE must result in complete protection of the respiratory system, skin, eyes, face, hands, feet, head, body and hearing.

## 6.1 General Site requirements

For each activity, the proper level of protection was determined. However, when changes in the working conditions occur, a planned level of protection may not be sufficient. In such a case, the affected work zone will be evacuated until the conditions and protection requirements are re-evaluated by the superintendent with the help of the site safety representative.

For anybody working on site, the following safety equipment must be worn for regular activities where hazardous material or contaminated soils are not involved:

- Safety boots
- Safety hat
- Safety glasses
- Leather gloves
- Reflecting vest

Safety hats, glasses, gloves and reflecting vest will be provided to everybody. However, all workers must bring their own safety boots on site.

## 6.2 Specific requirements

The following specific activities are requiring additional personnel protective equipment:

- Excavation -Contaminated or hazardous soils containerization;
- Excavation -Buried debris sorting;
- Surface debris -Barrel processing.

Level C (EPA) of personal protective equipment was planned for these project activities. This level of protection was used on other DEW line cleanup to perform the same activities. It includes the following equipment:

- Air purifying respirator with organic vapour and HEPA combination filters.
- Chemical resistant coveralls.
- Chemical resistant inner and outer gloves.
- Chemical resistant construction footwear.
- Hard hat.
- Face shield or chemical splash goggles.
- Disposable boot covers.

## 6.3 Dressing and undressing protocol

The proper way to put on protective clothing is as follows:

1. Surgical gloves.
2. Cotton overalls.
3. Tyvek or polylaminated coveralls.
4. Construction footwear.
5. Boot covers (or rubber boots).
6. Tyvek bonnet (hood).
7. Respirator.
8. Hard hat.
9. Outer gloves.

Before leaving the dressing area, verify satisfactory fit of the mask-to-face-seal. Facial hair (beard) is not permitted. To check mask tightness, place hands over cartridge ends and breathe in: in doing so, the mask

should stick to face and air should not pass. Should this not be the case and/or if you are doubtful, change the mask.

The proper way to disrobe is as follows:

1. Remove outer gloves.
2. Remove hard hat.
3. Remove glasses or eye/facial protection.
4. Remove respiratory mask.
5. Remove bonnet (hood).
6. Remove boot covers.
7. Remove construction footwear.
8. Remove coverall (Tyvek or polylaminated).
9. Remove surgical gloves.
10. Remove working clothes (cotton coveralls).

Disposable safety equipment such as gloves, coveralls, boot covers, etc. must be removed and stored adequately in the decontamination unit or disposed in the assigned drum.

## 6.4 Training on PPE

At first, all employees will be trained on PPE during a worker orientation seminar. The general PPE training will include the following topics:

- The minimum level of PPE required on site;
- When extra PPE is necessary;
- How to properly put on, take off, adjust and wear the PPE;
- The limitations of the PPE;
- Respirator fit testing;
- PPE inspection and care.

From there, according to the task hazard analysis (see 8.1) and/or health and safety issues brought up and discussed in the weekly toolbox meeting (see 8.2), further specific training will be provided to the workers according to their needs.

Training records (see “Hiring Checklist” and “On-Site Training Record” forms in Appendix A) of all workers will be kept on site in the H&S employee file.

# 7 Emergency Equipment

## 7.1 First Aid

First aid involves the prevention of initial injury and responder safety, and the treatment phases. First aid can be summarized in these three key points:

- **Preserve life** - the overriding aim of all medical care, including first aid, is to save lives
- **Prevent further harm** - also sometimes called prevent the condition from worsening, this covers both external factors, such as moving a patient away from any cause of harm, and applying first aid techniques to prevent worsening of the condition, such as applying pressure to stop a bleed becoming dangerous.
- **Promote recovery** - first aid also involves trying to start the recovery process from the illness or injury, and in some cases might involve completing a treatment, such as in the case of applying a plaster to a small wound

### 7.1.1 First Aid kit

A first aid kit is a collection of supplies and equipment for use in giving first aid. First aid kits may be made up of different contents depending on the nature of the project and the location of the kit. First aid kits can be assembled in durable plastic boxes, fabric pouches or in wall mounted cabinets. The type of container will vary depending on purpose, and they range in size from wallet sized through to large rucksacks. Containers are clean and waterproof to keep the contents safe and aseptic. Kits have to be checked regularly and restocked if any items are damaged or expired out of date.

### 7.1.2 Eye wash station

Emergency eye wash stations are required for work environments that may expose employees to harmful chemicals. Though all proper precautions may be taken to prevent chemical exposure, accidents can still happen. Eye wash stations are designed to immediately flush contaminants out of the eyes after exposure. They are located near high-risk areas and have the ability to be activated immediately. Proper maintenance of eye wash stations is essential. They should be tested weekly to ensure all parts are functioning properly and also to flush water through the system so that contaminants do not accumulate.

## 7.2 Fire Protection

### 7.2.1 Smoke detector

A smoke detector is a device that detects smoke, typically as an indicator of fire. A smoke detector is installed in each room. These detectors must be active and shall not be obstructed.

### 7.2.2 Fire extinguisher

A portable fire extinguisher is a ‘‘first aid’’ device and is very effective, when used while the fire is small. The use of a fire extinguisher that matches the class of fire, by a person who is well trained, can save both lives and property. Portable fire extinguishers must be installed in workplaces, regardless of other

firefighting measures. The successful performance of a fire extinguisher, in a fire situation largely depends on its proper selection, inspection, maintenance, and distribution.

Fires are classified into four general categories depending on the type of material or fuel involved. The type of fire determines the type of extinguisher that should be used to extinguish it.

Class A Fires involve materials such as wood, paper, and cloth, which produce glowing embers.

Class B Fires involve flammable gases, liquids, and greases, including gasoline and most hydrocarbon liquids which must be vaporized for combustion to occur.

Class C Fires involve fires in live electrical equipment, or in materials near electrically powered equipment.

Class D Fires involve combustible metals, such as magnesium, zirconium, potassium, and sodium.

Extinguishers will be selected according to the potential fire hazard, the construction and occupancy of facilities, hazard to be protected, and other factors pertinent to the situation. Classes A-B-C extinguishers are selected for the construction camp, rest rooms, offices and on-site activities. Extinguishers are conspicuously located and readily accessible for immediate use in the event of fire. Inside the offices, rest rooms, the garage and construction camp, they are located along normal paths of travel and egress. Portable extinguishers are maintained in a fully charged and operable condition. They are kept in their designated locations, at all times, when not used. When extinguishers are removed for maintenance or testing, a fully charged and operable replacement unit has to be provided.

### 7.2.3 Fire Blanket

A fire blanket is a safety device designed to extinguish small incipient (starting) fires. It consists of a sheet of fire retardant material which is placed over a fire in order to smother it (see below).

Small fire blankets such as, for use in kitchens and around the home, are usually made of fiberglass, and are folded into a quick-release container for ease of storage.

## 7.3 Environmental Protection

### 7.3.1 Spill kit

Spill kits are made to protect the environment from hazardous products spills and leaks. They are located close to hazardous products storage areas as well as refuelling stations on the site. The Garage is also equipped with a spill kit and it usually includes:

- Absorbent socks;
- Absorbent pillows;
- Temporary Disposal Bags and Ties;
- Instruction manual;
- Etc.

# 8 Safety Meetings, Inspections and Reports

To ensure proper understanding of the health and safety program by everyone on site and to test its application, a series of meeting and inspections will be performed by the project manager, the site superintendent, the on-site health and safety representative or the company chief safety officer.

## 8.1 Worker orientation seminar

Every employee who will access the site must attempt the worker orientation seminar. During this meeting, presented at the beginning of every working season or as needed for newly hired employees, the health and safety program will be presented and explained. During this seminar, each employee will be provide with the "Employee Occupational Health & Safety Handbook" summarizing the most relevant company H&S policy, rules and practices. Attendants must complete and sign the test sheet in the handbook and the related record for each employee (see "Hiring Checklist" forms in Appendix A) must be completed and kept in the H&S employee file

## 8.2 Task Hazard Analysis

Prior to start any new activities, a task hazard analysis will be performed in order to identify potential hazards and determine the required level of PPE. Risk Assessment Forms will be provided and explained to the employee according to his trade. According to their experience and comments, training will be provided to the workers as needed and the records of it kept in the H&S employee file (see "On-Site Training Record" forms in Appendix A).

## 8.3 Weekly Toolbox Safety Meetings

Once a week, the site superintendent will hold a toolbox safety meeting at the cafeteria or project site. The following safety subjects or concerned might be discussed:

- Describe all assigned tasks and their potential hazards;
- Personal protective equipment;
- Coordination of all activities;
- Identify all safety measures to prevent injuries;
- Plan for emergency situations;
- Describe any change in the health and safety program;
- Obtain workers' opinions on site conditions, affecting security;
- Obtain workers' opinions on the health and safety plan effectiveness.

A summary of discussed subjects and a copy of the presence list will be completed on the toolbox safety meeting form (see "Toolbox Safety Meeting" form Appendix A) and be kept on site.

## 8.4 General Joint Work Site Health and Safety Committee

A general Joint Work Site Health and Safety Committee (JWSHSC) overseeing all company activities was established in 2010. This committee consists of workers and management members which will hold meetings at least twice per year and/or as needed according the health and safety issues occurring over

the work season. The chief safety officer of the company will organize the meeting, take the minutes (see form in Appendix A) and follow the agreed recommendations.

A member of this committee, most likely the chief safety officer, will also conduct site inspections of each active project at least once per season as per section 8.5.

## 8.5 Site Inspections

To ensure the correct application of the health and safety program, a seasonal inspection of the site, installations, equipment, conditions and activities of each project will be performed by the company chief safety officer accompanied by the site safety representative the site superintendent or the camp manager. These inspections will follow the check list presented in Appendix A.

## 8.6 Incident & Accident Reports

After any accident or incident, the supervisor and worker directly involved in the area, shall assist the health and safety representative or superintendent to complete the incident & accident report. All personnel witnesses may be questioned, if needed. The incident & accident report form is included in Appendix A. All incident & accident reports with available relevant pictures shall be forwarded to the project manager and to the WSCC site representative.

When a worker is injured on site, the WSCC worker's and employer's report of injury must be filled by the injured employee and by the superintendent or site safety representative. Both reports must be sent to the WSCC office within 24 hours.

# Appendix A: [Forms]

**Kudlik Construction Ltd**

**LISTE DE SUIVI À L'EMBAUCHE / HIRING CHECKLIST**

**Nom / Name:** _____ **Poste / Trade:** _____

**Projet / Project:** _____ **Date / Date:** _____

| *Points de Contrôle / Control Points* | | | *Date ou/or Exp. Date* | *Initial* | |
|---|---|---|---|---|---|
| | | | | *Employee* | *Kudlik* |
| **Documentation** | 1 | Formulaire d'Embauche / Hiring Form | | | |
| | 2 | Formulaire d'Impôt / Income Tax Form | | | |
| | 3 | Spécimen de Chèque / Void Cheque | | | |
| | 4 | Employee Verification and Consent Form | | | |
| | 5 | Politique d'Entreprise en Santé & Sécurité / Company Health & Safety Policy | | | |
| | 6 | Manuel de Santé & Sécurité / Health & Safety Manual | | | |
| | 7 | Manuel de l'Employé / Employee Manual | | | |
| **Formations Techniques / Technical Trainings** | 1 | Fiche d'Actions Spécifiques / Specifics Actions Sheet | | | |
| | 2 | Cartes de Competences: Compagnon , Apprenti - Métier: / Competency,Skill or Trade Cards: | | | |
| | 3 | Cours Santé & Sécurité sur Chantiers de Construction (ASP Construction) / Miscellaneous Health & Safety Course on Construction Sites | | | |
| | 4 | Secourisme en Milieu de Travail / Workplace or Basic First Aid | | | |
| | 5 | Secourisme en Milieu Éloigné / Wilderness First Aid | | | |
| | 6 | Transport Marchandises Dangereuses / Transportation of Dangerous Goods | | | |
| | 7 | Permis Général d'Explosifs / Dynamite License or Card | | | |
| | 8 | Certificat de Dynamitage / Dynamiting Certificat or Card | | | |
| | 9 | Formation Espaces Clos / Confined Space Training | | | |
| | 10 | Formation Équipement de Levage / Lifting Equipment Training - Type d'équipement / Equipment Type: | | | |
| | 11 | Autre Formation / Other Training: | | | |
| | | | | | |
| | | | | | |
| | 12 | Autre Compétence / Other Skill: | | | |
| | | | | | |
| | | | | | |
| **Intégration au Site / On Site Briefing** | 1 | Introduction à la Santé & Sécurité au Chantier: Responsabilité et Guide de l'Employé / Introduction to Health & Safety On Site: Responsibilities and Employee Guide | | | |
| | 2 | Specifics Actions Sheet for Local Employee | | | |
| | 3 | Contact en Cas d'Urgence / Emergency Contact | | | |
| | 4 | Revue du Programme et Fourniture EPP / Program Review and PPE Supply | | | |
| | 5 | Visite du Chantier avec Hazards Potentiels et Mesures d'Urgence Spécifiques / Site Tour with Potential Hazards and Specific Emergency Procedures | | | |
| | 6 | Présentation du Mentor / Introduction to the Mentor | | | |
| | 7 | Formation sur Équipement et Outils Attitrés / Training on Dedicated Equipment and Tools: | | | |
| | 8 | SIMDUT, Fiches Signalétiques et Produits Toxiques / WHMIS, Material Safety Data Sheets (MSDSs) and Toxic Products | | | |
| | 9 | Formation Spécifique en Santé & Sécurité au Besoin / Specific Healt & Safety Training As Needed - Sujet / Topics: | | | |
| | 10 | Autre / Other: | | | |

Figure 2: Hiring Checklist

# ON-SITE TRAINING CHECKLIST

**METAL DUMP REMEDIATION, IQALUIT**

Employee Name _____

| | *Documents & # Fascicles* | *Date* | *Employee Initial* |
|---|---|---|---|
| **Risk Assessment Form** | | | |
| • Carpenter General | ☐ | / / | _____ |
| • Crusher Operator | ☐ | / / | _____ |
| • Heavy Equipment Operator | ☐ | / / | _____ |
| • Housekeeper | ☐ | / / | _____ |
| • Kitchen Hand | ☐ | / / | _____ |
| • Labourer | ☐ | / / | _____ |
| • Painter | ☐ | / / | _____ |
| • Truck Driver | ☐ | / / | _____ |
| **Health & Safety Fascicles** | | | |
| • Cold Environments Procedures | ☐☐☐☐☐ | / / | _____ |
| • Fall Protection Program | ☐☐☐☐☐ | / / | _____ |
| • Hand Tools Procedures | ☐☐☐☐☐ | / / | _____ |
| • Heavy Equipment General Lifting Procedures | ☐☐☐☐☐ | / / | _____ |
| • Manual Material Handling Procedures | ☐☐☐☐☐ | / / | _____ |
| • Mechanical & Garage Work Procedures | ☐☐☐☐☐ | / / | _____ |
| • Miscellaneous Civil Work Project Procedures | ☐☐☐☐☐ | / / | _____ |
| • Powered Hand Tools Procedures | ☐☐☐☐☐ | / / | _____ |
| • PPE Program | ☐☐☐☐☐ | / / | _____ |
| • Steel Erection with a Telescopic Handler Procedures | ☐☐☐☐☐ | / / | _____ |
| • Welding Practices | ☐☐☐☐☐ | / / | _____ |
| • Woodworking Machines Procedures | ☐☐☐☐☐ | / / | _____ |
| • Working at Heights Procedures | ☐☐☐☐☐ | / / | _____ |
| • Workplace Housekeeping Practices | ☐☐☐☐☐ | / / | _____ |
| **Other** | | | |
| • _____ | ☐ | / / | _____ |
| • _____ | ☐ | / / | _____ |

Figure 3: On-site training Checklist

**Kudlik Construction Ltd**
**Civil Works**

# TOOLBOX SAFETY MEETING
(Site Health & Safety Meeting Record)

**Project:** _____ **Location:** _____
**Date:** _____ **Time Start:** _____ **Time End:** _____
**Speaker:** _____ **Supervisor:** _____

| *Safety Topics / Concerns* | | ✓ | *Action Plans / Comments* |
|---|---|---|---|
| **Personal Protective Equipment (PPE)** | Mandatory PPE: hardhat, safety boots and safety vest. | | |
| | PPE for specific tasks: safety glasses, earplugs, dust masks, g | | |
| | Other available PPE: face shield, earmuffs, Tyvek suit, etc. | | |
| | Inoperable or damaged PPE | | |
| | Other on PPE: | | |
| **Heavy Equipment Safety Tips** | Equipment walk-around (pre-operation inspection) | | |
| | General on HE: no smoking, parking break use, turning off en | | |
| | 3 points stance getting on & off, fire extinguishers, spill kits, | | |
| | Truck/Driving: headlights on, right-of-way, speed limit, fog, e | | |
| | Truck/Backing Up: use both mirrors, get off & look if not sure | | |
| | you sink: stop, don't spin the wheels, follow operator signal, | | |
| | Truck/Unloading: tailgate open, no parking brake, truck level | | |
| | pull ahead sligthly to drop box, material sticked in the box, e | | |
| | Busy Work Area: keep eye contact with others, drive slowly, e | | |
| | Other on HE Safety Tips: | | |
| **Manual Materials Handling (MMH)** | Tips to lift/put down compact, large or heavy loads, bags, etc | | |
| | Tips for Team Handling: barrels, heavy steel pieces, etc. | | |
| | Shoveling & Digging: gravel, snow, shovel size, shoveling rate | | |
| | Other on MMH: | | |
| **Workplace House-keeping** | Keep the site clean: waste disposal, materials/tools storage, | | |
| | Tools maintenance: guards/safety features, damaged tools, e | | |
| | Slips, trips and falls prevention: cords and cables, wet floor, | | |
| | Rules for lunchroom, washroom and tobacco at worksite | | |
| | Other on Housekeeping: | | |
| **Incident, Accident and Emergency** | Report immediately: injury, spill, fire hazard, safety issue, etc | | |
| | Fire prevention: extinguisher, smoke detector, smoking area, | | |
| | Emergency Response Plan: fire, spill, injury, accident, etc. | | |
| | Emergency Equipment: first aid kit, spill kit, extinguisher, etc. | | |
| | Employee Behavior: alcohol, drug, harassment, bullying, etc. | | |
| | Other on Incident/Accident/Emergency: | | |

| *Attendees Sign In* | | *Supervisor's Signature* |
|---|---|---|
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Figure 4: Toolbox Safety Meeting Form for Civil Project

Kudlik Construction Ltd.

# ACCIDENT / INCIDENT DECLARATION FORM

*Fill out during the work shift and immediately forward to management*

**Part A: Worker**

**TYPE OF EVENT** ☐ Accident/injury ☐ Accident/damage ☐ Incident ☐ Other

**IDENTIFICATION**

Name: _____

First name: _____

Position or function: _____

Department or sector: _____

**FIRST AID**

Part of the body affected: _____

Type of injury: _____

**First aid received:** ☐ Yes ☐ No

Nature of the first aid received:

_____

_____

_____

_____ _____ / _____

Signature of the first aid worker Date / Time

**ACCIDENTAL EVENT**

Date of the event: _____ Time of the event: _____

Precise location of the event: _____ Activity or tasks carried out: _____

Precise description of the event or the high-risk situation: (specify, if applicable, the step of the task, the movements made, the equipment involved, the condition of the site, etc.)

_____

_____

_____

_____

Nature and elements damaged: (if applicable) _____

_____

Name of the witnesses: (if applicable)

_____ _____ _____

**SUGGESTIONS OF THE EMPLOYEE** (suggestions to avoid that another event of this type recurs)

_____

_____

_____

**SIGNATURE OF THE EMPLOYEE**

I have been informed of the accidental event declaration procedure and I confirm that the information provided is true and corresponds to what really occurred.

Date: _____ Time: _____ Signature: _____

**Part B: EMPLOYER**

**REPRESENTATIVE OF THE EMPLOYER**

Declaration received by: _____ Function: _____

Declaration acceptance date: _____ Time: _____

Immediate or preventive measure(s) applied: _____

_____

_____

Information transmitted to the employee: Reminder of the declaration procedure: ☐ Yes ☐ No

This form was filled out in accordance with the policies and procedures in effect at the establishment and does not constitute, under any circumstances, an implicit acknowledgment of the accidental event or industrial accident within the meaning of the AIAOD [Act Respecting Industrial Accidents and Occupational Diseases].

Date: _____ Time: _____ Signature: _____

**Potential recurrence of the accidental event** (after investigation)

☐ Minor ☐ Moderate ☐ High

**Potential severity of the accidental event** (after investigation)

☐ Minor ☐ Moderate ☐ High

**Accident report**

☐ Yes ☐ No

Kudlik Construction Ltd.

# ACCIDENTAL EVENT INVESTIGATION AND ANALYSIS REPORT

Preliminary report ☐ ☐ Final report ☐ ☐

| RESULTS | | EMPLOYEE | First name: | Name: | Employee No. |
|---|---|---|---|---|---|
| Injury: | ☐ | | | | |
| Damage: | ☐ | | | | |
| Incident: | ☐ | | | | |
| Other: | ☐ | | Job title: | Department/Sector: | |

**DAMAGE**

Description:

Evaluation: | | | | | | $

☐ ☐ Approximate ☐ ☐ Real

## ACCIDENTAL EVENT

**Date of the accidental event:** ____/____/____

**Potential recurrence** (after investigation) ☐ A ☐ B ☐ C

**Potential severity of the event** (after investigation) ☐ A ☐ B ☐ C

**Site visited?** ☐ Yes ☐ No

Date of the visit: (year/month/day) ____/____/____ (time) _____

Has this type of accidental event occurred previously at the company?
☐ Yes _____
☐ No

**Lieu précis:** _____

Enclosed: ☐ Sketch ☐ Photo(s) ☐ Other(s)

Work activity or tasks carried out at the time of the event: _____

## DAMAGE

**Location** (structure, equipment, tool, etc.) _____

**Part damaged** (specify the element, etc.) _____

**Precise location**

Enclosed: Photo ☐ Sketch ☐ Other ☐

**Work activity** or tasks carried out at the time of the event _____

**Evaluation**

☐ Approximate: $| | | | | | ☐ Real: $| | | | | |

## RESULTS OF THE INVESTIGATION (brief or summary of the investigation)

**Brief description and account of the accidental event (investigator's version)**

1. Based on the result of the investigation (p.2), summarize "how" and "why" this accidental event occurred. Specify with facts the location, activity carried out, relationship with the work entrusted, equipment, tools or materials concerned, the unforeseen event that triggered the contact and, if applicable, the causal agent of the injury.
2. In all cases, first fill out page 2 of this form, identifying and explaining, with facts, "how" and "why" this accidental event occurred.

☐ **Continued on other appended document:**

**Persons having provided an account** relative to this accidental event. Indicate if eye witness account (E) or from any other person(s) having contributed (C) to providing information that is relevant to the investigation. Append, as needed, a complete list of the witnesses as well as their respective statements, if applicable.

| | E | C | | E | C | | E | C |
|---|---|---|---|---|---|---|---|---|
| _____ | ☐ | ☐ | _____ | ☐ | ☐ | _____ | ☐ | ☐ |
| _____ | ☐ | ☐ | _____ | ☐ | ☐ | _____ | ☐ | ☐ |

Distribution: Original: ☐ OHS/HR manager Photocopies: ☐ Manager ☐ Director ☐ CSS

V

## RESULTS OF THE INVESTIGATION AND ANALYSIS

For each of the elements of the work situation:

1- Indicate the FACTS that contributed to **HOW** and **WHY** the accidental accident occurred.
2- In reference to the Cause Identification and Analysis Table in appendix, write in the (Cause No.) column the number of the immediate cause and of the fundamental cause for each of the factors identified.

| | Imm. cause No. | HOW? | Fund. cause No. | WHY? |
|---|---|---|---|---|
| **Person** | | | | |
| **Task** | | | | |
| **Location** | | | | |
| **Equipment** | | | | |
| **Time** | | | | |
| **Organization** | | | | |

## ANALYSIS AND CORRECTIVE ACTIONS

In reference to the contributing factors (facts) (results of the investigation), identify all the measures that will make it possible to correct, prevent and control this type of accidental event.

| Corrective/preventive measures | Person in charge | Expected timeframe | | Request No. | Measures completed |
|---|---|---|---|---|---|
| | | Start | End | | |
| | | | | | Date: _____ Initials: _____ |
| | | | | | Date: _____ Initials: _____ |
| | | | | | Date: _____ Initials: _____ |
| | | | | | Date: _____ Initials: _____ |
| | | | | | Date: _____ Initials: _____ |

## ADMINISTRATIVE MANAGEMENT

| | |
|---|---|
| Investigation conducted by (manager): Date:<br>Name: _____<br>Signature: _____ _____ | CSS representative who participated in the investigation: Date:<br>Name: _____<br>Signature: _____ _____ |
| Report revised by: Date:<br>Name: _____<br>Signature: _____ _____ | Report reviewed by the CSS: Date:<br>Name of the designated representative: _____<br>Signature: _____ _____ |
| Date preliminary report received: _____ | Investigation and analysis report reviewed and assessed by (CSS): _____<br>Date: _____ |

## *APPENDIX: REFERENCE FOR INVESTIGATION AND ANALYSIS REPORT*

The table below shows statements of causes generally related to accidental events. To maximize the quality and efficiency of your investigation and analysis, you must:

1. *Validate and, as needed, complete your investigation by reviewing all the causes below in order to make sure that you have identified all the contributing factors in the accidental event under investigation.*
2. *Analyze each of the factors selected in order to identify, from the list below, the immediate cause or the corresponding fundamental cause.*
3. *Write the number of the immediate cause or corresponding fundamental cause next to each of the factors described in the section "Results of the investigation and analysis".*

### *Cause Identification and Analysis Table*

**IMMEDIATE CAUSES**

*1. Start your analysis by identifying the immediate causes related to "How" the event occurred.*
*2. An immediate cause must be explained or associated with a fundamental cause related to "Why? the event occurred.*
*3. The causes selected must be associated with the factors described in the section " Results of the investigation and analysis".*

**Location**

101. Inadequate installation
102. Unprotected installation
103. Non-compliant installation
104. Messy (cluttered) work space
105. Tight (small ) work space
106. Open (non-delimited) work space
107. Poor condition of the traffic areas
108. Poor ventilation
109. Insufficient lighting
110. Slippery surface
111. Hazardous storage
112. Risk of fire and explosion
113. Toxic/harmful gas-smoke-fumes
114. Unfavourable ambient conditions (heat-cold-noise, etc.)
115. Unfavourable weather conditions
199. Other cause/Location

**Equipment**

201. Hazardous products
202. Product incorrectly or not labelled
203. Incorrectly stored product or merchandise
204. Product incorrectly used
205. Hazardous material
206. Material incorrectly used
207. Unprotected equipment
208. Inadequate equipment
209. Defective Equipment
210. Non-compliant equipment
211. Inadequate tool
212. Defective tool
213. Non-compliant tool
214. Absence of protection
215. Insufficient ineffective protection
216. Ergonomic design problem
299. Other cause/Equipment

**Time**

301. Working cycle (speed-pace)
302. Work duration
303. Interference between two actions
304. Repetition of a movement
399. Other cause/Time

**Task**

401. Dangerous movement of the employee
402. Dangerous movement of a third party
403. Poor execution
404. Operate without authorization
405. Operate at a dangerous speed
406. Bypass the safety systems
407. Incorrect utilization
408. Incorrectly positioned/loaded/lifted /pulled /etc.
409. Ergonomic problem
499. Other cause/Task

**Person**

501. Personal characteristic or particularity
502. Failure to observe work procedures
503. Failure to observe safety regulations
504. Failure to follow specific (verbal) instruction
505. Failure to use individual protective equipment
506. Incorrect use of personal protective equipment
507. Deliberate act of the employee
508. Influence of alcohol/drug/medication
509. Cause not related to work
599. Other cause/Person

**FUNDAMENTAL CAUSES**

**Organization**

601. Absence of OHS consideration (dangers, risks, compliance) regarding this problem
602. Absence of analysis of compliance with legal requirements
603. Absence of or poor risk assessment
604. Lack or absence of supervision and monitoring
605. Absence of consideration of human and ergonomic factors
606. Construction, layout or ergonomic problem
607. Weakness (or absence) of supply or installation policy
608. Weakness (or absence) of communication of OHS information
609. Incorrect storage and transport method
610. Inadequacy or absence of maintenance or inspection
611. Inadequacy or absence of rules or procedures
612. Absence of or poor control of the rules and procedures
613. Lack of communication of the rules, procedures or work specifications
614. Lack or absence of training
615. Incorrect assignment (selection, hire)
616. Weakness in the rules for managing an OHS management process
617. Lack of resources (human, technological or financial)
699. Other fundamental cause

**Person**

701. Personal physical condition
702. Physical stress (fatigue)
703. Psychological stress
704. Lack of experience
705. Lack of training
706. Lack of knowledge
707. Incorrect comprehension of the instructions
708. Lack of motivation
709. Lack of skill
799. Other personal factor

## JOINT WORK SITE HEALTH AND SAFETY COMMITTEE
## COMMITTEE MINUTES

Date:

Project: METAL DUMP REMEDIATION, IQALUIT

**Committee members present:**

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

| No. | Item for consideration | Recommendation | Action by | Target Date | Completion Date |
|---|---|---|---|---|---|
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Figure 5: Joint Work site Health & Safety Committee Minutes Form

# SAFETY INSPECTION RECORDING FORM

**Work Site Safety Inspection** Date: _____

Project: METAL DUMP REMEDIATION, IQALUIT Inspected by: _____

Items to watch for:

1. Safety Policy posted, Manual available
2. Housekeeping
3. First-aid
4. Scaffolds and ladders
5. PPE - Hard hats/boots/glasses/etc.
6. Hoisting and rigging
7. Proper lifting
8. Hand and Power tools maintained
9. Site secure from public
10. Hoarding and heating
11. Excavation slope protection
12. Electrical wiring, cords
13. Adequate lighting
14. WHMIS information available
15. Explosive actuated tools
16. Fire protection equipment
17. Handrails/openings covered
18. Safety Harnesses
19. Safety training
20. Vehicle speed
21. Ventilation
22. Toxic material storage
23. Warning signs, labels
24. Smoking restrictions
25. Materials safely stored

| # | Hazard Classification Rating (A,B,C) | Description of Hazard (unsafe condition/practice/ procedure) | Corrective Action Plan (describe action(s) taken or to be taken; responsibility assigned to; and by what date) |
|---|---|---|---|
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Figure 6: Safety Inspection Recording Form

# SITE INSPECTION CHECKLIST

**Project:** **METAL DUMP REMEDIATION, IQALUIT** **Time:** _____

**Inspected By:** _____ **Date:** _____

| | | | |
|---|---|---|---|
| **Public Safety** | ❑ Barricade<br>❑ Adjoining property<br>❑ Sidewalks/roads clean | ❑ Signage<br>❑Traffic Control<br>❑ Fencing/hoarding | ❑ Safe public passage<br>❑ Overhead hazards<br>❑ Signage |
| **Excavation** | ❑ Engineer drawings<br>❑ Engineer inspections<br>❑ Safe access | ❑ Shoring or sloping<br>at ¾ hor. to 1 vert.<br>for banks over four feet high | ❑ Shoring conditions<br>❑ Location of<br>underground utilities |
| **High Voltage Powerlines** | ❑ Clearance being maintained | ❑ Assurance in writing from utility | ❑ 30M33 form on site |
| **Asbestos-Containing Materials** | ❑ Identified | ❑ Removed by qualified personnel | ❑ Clearance letter available |
| **Structure** | ❑ Material stock piling<br>❑ Overhead hazards<br>❑ Safe access | ❑ Illumination<br>❑ Housekeeping<br>❑ Floor openings protected | ❑ Guardrails<br>❑ Overhead hazards<br>❑ Foundation |
| **First-aid** | ❑ Attendant<br>❑ Communication and availability | ❑ First-aid Kit<br>❑ Transportation to medical aid | ❑ Record Treatment book |
| **Personal Protective Equipment** | ❑ Hard hats<br>❑ Safety footwear<br>❑ Safety glasses | ❑ Hearing protection<br>❑ Fall Protection Equipment<br>❑ Gloves | ❑ Life jackets<br>❑ Respirators |
| **Traffic Control** | ❑ Barricades or cones<br>❑ Trained flag person(s) | ❑ Stop paddles, flags<br>❑ Wide load sign working | ❑ High visibility vests |
| **Cranes** | ❑ Operator Inspections<br>❑ Log book | ❑ Manufacture's manual<br>❑ Safety latches | ❑ Oil leaks<br>❑ Sling charts |
| **Rigging, Slings and Chains** | ❑ Check for wear<br>❑ Stretched links | ❑ S.W.L. tags on<br>❑ Hooks | ❑ Properly stored |

X

# SITE INSPECTION CHECKLIST

| | | | |
|---|---|---|---|
| **Lifting Equipment and Shoring** | ❑ Hose<br>❑ Hydraulic jacks<br>❑ Screw jacks | ❑ Pump jacks<br>❑ Rollers<br>❑ Pillow Blocks | ❑ Timbers |
| **Tools and Equipment** | ❑ Chain saw<br>❑ Powder actuated tools❑<br>❑ Lock-out procedures | ❑ Circular saws<br>Hand tools<br>❑ Operating Procedures | ❑ Drills<br>❑ Guards |
| **Oxy-Acetylene** | ❑ Bottles tied up<br>❑ Flash back arrestors<br>❑ Regulator working | ❑ Hoses in good shape<br>❑ Lifting cage<br>❑ Safety goggles available | ❑ Lens on regulators<br>❑ Regulator stored free of grease |
| **Ladders** | ❑ Non-slip base<br>❑ Extends 3' beyond platform | ❑ Rungs not defective<br>❑ Angled at 4:1 ratio | ❑ Rails not defective<br>❑ Workers not on top two steps |
| **Scaffolds** | ❑ All braces on<br>❑ Level and plumb<br>❑ Secured to structure | ❑ All connections on<br>❑ Guardrails | ❑ Firm base<br>❑ Planks (min. 20" platform) |
| **Fire Prevention** | ❑ Fire extinguishers | ❑ Exits | ❑ Flammables stored safely |
| **WHMIS** | ❑ Labels on<br>❑ Protective and spill equipment available | ❑ MSDS for controlled products | ❑ Workers trained in controlled products |
| **Safety Program** | ❑ Toolbox talk minutes<br>❑ Safety Orientation | ❑ Following site rules<br>❑ Training procedures | ❑ Following safe work |

Figure 7: Site Inspection Checklist

## Appendix B: [Safe Practice Guides]

These documents are based on the free information available from the Canadian Centre for Occupational Health and Safety.

### Civil Work

Civil works includes a wide range of activities with machinery that may presents hazards

### Hand Tool

Tools are such a common part of our lives that it is difficult to remember that they may pose hazards. All tools are manufactured with safety in mind but, tragically, a serious accident often occurs before steps are taken to search out and avoid or eliminate tool-related hazards. In the process of removing or avoiding the hazards, workers must learn to recognize the hazards associated with the different types of tools and the safety precautions necessary to prevent those hazards.

### Heavy Equipment Lifting

Lifting operations are among the most delicate and dangerous work on a job site and it must be taken really seriously as improper techniques can cause major injuries and death.

### Manual Material Handling

Manual Materials Handling (MMH) means moving of handling things by lifting, lowering, pushing, pulling, carrying, holding, or restraining. MMH is also the most common cause of occupational fatigue, low back pain and lower back injuries.

### Mechanical & Garage Work

Mechanical & Garage Work includes a wide range of activities that may presents hazards

### Powered Hand Tool

Tools are such a common part of our lives that it is difficult to remember that they may pose hazards. All tools are manufactured with safety in mind but, tragically, a serious accident often occurs before steps are taken to search out and avoid or eliminate tool-related hazards. In the process of removing or avoiding the hazards, workers must learn to recognize the hazards associated with the different types of tools and the safety precautions necessary to prevent those hazards.

### Welding

Welding, without the proper precautions, can be a dangerous and unhealthy practice. However, with the use of new technology and proper protection, risks of injury and death associated with welding can be greatly reduced. Because many common welding procedures involve an open electric arc or flame, the risk of burns and fire is significant; this is why it is classified as a hot work process.

## Work at Height

Falls from height are responsible for many serious and fatal injuries every year. If a person falls from a height above two meters the likelihood is that they will sustain serious injury. Many work activities involve working at height. Working from ladders, scaffolds and platforms are obvious examples, but there are many more activities where people are required to work at height. Examples include roof work, working over tanks and pits, at the edge of elevated structures, or on top of vehicles or trailers.

## Work in Cold Environment

Working in cold environments can be not only hazardous to your health but also life threatening. It is critical that the body be able to preserve core body temperature steady at + 37°C (+ 98.6°F). This thermal balance must be maintained to preserve normal body functioning as well as provide energy for activity (or work!). The body's mechanisms for generating heat (its metabolism) has to meet the challenge presented by low temperature, wind and wetness - the three major challenges of cold environments.

# APPENDIX B

## Kudlik Submittals

Kudlik Construction Ltd.

# Transmittal

| | |
|---|---|
| No. : | 001 |
| Rev. : | 00 |
| Date : | 2017-07-18 |

**Project :** METAL DUMP REMEDIATION, IQALUIT R.083118.001 **Project No.:** 2017-093

**Subject :** ORIGINAL GROUND SURVEY FILES

**Transmitted to :**
Arcadis
329 Churchill Ave
Ottawa, Ontario, K1Z 5B8

Stephen Livingstone
Stephen.Livingstone@arcadis.com
(613) 721 0555

**Copy to :**

| | | | |
|---|---|---|---|
| **Discipline :** | CIVIL | **Transmited for :** | |
| **Specification :** | 01 71 00 - Item 1.3.3 | **Review requested by :** | **2017-07-28** |
| **Drawings reference :** | | **Color choice :** | |
| **Transmitted as :** | | **Number of page :** | |

**Sub contractor or supplier :**
Kudlik Construction Ltd
1519 Federal Roal
Iqaluit, Nu, X0A 0H0

François Bourassa
fbourassa@kudlik.biz
867-979-1166

**Manufacturer :**

**Description :** SURVEY FILE AND DRAWING

**Supplier SD No. :**

**Comments :** ONE EXCEL FILE AND ONE PFD FILE

**Reviewed and submitted by :**

Prepared by :
François Bourassa, P. Eng.
Project Manager
Kudlik Construction Ltd.

##
##
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##
###

**Comments and review by :**

Ryan Fletcher July 20/17

No comments

Please provide qualifications of the surveyor

Kudlik Construction Ltd.

# Transmittal

**No. :** 001
**Rev. :** 00
**Date :** 2017-07-18

**Project :** METAL DUMP REMEDIATION, IQALUIT
R.083118.001
**Project No.:** 2017-093

**Subject :** ORIGINAL GROUND SURVEY FILES

**Transmitted to :**
Arcadis
329 Churchill Ave
Ottawa, Ontario, K1Z 5B8

Stephen Livingstone
Stephen.Livingstone@arcadis.com
(613) 721 0555

**Copy to :**

**Discipline :** CIVIL
**Specification :** 01 71 00 - Item 1.3.3
**Drawings reference :**
**Transmitted as :**

**Transmited for :**
**Review requested by :** 2017-07-28
**Color choice :**
**Number of page :**

**Sub contractor or supplier :**
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François Bourassa
fbourassa@kudlik.biz
867-979-1166

**Manufacturer :**

**Description :** SURVEY FILE AND DRAWING

**Supplier SD No. :**
**Comments :** ONE EXCEL FILE AND ONE PFD FILE

**Reviewed and submitted by :**

Prepared by :
François Bourassa, P. Eng.
Project Manager
Kudlik Construction Ltd.

##
##
##
##
##
###

**Comments and review by :**

Kudlik Construction Ltd.

# Transmittal

**No. :** 006
**Rev. :** 00
**Date :** 2017-07-20

**Project :** METAL DUMP REMEDIATION, IQALUIT
R.083118.001
**Project No.:** 2017-093

**Subject :** SURVEYOR QUALIFICATIONS

**Transmitted to :**
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329 Churchill Ave
Ottawa, Ontario, K1Z 5B8

Ryan Fletcher
Ryan.Fletcher@arcadis.com
(613) 721 0555

**Copy to :**

**Discipline :**
**Specification :** 07 71 00 - Item 1.3.3
**Drawings reference :**
**Transmitted as :**

**Transmited for :**
**Review requested by :** **2017-07-30**
**Color choice :**
**Number of page :** 4 including this cover

**Sub contractor or supplier :**
Kudlik Construction Ltd
1519 Federal Roal
Iqaluit, Nu, X0A 0H0

François Bourassa
fbourassa@kudlik.biz
867-979-1166

**Manufacturer :**

**Description :** SURVEYOR RESUME

**Supplier SD No. :**
**Comments :**

**Reviewed and submitted by :**

Prepared by :
François Bourassa, P. Eng.
Project Manager
Kudlik Construction Ltd.

##
##
##
##
##
###

**Comments and review by :**

Kudlik Construction Ltd.

# DANIK MAZEROLLE

*Surveying / Civil Technician*

## Education

Civil Engineering Technician  Collège Communautaire du Nouveau-Brunswick - 2003

## Training

Trimble SCS900 Software Training – 2015
Trimble Business Center - HCE Software Training – 2015
Autocad Civil 3D software (Consortech) - 2010
Transportation of Dangerous Goods (YOW Canada) – 2015
Confined Space Training (EMOICQ) – 2012
Asbestos Training (ASP) – 2012
Platform and scissor-lift (ASP) – 2012
Forklift (ASP) – 2012
Fall protection (ASP) – 2012

## About

Mr. Mazerolle joined Kudlik Construction in 2004 as a surveying technician and he now cumulates over 14 years of experience in the survey of construction sites. Mr. Mazerolle is a determined individual and engaged team member who shows the rigor and attention to detail required to ensure the accuracy of the data collected on the field. He is used to working on rugged terrain and through the sometimes harsh conditions inherent to the execution of projects in the North.

Here is a non-exhaustive list of tasks that Mr. Mazerolle performs:

- Conduct surveys of the natural terrain before construction using RTK GPS
- Establish benchmarks for construction
- Implementation of various earthworks (culverts, bridges, roads, runway lighting, etc.)
- Implementation of building works (anchors, concrete, etc.)
- Verification of construction
- As-Built Surveys
- Calculation of the volume of granular material stockpiles
- Calculation of the volume of backfill and excavation material between two surfaces

Kudlik Construction Ltd.

## Major projects with Kudlik Construction Ltd

| | | |
|---|---|---|
| ▪ Asphalt supply for the IIAIP project | Sintra | $ 6.5 M / 2014-2017 |
| ▪ Apex Phase B Road | City of Iqaluit | $ 236 K / 2016-to date |
| ▪ Removal of Bulky Metals and Tires from the City of Iqaluit Solid Waste Site, Iqaluit, NU | City of Iqaluit | $ 1.7 M / 2016 |
| ▪ Aggregates supply for the IIAIP Project | Sintra | $ 7 M / 2014-2016 |
| ▪ Underground utilities – ATB and CSB (IIAIP) | Sintra | $ 2,5 M / 2015 |
| ▪ Civil work for new 900 Creekside block | NCC Development | $ 0,3 M / 2015 |
| ▪ Watermain replacement | City of Iqaluit | $ 0,3 M / 2015 |
| ▪ Bus Turnaround – civil work | City of Iqaluit | $ 0,1 M / 2015 |
| ▪ Excavation and Backfill for the new ATB and CSB (IIAIP) | Bouygues Building Canada | $ 5 M / 2014-2015 |
| ▪ Concrete work for the new ATB and CSB (IIAIP) | Bouygues Building Canada | $ 6.5 M / 2014-2015 |
| ▪ Civil work for Inuit Broadcasting Corp – Iqaluit | NCC Development | $ 0,5 M / 2014 |
| ▪ Civil and concrete for new Warehouse | NCC Development | $ 0,7 M / 2014 |
| ▪ Plant expansion and upgrade, Iqaluit, NU | Qulliq Energy Corporation | $10.5 M / 2012 |
| ▪ Plateau subdivision, Phase 4, Iqaluit, NU | City of Iqaluit | $1.9M / 2012 |
| ▪ Lift Station No.2, Iqaluit, NU | City of Iqaluit | $1.7M / 2010 |
| ▪ Substation civil-electrical work, Iqaluit, NU | Qulliq Energy Corporation | $2.5M / 2010 |
| ▪ Reopening of Taxi-Way, Iqaluit, NU | Government of Nunavut | $13.6M / 2010 |
| ▪ Qikiqtani General Hospital, Iqaluit, NU | Qikiqtaaluk Corporation | $2.8M / 2010 |

# Collège communautaire du Nouveau-Brunswick
Edmundston

sur la recommandation du corps professoral nous décernons à

## DANIK MAZEROLLE

le DIPLÔME de

## TECHNOLOGIE DU GÉNIE CIVIL (COOP)

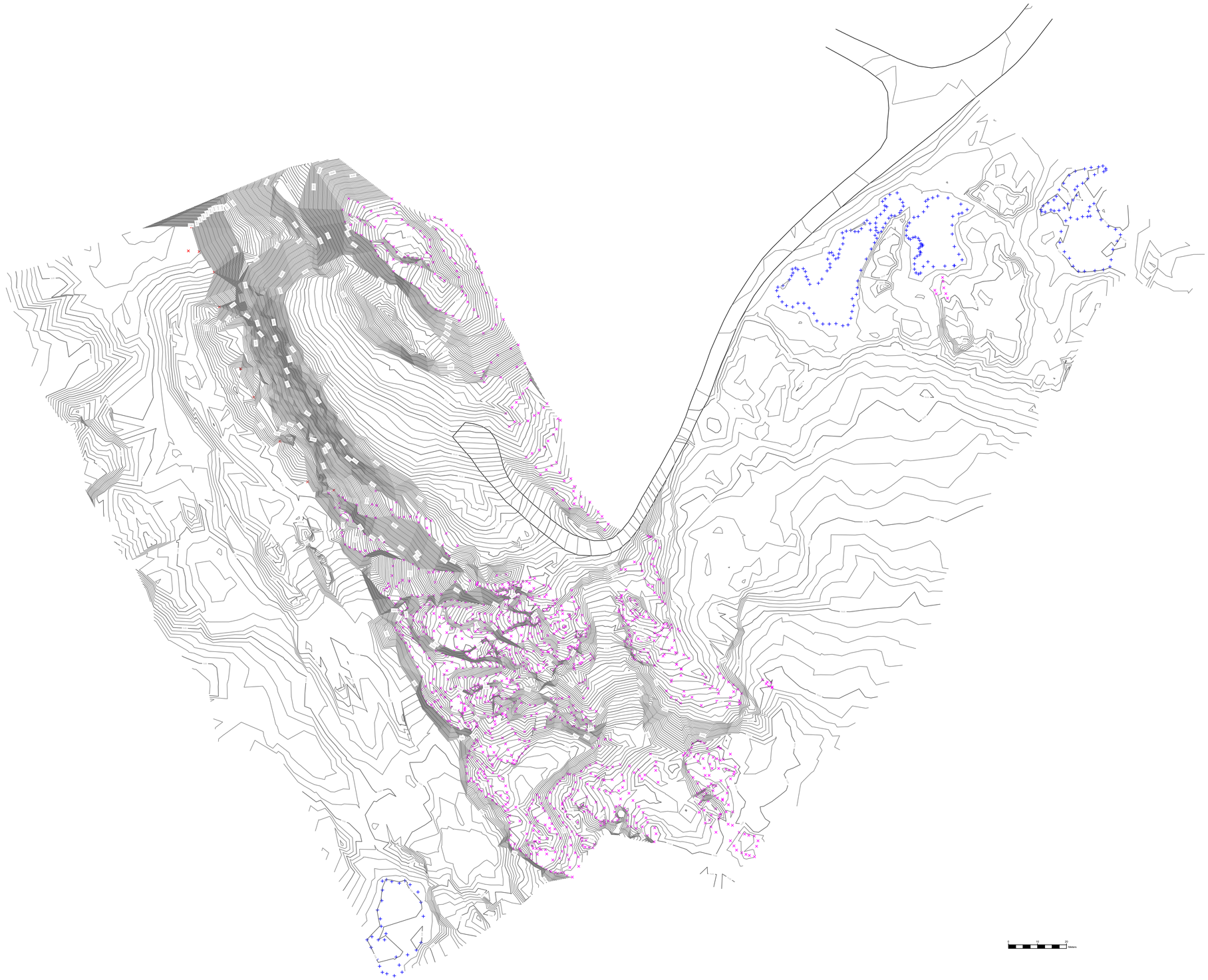
avec tous les droits, honneurs et privilèges rattachés à ce diplôme

Directeur/Directrice

Registraire

Le 30 mars 2003

Date




Kudlik Construction Ltd.
IQALUIT | Nunavut

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1519 Federal Road
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X0A 0H0
Tel.: 867.979.1166 #26
Fax.: 867.979.1169


# *Remidiation Metal Dump*

| DATE | SCALE | DESIGNER | VÉRIFIED BY |
|---|---|---|---|
| 2017-07-01 | -- | Jeff Deziel | --- |

| PROJECT # | DRAWING # | SHEET | REV. | FOR. |
|---|---|---|---|---|
| ### | ## | 01 | 01 | A1 |

Kudlik Construction Ltd.

# Transmittal

| | |
|---|---|
| No. : | 002 |
| Rev. : | 00 |
| Date : | 2017-07-18 |

**Project :** METAL DUMP REMEDIATION, IQALUIT — **Project No.:** 2017-093

R.083118.001

**Subject :** AGGREGATE MATERIALS

**Transmitted to :**
Arcadis
329 Churchill Ave
Ottawa, Ontario, K1Z 5B8

Stephen Livingstone
Stephen.Livingstone@arcadis.com
(613) 721 0555

**Copy to :**

| | | | |
|---|---|---|---|
| **Discipline :** | CIVIL | **Transmited for :** | |
| **Specification :** | 31 05 16 | **Review requested by :** | 2017-07-24 |
| **Drawings reference :** | | **Color choice :** | |
| **Transmitted as :** | | **Number of page :** | 5 including this cover |

**Sub contractor or supplier :**
Kudlik Construction Ltd
1519 Federal Roal
Iqaluit, Nu, X0A 0H0

François Bourassa
fbourassa@kudlik.biz
867-979-1166

**Manufacturer :**

**Description :** SIEVE ANALYSIS

**Supplier SD No. :**

**Comments :** TYPE 1, 2, 3 AND 4

**Reviewed and submitted by :**

Prepared by :
François Bourassa, P. Eng.
Project Manager
Kudlik Construction Ltd.

##
##
##
##
##
###

**Comments and review by :**

Rym Fluteau July 20/17

comments provided via e-mail

Kudlik Construction Ltd.

# Transmittal

| | |
|---|---|
| No. : | 002 |
| Rev. : | 00 |
| Date : | 2017-07-18 |

**Project :** METAL DUMP REMEDIATION, IQALUIT — **Project No.:** 2017-093

R.083118.001

**Subject :** AGGREGATE MATERIALS

**Transmitted to :**
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Ottawa, Ontario, K1Z 5B8

Stephen Livingstone
Stephen.Livingstone@arcadis.com
(613) 721 0555

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|---|---|---|---|
| **Discipline :** | CIVIL | **Transmited for :** | |
| **Specification :** | 31 05 16 | **Review requested by :** | 2017-07-24 |
| **Drawings reference :** | | **Color choice :** | |
| **Transmitted as :** | | **Number of page :** | 5 including this cover |

**Sub contractor or supplier :**
Kudlik Construction Ltd
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François Bourassa
fbourassa@kudlik.biz
867-979-1166

**Manufacturer :**

**Description :** SIEVE ANALYSIS

**Supplier SD No. :**

**Comments :** TYPE 1, 2, 3 AND 4

**Reviewed and submitted by :**

Prepared by :
François Bourassa, P. Eng.
Project Manager
Kudlik Construction Ltd.

##
##
##
##
##
###

**Comments and review by :**

Rym Fluteau July 20/17

comments provided via e-mail

4500, rue Louis-B.-Mayer
Laval (QC) H7P 6E4
Phone: 450-682-8013
www.exp.com

Cetified: ISO 9001:2008

# SOILS AND AGGREGATES

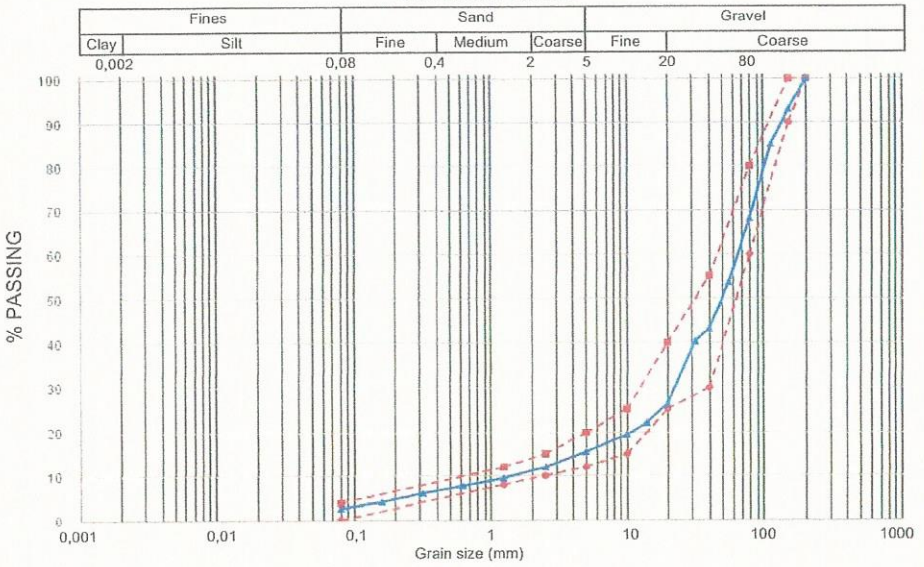
| | | | |
|---|---|---|---|
| Client : | KUDLIK CONSTRUCTION LTD | Project n° : | KUCE-218525-005400 |
| | | Sample n° : | IQ-0961 |
| Project : | Iqaluit 2014 à 2017 | **Client Ref.:** | |

| | | | |
|---|---|---|---|
| Material : | 0-200mm (Iqaluit) , Crushed stone (Type 3) | Sampling date : | 2017-07-04 by EXP |
| Source : | Quarry north of the airport, Iqaluit | Location : | Stockpile |
| Utilisation : | Backfilling | Receiving date : | 2017-07-04 |

**Grain size analysis**
**LC 21-040**

| Sieve (mm) | Grading (%passing) | | |
|---|---|---|---|
| | Value | Specifications | |
| 200 | 100 | 100 | 100 |
| 150 | 93 | 90 | 100 |
| 112 | 85 | | |
| 80 | 68 | 60 | 80 |
| 56 | 54 | | |
| 40 | 43 | 30 | 55 |
| 31,5 | 40 | | |
| 20 | 26 | 25 | 40 |
| 14 | 22 | | |
| 10 | 19 | 15 | 25 |
| 5 | 15 | 12 | 20 |
| 2,5 | 12 | 10 | 15 |
| 1,25 | 10 | 8 | 12 |
| 0,630 | 8 | | |
| 0,315 | 6 | | |
| 0,160 | 4 | | |
| 0,080 | 2,7 | 0,0 | 4,0 |

**Gradation Curve**




| Proctor | Other tests | Results | Specifications |
|---|---|---|---|
| Method : | | | |
| Masse vol. max. : | | | |
| Optimum water | | | |

Remarks :

Verified by : CHUONG SONG LU

Approved by : André Arbour Date : 2017-07-05
André Arbour

4500, rue Louis-B.-Mayer
Laval (QC) H7P 6E4
Phone: 450-682-8013
www.exp.com

Cetified: ISO 9001:2008

**SOILS AND AGGREGATES**

Client : KUDLIK CONSTRUCTION LTD
Project n° : KUCE-218525-005400
Sample n° : IQ-0963
Project : Iqaluit 2014 à 2017
**Client Ref.:**

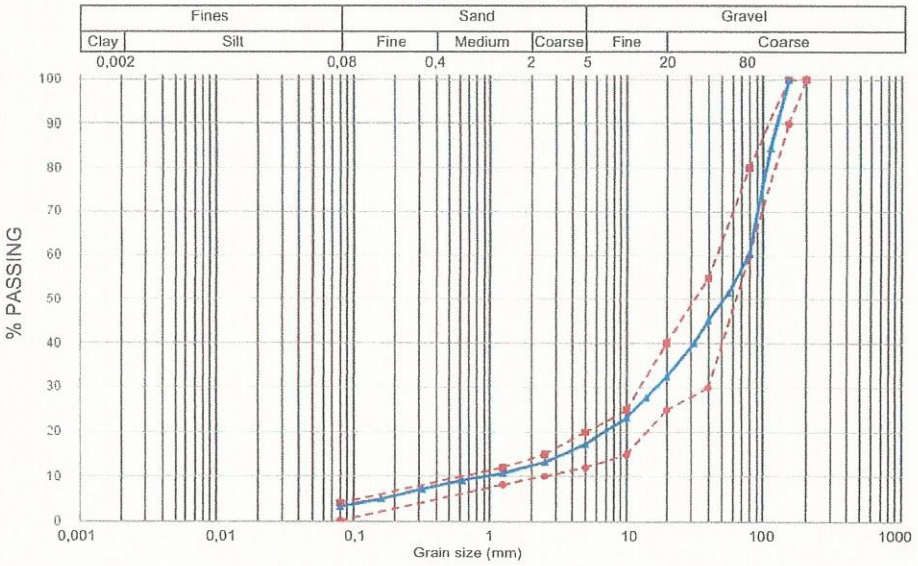
Material : 0-200mm (Iqaluit) , Crushed stone (Type 3)
Sampling date : 2017-07-07 by EXP
Source : Quarry north of the airport, Iqaluit
Location : Stockpile

Utilisation : Backfilling
Receiving date : 2017-07-07

**Grain size analysis**
**LC 21-040**

| Sieve (mm) | Grading (%passing) Value | Specifications | |
|---|---|---|---|
| 200 | | 100 | 100 |
| 150 | 100 | 90 | 100 |
| 112 | 85 | | |
| 80 | 60 | 60 | 80 |
| 56 | 51 | | |
| 40 | 45 | 30 | 55 |
| 31,5 | 40 | | |
| 20 | 32 | 25 | 40 |
| 14 | 28 | | |
| 10 | 23 | 15 | 25 |
| 5 | 17 | 12 | 20 |
| 2,5 | 13 | 10 | 15 |
| 1,25 | 11 | 8 | 12 |
| 0,630 | 9 | | |
| 0,315 | 7 | | |
| 0,160 | 5 | | |
| 0,080 | 3,2 | 0,0 | 4,0 |

**Gradation Curve**




| Proctor | Other tests | Results | Specifications |
|---|---|---|---|
| Method : | | | |
| Masse vol. max. : | | | |
| Optimum water | | | |

Remarks :

Verified by : CHUONG SONG LU
Approved by : André Arbour
Date : 2017-07-08

4500, rue Louis-B.-Mayer
Laval (QC) H7P 6E4
Phone: 450-682-8013
www.exp.com

Cetified: ISO 9001:2008

**SOILS AND AGGREGATES**

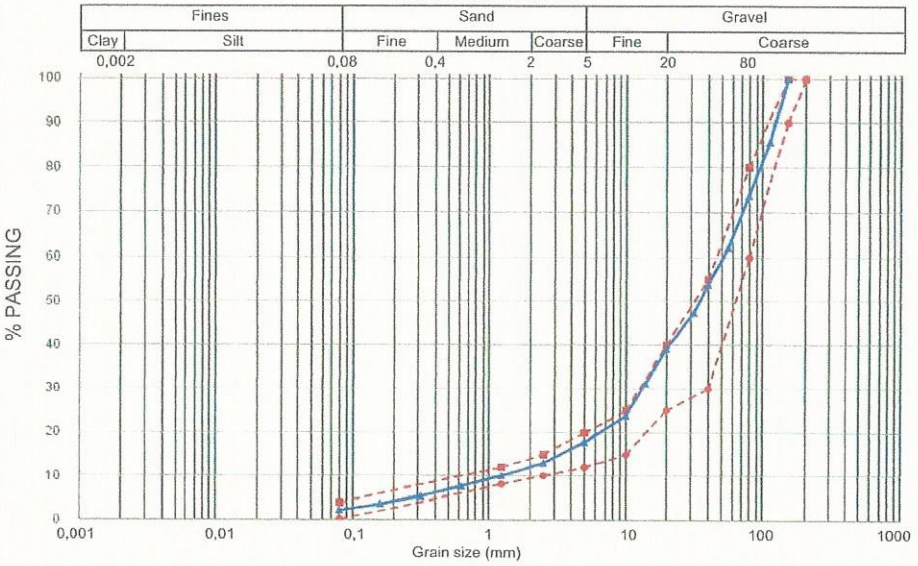
| | | | |
|---|---|---|---|
| Client : | KUDLIK CONSTRUCTION LTD | Project n° : | KUCE-218525-005400 |
| | | Sample n° : | IQ-0964 |
| Project : | Iqaluit 2014 à 2017 | **Client Ref.:** | |

| | | | |
|---|---|---|---|
| Material : | 0-200mm (Iqaluit) , Crushed stone (Type 3) | Sampling date : | 2017-07-08 by EXP |
| Source : | Quarry north of the airport, Iqaluit | Location : | Stockpile |
| Utilisation : | Backfilling | Receiving date : | 2017-07-08 |

**Grain size analysis**
**LC 21-040**

| Sieve (mm) | Grading (%passing) | | |
|---|---|---|---|
| | Value | Specifications | |
| 200 | | 100 | 100 |
| 150 | 100 | 90 | 100 |
| 112 | 86 | | |
| 80 | 74 | 60 | 80 |
| 56 | 62 | | |
| 40 | 54 | 30 | 55 |
| 31,5 | 47 | | |
| 20 | 39 | 25 | 40 |
| 14 | 31 | | |
| 10 | 24 | 15 | 25 |
| 5 | 18 | 12 | 20 |
| 2,5 | 13 | 10 | 15 |
| 1,25 | 10 | 8 | 12 |
| 0,630 | 8 | | |
| 0,315 | 5 | | |
| 0,160 | 4 | | |
| 0,080 | 2,3 | 0,0 | 4,0 |

**Gradation Curve**




| Proctor | Other tests | Results | Specifications |
|---|---|---|---|
| Method :<br>Masse vol. max. :<br>Optimum water | | | |

Remarks :

Verified by : CHUONG SONG LU

Approved by : André Arbour

Date : 2017-07-08

4500, rue Louis-B.-Mayer
Laval, QC H7P 6E4
Tél. : 450-682-8013

## RESULTS OF SIEVE ANALYSIS

OUR/REF. : **LAV-218525** PROJECT : MATERIAL : **Crushed stone 0-5mm**

CLIENT : **Kudlik Construction ltd** PERIOD : SOURCE : **Quarry north of the airport, Iqaluit, Nunavut**

SAMPLED BY : **Song Lu Chuong** **KUDLIK Stockpile** PROPOSED USAGE : **Asphalt**

SOURCE : **Quarry north of the airport, Iqaluit, Nunavut**

| # LAB. | SAMPLING | | SIEVES IN MILLIMETER | | | | | | | | | | SIEVES IN MICRON | | | | Cumulative at the End of the day |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE | DATE | 80 | 56 | 40 | 31,5 | 20 | 14 | 10 | 5 | 2,5 | 1,25 | 630 | 315 | 160 | 80 | |
| IQ-0930 | 1 | 2017-06-04 N | | | | | | 100 | 100 | 88 | 58 | 41 | 31 | 23 | 16 | 10,4 | |
| IQ-0932 | 2 | 2017-06-05 D | | | | | | 100 | 100 | 88 | 58 | 41 | 31 | 23 | 15 | 9,5 | |
| IQ-0934 | 3 | 2017-06-05 N | | | | | | 100 | 100 | 88 | 59 | 42 | 32 | 24 | 16 | 10,1 | |
| IQ-0936 | 4 | 2017-06-06 D | | | | | | 100 | 100 | 88 | 56 | 37 | 27 | 20 | 14 | 9,5 | |
| IQ-0938 | 5 | 2017-06-06 N | | | | | | 100 | 100 | 91 | 62 | 43 | 32 | 23 | 15 | 9,1 | |
| IQ-0940 | 6 | 2017-06-07 D | | | | | | 100 | 100 | 92 | 62 | 43 | 31 | 22 | 15 | 9,0 | |
| IQ-0942 | 7 | 2017-06-07 N | | | | | | 100 | 100 | 90 | 58 | 39 | 29 | 21 | 14 | 8,6 | |
| IQ-0944 | 8 | 2017-06-08 D | | | | | | 100 | 100 | 92 | 65 | 46 | 34 | 24 | 16 | 9,7 | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| ***AVERAGE*** | | | | | | | | **100** | **100** | **90** | **60** | **42** | **31** | **23** | **15** | **9,5** | |

* Out of specifications

| REQUIREMENT | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MIN. | | | | | | | | 100 | 85 | | | | | | 8 |
| | MAX. | | | | | | | | 100 | 100 | | | | | | 11 |

Prepared by : Song Lu Chuong Date : June 08, 2017 Approved by : Date : JUNE 11 2017

Kudlik Construction Ltd.

# Transmittal

**No. :** 002
**Rev. :** 00
**Date :** 2017-07-18

**Project :** METAL DUMP REMEDIATION, IQALUIT
R.083118.001
**Project No.:** 2017-093

**Subject :** AGGREGATE MATERIALS

**Transmitted to :**
Arcadis
329 Churchill Ave
Ottawa, Ontario, K1Z 5B8

Stephen Livingstone
Stephen.Livingstone@arcadis.com
(613) 721 0555

**Copy to :**

**Discipline :** CIVIL
**Specification :** 31 05 16
**Drawings reference :**
**Transmitted as :**

**Transmited for :**
**Review requested by :** **2017-07-24**
**Color choice :**
**Number of page :** 5 including this cover

**Sub contractor or supplier :**
Kudlik Construction Ltd
1519 Federal Roal
Iqaluit, Nu, X0A 0H0

François Bourassa
fbourassa@kudlik.biz
867-979-1166

**Manufacturer :**

**Description :** SIEVE ANALYSIS

**Supplier SD No. :**
**Comments :** TYPE 1, 2, 3 AND 4

**Reviewed and submitted by :**

Prepared by :
François Bourassa, P. Eng.
Project Manager
Kudlik Construction Ltd.

##
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##
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##
###

**Comments and review by :**

4500, rue Louis-B.-Mayer
Laval (QC) H7P 6E4
Phone: 450-682-8013
www.exp.com

Cetified: ISO 9001:2008

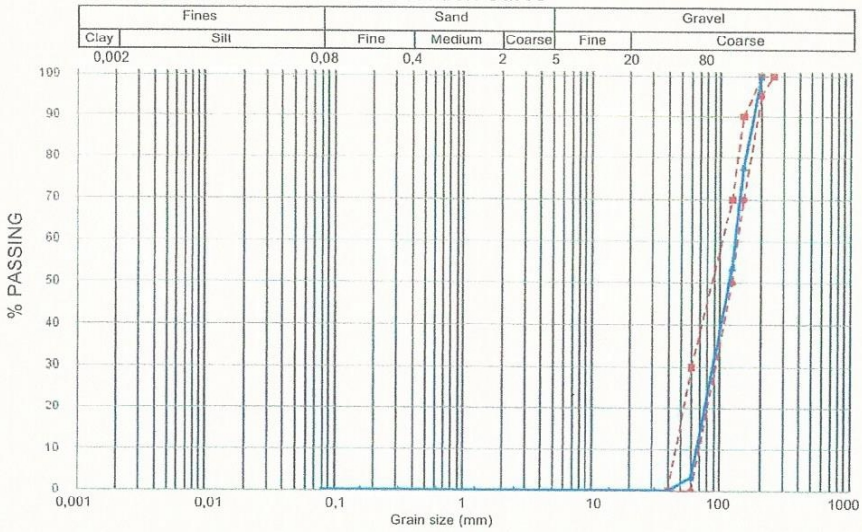
# SOILS AND AGGREGATES

| | | | |
|---|---|---|---|
| Client : | KUDLIK CONSTRUCTION LTD | Project n° : | KUCE-218525-005400 |
| Project : | Iqaluit 2014 à 2017 | Sample n° : | IQ-0971 |
| | | **Client Ref.:** | |
| Material : | RIP RAP , Crushed stone (Type 3) | Sampling date : | 2017-07-11 by EXP |
| Source : | Quarry north of the airport, Iqaluit | Location : | Stockpile |
| Utilisation : | Backfilling | Receiving date : | 2017-07-11 |

**Grain size analysis**
**LC 21-040**

| Sieve (mm) | Grading (%passing) Value | Specifications | |
|---|---|---|---|
| 250 | | 100 | 100 |
| 200 | 100 | 95 | 100 |
| 150 | 78 | 70 | 90 |
| 125 | 54 | 50 | 70 |
| 60 | 3 | 0 | 30 |
| 40 | 0 | 0 | 0 |
| 31,5 | 0 | | |
| 20 | 0 | | |
| 14 | 0 | | |
| 10 | 0 | | |
| 5 | 0 | | |
| 2,5 | 0 | | |
| 1,25 | 0 | | |
| 0,630 | 0 | | |
| 0,315 | 0 | | |
| 0,160 | 0 | | |
| 0,080 | 0,0 | | |

**Gradation Curve**




| Proctor | Other tests | Results | Specifications |
|---|---|---|---|
| Method :<br>Masse vol. max. :<br>Optimum water | | | |

Remarks :

Verified by : CHUONG SONG LU

Approved by : André Arbour Date : 2017-07-12
André Arbour

4500, rue Louis-B.-Mayer
Laval (QC) H7P 6E4
Phone: 450-682-8013
www.exp.com

Cetified: ISO 9001:2008

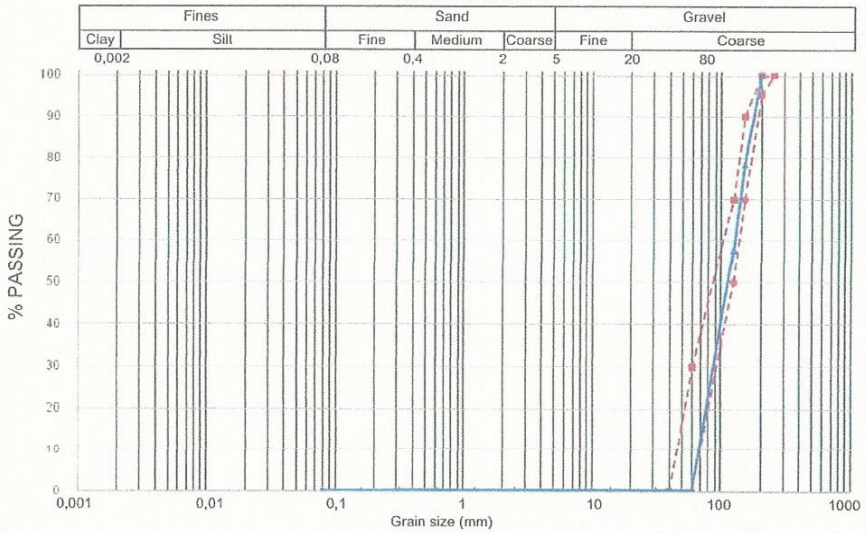
**SOILS AND AGGREGATES**

| | | | |
|---|---|---|---|
| Client : | KUDLIK CONSTRUCTION LTD | Project n° : | KUCE-218525-005400 |
| | | Sample n° : | IQ-0979 |
| Project : | Iqaluit 2014 à 2017 | **Client Ref.:** | |
| Material : | RIP RAP , Crushed stone (Type 3) | Sampling date : | 2017-07-12 by EXP |
| Source : | Quarry north of the airport, Iqaluit | Location : | Stockpile |
| Utilisation : | Backfilling | Receiving date : | 2017-07-12 |

**Grain size analysis**
**LC 21-040**

| Sieve (mm) | Grading (%passing) Value | Specifications | |
|---|---|---|---|
| 250 | | 100 | 100 |
| 200 | 100 | 95 | 100 |
| 150 | 78 | 70 | 90 |
| 125 | 58 | 50 | 70 |
| 60 | 0 | 0 | 30 |
| 40 | 0 | 0 | 0 |
| 31,5 | 0 | | |
| 20 | 0 | | |
| 14 | 0 | | |
| 10 | 0 | | |
| 5 | 0 | | |
| 2,5 | 0 | | |
| 1,25 | 0 | | |
| 0,630 | 0 | | |
| 0,315 | 0 | | |
| 0,160 | 0 | | |
| 0,080 | 0,1 | | |

**Gradation Curve**




| Proctor | Other tests | Results | Specifications |
|---|---|---|---|
| Method :<br>Masse vol. max. :<br>Optimum water | | | |

Remarks :

Verified by : CHUONG SONG LU

Approved by : André Arbour

Date : 2017-07-13

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Phone: 450-682-8013
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Cetified: ISO 9001:2008

**SOILS AND AGGREGATES**

Client : KUDLIK CONSTRUCTION LTD

Project n° : KUCE-218525-005400

Sample n° : IQ-0983

Project : Iqaluit 2014 à 2017

**Client Ref.:**

Material : RIP RAP , Crushed stone (Type 3)

Source : Quarry north of the airport, Iqaluit

Sampling date : 2017-07-13 by EXP

Location : Stockpile

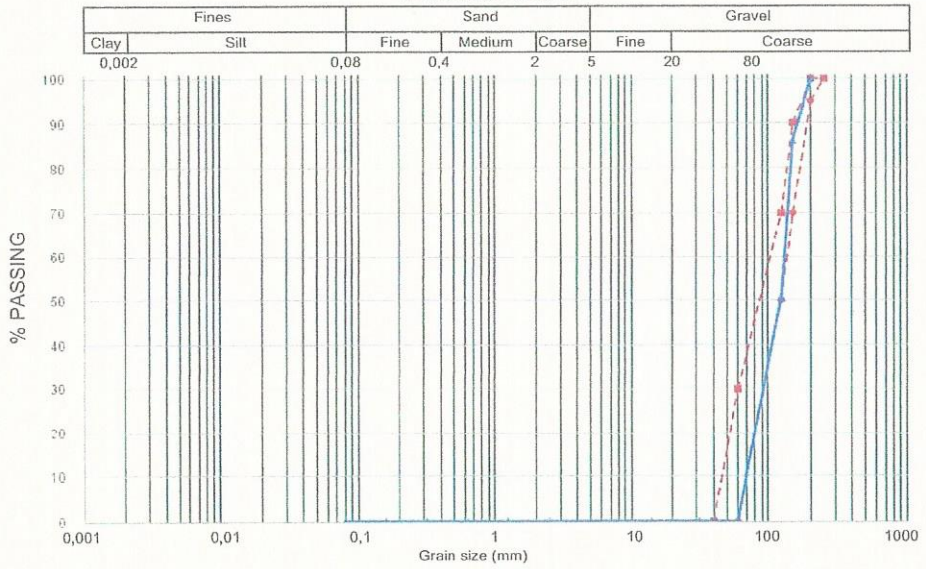
Utilisation : Backfilling

Receiving date : 2017-07-13

**Grain size analysis**
**LC 21-040**

| Sieve (mm) | Grading (%passing) | | |
|---|---|---|---|
| | Value | Specifications | |
| 250 | | 100 | 100 |
| 200 | 100 | 95 | 100 |
| 150 | 86 | 70 | 90 |
| 125 | 51 | 50 | 70 |
| 60 | 0 | 0 | 30 |
| 40 | 0 | 0 | 0 |
| 31,5 | 0 | | |
| 20 | 0 | | |
| 14 | 0 | | |
| 10 | 0 | | |
| 5 | 0 | | |
| 2,5 | 0 | | |
| 1,25 | 0 | | |
| 0,630 | 0 | | |
| 0,315 | 0 | | |
| 0,160 | 0 | | |
| 0,080 | 0,0 | | |

**Gradation Curve**




| Proctor | Other tests | Results | Specifications |
|---|---|---|---|
| Method :<br>Masse vol. max. :<br>Optimum water | | | |

Remarks :

Verified by : CHUONG SONG LU

Approved by : André Arbour

Date : 2017-07-13

4500, rue Louis-B.-Mayer
Laval, QC H7P 6E4
Tél. : 450-682-8013

## RESULTS OF SIEVE ANALYSIS

OUR/REF. : **LAV-218525** PROJECT : **0-20 mm blast 2016** MATERIAL : **Crushed stone MG-20 (type 1)**

CLIENT : **Kudlik Construction ltd** PERIOD : SOURCE : **Quarry north of the airport, Iqaluit,**

MPLED BY : **Simon Plouffe** **Stockpile 2016** PROPOSED USAC **Backfilling**

SOURCE : **Quarry north of the airport, Iqaluit, Nunavut**

| # LAB. | SAMPLING | | SIEVES IN MILLIMETER | | | | | | | | | | SIEVES IN MICRON | | | | Cumulative at the End of the day |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE | DATE | 80 | 56 | 40 | 31,5 | 20 | 14 | 10 | 5 | 2,5 | 1,25 | 630 | 315 | 160 | 80 | |
| IQ-792 | 1 | 2016-07-02 D | | | | 100 | 90 | 71 | 57 | 38 | 26 | 19 | 15 | 11 | 8 | 4,8 | |
| IQ-794 | 2 | 2016-07-03 D | | | | 100 | 97 | 79 | 62 | 41 | 30 | 22 | 18 | 13 | 9 | 5,7 | |
| IQ-795 | 3 | 2016-07-03 D | | | | 100 | 96 | 83 | 71 | 47 | 31 | 23 | 17 | 13 | 9 | 5,7 | |
| IQ-796 | 4 | 2016-07-04 D | | | | 100 | 92 | 68 | 53 | 34 | 25 | 19 | 14 | 11 | 7 | 4,7 | |
| IQ-798 | 5 | 2016-07-05 D | | | | 100 | 100 | 78 | 57 | 31 | 21 | 16 | 13 | 10 | 7 | 4,5 | |
| IQ-801 | 6 | 2016-07-06 D | | | | 100 | 100 | 85 | 66 | 39 | 27 | 20 | 16 | 12 | 9 | 5,5 | |
| IQ-803 | 7 | 2016-07-07 D | | | | 100 | 100 | 87 | 70 | 40 | 26 | 20 | 16 | 12 | 9 | 5,5 | |
| IQ-806 | 8 | 2016-07-08 D | | | | 100 | 100 | 87 | 71 | 43 | 31 | 24 | 19 | 15 | 10 | 6,4 | |
| IQ-807 | 9 | 2016-07-09 D | | | | 100 | 100 | 89 | 73 | 44 | 30 | 22 | 17 | 13 | 9 | 5,5 | **10 890 MT (2-9 juillet)** |
| | | | | | | | | | | | | | | | | | |
| ***AVERAGE*** | | | | | | **100** | **97** | **81** | **63** | **40** | **27** | **21** | **16** | **12** | **9** | **5,4** | |

* Out of specifications

| REQUIREMENT | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MIN. | | | | | 100 | 90 | 68 | | 35 | | 15 | | 5 | | 2 |
| | MAX. | | | | | 100 | 100 | 93 | | 60 | | 38 | | 17 | | 7 |

Prepared by : Simon Plouffe ate : July 14 2016 Approved by : Date : July 21 2016

Kudlik Construction Ltd.

# Transmittal

| | |
|---|---|
| No. : | 003 |
| Rev. : | 00 |
| Date : | 2017-07-19 |

**Project :** METAL DUMP REMEDIATION, IQALUIT — **Project No.:** 2017-093
R.083118.001

**Subject :** PROJECT SCHEDULE

**Transmitted to :**
Arcadis
329 Churchill Ave
Ottawa, Ontario, K1Z 5B8

Stephen Livingstone
Stephen.Livingstone@arcadis.com
(613) 721 0555

**Copy to :**

| | | | |
|---|---|---|---|
| **Discipline :** | | **Transmited for :** | |
| **Specification :** | 01 32 17 - Item 1.1 | **Review requested by :** | **2017-07-24** |
| **Drawings reference :** | | **Color choice :** | |
| **Transmitted as :** | | **Number of page :** | 6 including this cover |

**Sub contractor or supplier :**
Kudlik Construction Ltd
1519 Federal Roal
Iqaluit, Nu, X0A 0H0

François Bourassa
fbourassa@kudlik.biz
867-979-1166

**Manufacturer :**

**Description :** GANTT CHART SCHEDULE

**Supplier SD No. :**

**Comments :**

**Reviewed and submitted by :**

Prepared by :
François Bourassa, P. Eng.
Project Manager
Kudlik Construction Ltd.

##
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##
##
###

**Comments and review by :**

Ryan Fletcher July 20/17

No comments

Kudlik Construction Ltd.

# Transmittal

**No. :** 003
**Rev. :** 00
**Date :** 2017-07-19

**Project :** METAL DUMP REMEDIATION, IQALUIT
R.083118.001
**Project No.:** 2017-093

**Subject :** PROJECT SCHEDULE

**Transmitted to :**
Arcadis
329 Churchill Ave
Ottawa, Ontario, K1Z 5B8

Stephen Livingstone
Stephen.Livingstone@arcadis.com
(613) 721 0555

**Copy to :**

**Discipline :**
**Specification :** 01 32 17 - Item 1.1
**Drawings reference :**
**Transmitted as :**

**Transmited for :**
**Review requested by :** **2017-07-24**
**Color choice :**
**Number of page :** 6 including this cover

**Sub contractor or supplier :**
Kudlik Construction Ltd
1519 Federal Roal
Iqaluit, Nu, X0A 0H0

François Bourassa
fbourassa@kudlik.biz
867-979-1166

**Manufacturer :**

**Description :** GANTT CHART SCHEDULE

**Supplier SD No. :**
**Comments :**

**Reviewed and submitted by :**

Prepared by :
François Bourassa, P. Eng.
Project Manager
Kudlik Construction Ltd.

##
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##
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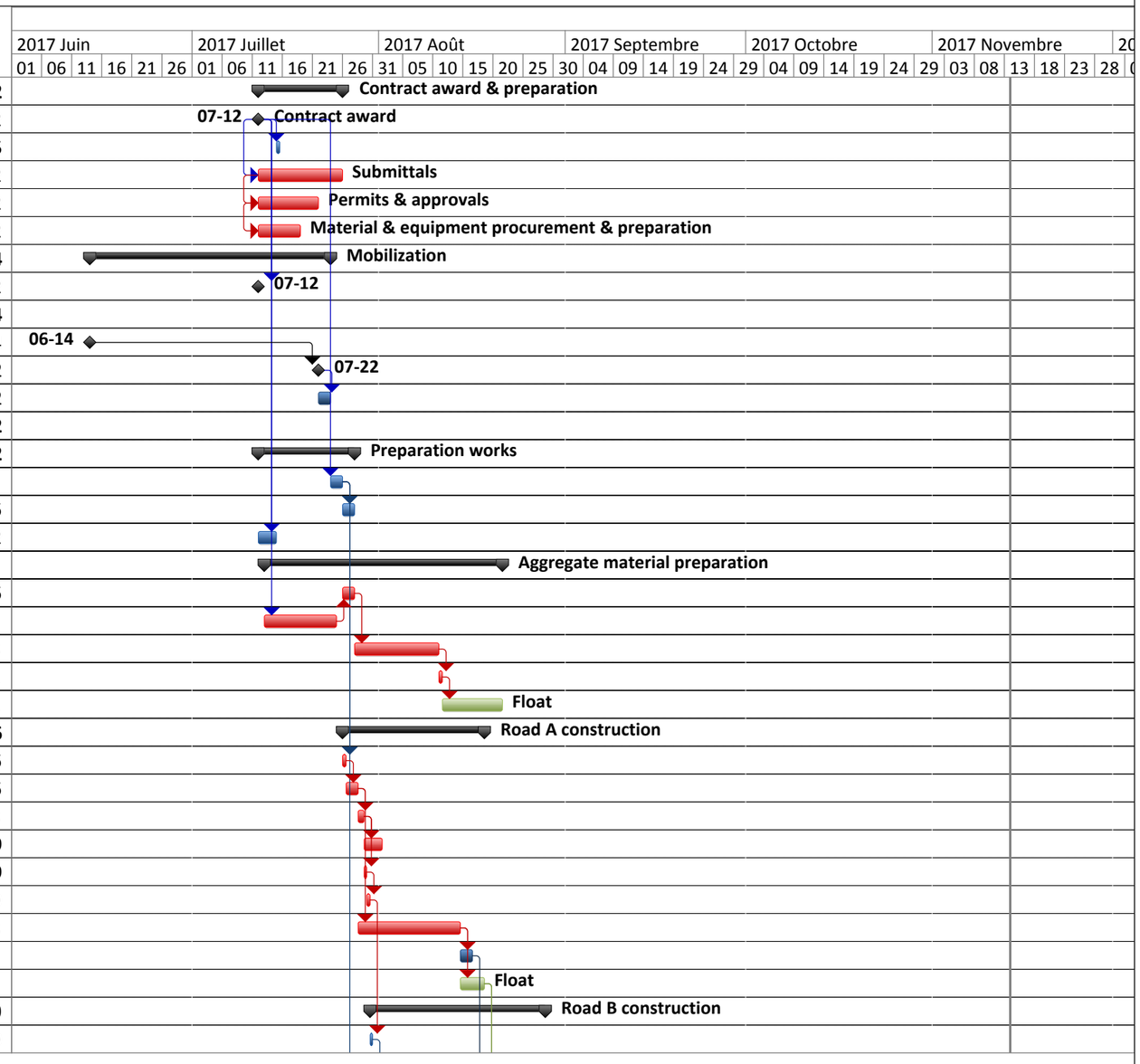
##
###

**Comments and review by :**

Kudlik Construction Ltd

# Iqaluit Metal Dump
# Construction Schedule

| N° | Task Name | Durée | Début |
|---|---|---|---|
| 1 | **Contract award & preparation** | **14 jours** | **Mer 17-07-12** |
| 2 | Contract award | 0 jour | Mer 17-07-12 |
| 3 | Pre-construction meeting | 0,5 jour | Sam 17-07-15 |
| 4 | Submittals | 14 jours | Mer 17-07-12 |
| 5 | Permits & approvals | 10 jours | Mer 17-07-12 |
| 6 | Material & equipment procurement & preparation | 7 jours | Mer 17-07-12 |
| 7 | **Mobilization** | **40 jours** | **Mer 17-06-14** |
| 8 | All equipment and supplies (already in Iqaluit) | 0 jour | Mer 17-07-12 |
| 9 | **Geotextile delivery** | **40 jours** | **Mer 17-06-14** |
| 10 | Cut off date for sealift loading | 0 jour | Mer 17-06-14 |
| 11 | First Sealift arrival to Iqaluit | 0 jour | Sam 17-07-22 |
| 12 | Sealift unloading | 2 jours | Sam 17-07-22 |
| 13 | **Site Activities** | **119,5 jours** | **Mer 17-07-12** |
| 14 | **Preparation works** | **16 jours** | **Mer 17-07-12** |
| 15 | Define and setup work areas | 2 jours | Lun 17-07-24 |
| 16 | Install temporary utilities | 2 jours | Mer 17-07-26 |
| 17 | Survey the elevations of all working area | 3 jours | Mer 17-07-12 |
| 18 | **Aggregate material preparation** | **39,5 jours** | **Jeu 17-07-13** |
| 19 | Type 1: 3,900 m3 total requirement, in stock: 3,000 m3, to produce; 900 m3 | 2 jours | Mer 17-07-26 |
| 20 | Type 2: 30,000 m3 total requirement, in stock: 12,700 m3, to produce; 17,300 m3 | 12 jours | Jeu 17-07-13 |
| 21 | Type 3: 5,900 m3 total requirement, in stock: 150 m3, to produce: 5,750 m3 | 14 jours | Ven 17-07-28 |
| 22 | Type 4: 1,700 m3 total requirement, already produced | 0,5 jour | Ven 17-08-11 |
| 23 | Float | 10 jours | Ven 17-08-11 |
| 24 | **Road A construction** | **23,5 jours** | **Mer 17-07-26** |
| 25 | Stripping soil & existing aggregate between 0+000 and 0+185 (±200 m3) | 0,5 jour | Mer 17-07-26 |
| 26 | Stripping / grubbing beneath road embankment from 0+185 to 0+350 (± 450 m3) | 2 jours | Mer 17-07-26 |
| 27 | Common excavation under road embankment (±650 m3) | 1 jour | Ven 17-07-28 |
| 28 | Rock excavation under road embankment (±200 m3) | 3 jours | Sam 17-07-29 |
| 29 | Realign roadside ditch (D-1) and remove exiting culvert (1) | 0,5 jour | Sam 17-07-29 |
| 30 | Install a new culvert at chainage 0+120 | 0,5 jour | Dim 17-07-30 |
| 31 | Place, compact & grade type 2 material (±10,400 m3) | 17 jours | Ven 17-07-28 |
| 32 | Place, compact and grade 250 mm thickness of type 4 material (±1,250 m3) | 2 jours | Lun 17-08-14 |
| 33 | Float | 4 jours | Lun 17-08-14 |
| 34 | **Road B construction** | **29,25 jours** | **Dim 17-07-30** |
| 35 | Stripping / grubbing beneath road embankment (±150 m) | 0,5 jour | Dim 17-07-30 |



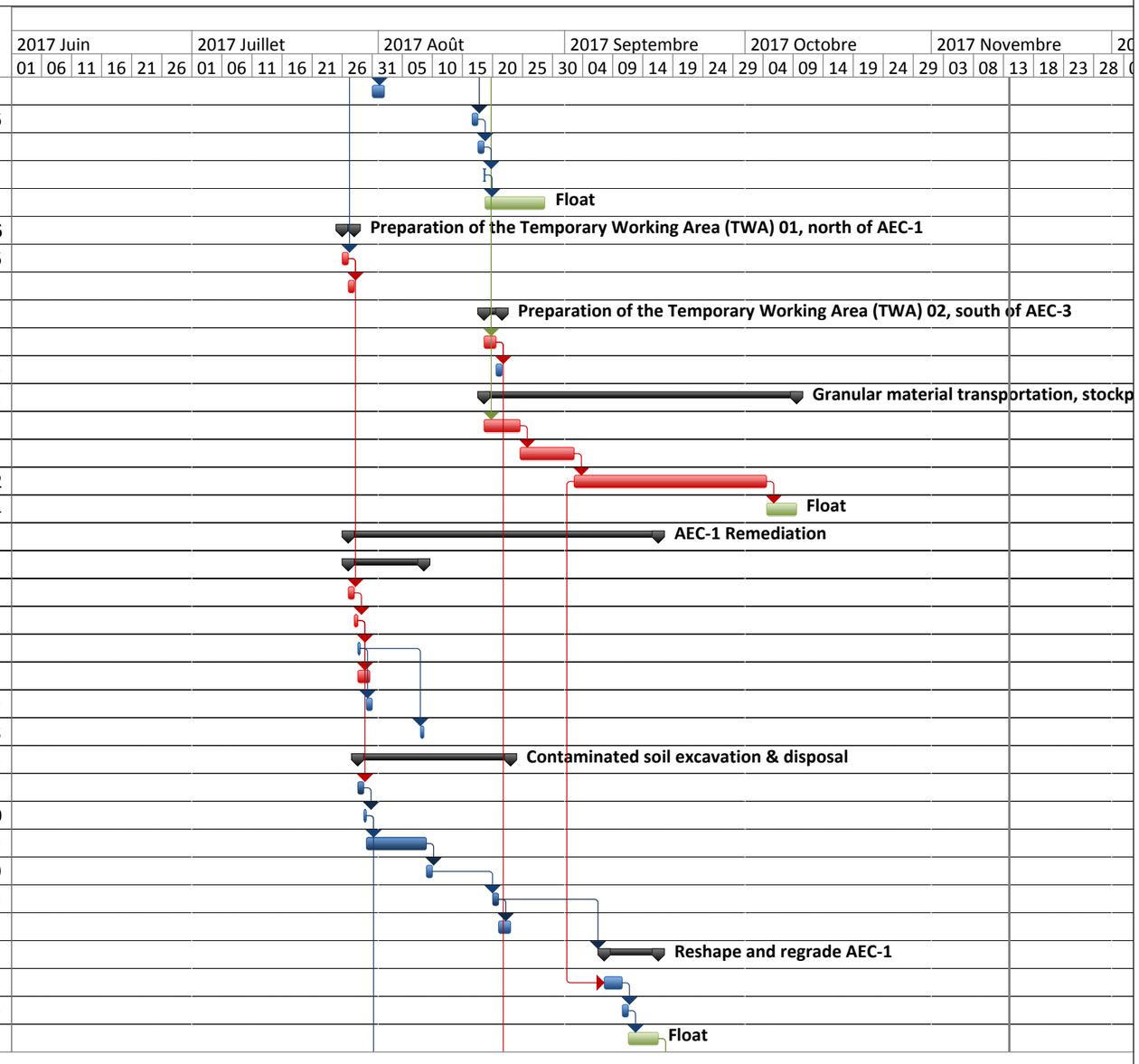

Project: Iqaluit Metal Dump
Kudlik Construction Ltd
Mer 17-07-19

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Task | Project Summary | Inactive Milestone | Manual Summary Rollup | Deadline |
| Split | External Tasks | Inactive Summary | Manual Summary | Critical |
| Milestone | External Milestone | Manual Task | Start-only | Critical Split |
| Summary | Inactive Task | Duration-only | Finish-only | Progress |

Kudlik Construction Ltd

# Iqaluit Metal Dump
# Construction Schedule

| N° | Task Name | Durée | Début |
|---|---|---|---|
| 36 | Excavate road ditch and place geotextile + rip rap (±300 m3) | 2 jours | Lun 17-07-31 |
| 37 | Place, compact & grade type 2 material (±400 m3) | 1 jour | Mer 17-08-16 |
| 38 | Place, compact and grade 250 mm thickness of type 4 material (±450 m3) | 1 jour | Jeu 17-08-17 |
| 39 | Place, compact and grade 100 mm thickness of type 1 material (±150 m3) | 0,25 jour | Ven 17-08-18 |
| 40 | Float | 10 jours | Ven 17-08-18 |
| 41 | **Preparation of the Temporary Working Area (TWA) 01, north of AEC-1** | **2 jours** | **Mer 17-07-26** |
| 42 | Reshape, regrade and compact at least 1,000 m2 | 1 jour | Mer 17-07-26 |
| 43 | Install lined hazardous waste processing area, 200 m2 | 1 jour | Jeu 17-07-27 |
| 44 | **Preparation of the Temporary Working Area (TWA) 02, south of AEC-3** | **3 jours** | **Ven 17-08-18** |
| 45 | Reshape, regrade and compact at least 1,000 m2 | 2 jours | Ven 17-08-18 |
| 46 | Reshape, regrade and compact at least 500 m2 for the granular material storage area | 1 jour | Dim 17-08-20 |
| 47 | **Granular material transportation, stockpiling or placing** | **52 jours** | **Ven 17-08-18** |
| 48 | Type 1: ±3,900 m3 | 6 jours | Ven 17-08-18 |
| 49 | Type 3: ±5,900 m3 | 9 jours | Jeu 17-08-24 |
| 50 | Type 2: ±19,600 m3 | 32 jours | Sam 17-09-02 |
| 51 | Float | 5 jours | Mer 17-10-04 |
| 52 | **AEC-1 Remediation** | **51,5 jours** | **Jeu 17-07-27** |
| 53 | **Debris removal & processing** | **12,5 jours** | **Jeu 17-07-27** |
| 54 | Remove ±100 m3 of surface /partially buried N-H material and haul it to TWA-01 | 1 jour | Jeu 17-07-27 |
| 55 | Remove ±50 m3 of surface /partially buried hazardous debris and haul it to TWA-01 | 0,5 jour | Ven 17-07-28 |
| 56 | Separate soils from debris and stockpile soils in 20 m3 piles | 0,5 jour | Ven 17-07-28 |
| 57 | Process non-hazardous debris (cut & prepare) | 2 jours | Ven 17-07-28 |
| 58 | Process and containerize hazardous waste material (±50 m3) | 1 jour | Dim 17-07-30 |
| 59 | Soil disposal according to analytical results | 0,5 jour | Mar 17-08-08 |
| 60 | **Contaminated soil excavation & disposal** | **25,5 jours** | **Ven 17-07-28** |
| 61 | Excavate PHC impacted soil (±400 m3) & deliver to TWA-1 | 1 jour | Ven 17-07-28 |
| 62 | Excavate metal contaminated soil (±200 m3) & deliver to TWA-1 | 0,5 jour | Sam 17-07-29 |
| 63 | Wait for confirmatory samples | 10 jours | Dim 17-07-30 |
| 64 | Additional excavation ? | 1 jour | Mer 17-08-09 |
| 65 | Backfill with approved granular material (±600 m3) | 1 jour | Dim 17-08-20 |
| 66 | Deliver PHC contaminated soil to the treatment facility or containerize | 2 jours | Lun 17-08-21 |
| 67 | **Reshape and regrade AEC-1** | **9 jours** | **Jeu 17-09-07** |
| 68 | Transport and place 300mm thick of type 2 material (±5,000 m2) | 3 jours | Jeu 17-09-07 |
| 69 | Final reshaping of the area | 1 jour | Dim 17-09-10 |
| 70 | Float | 5 jours | Lun 17-09-11 |



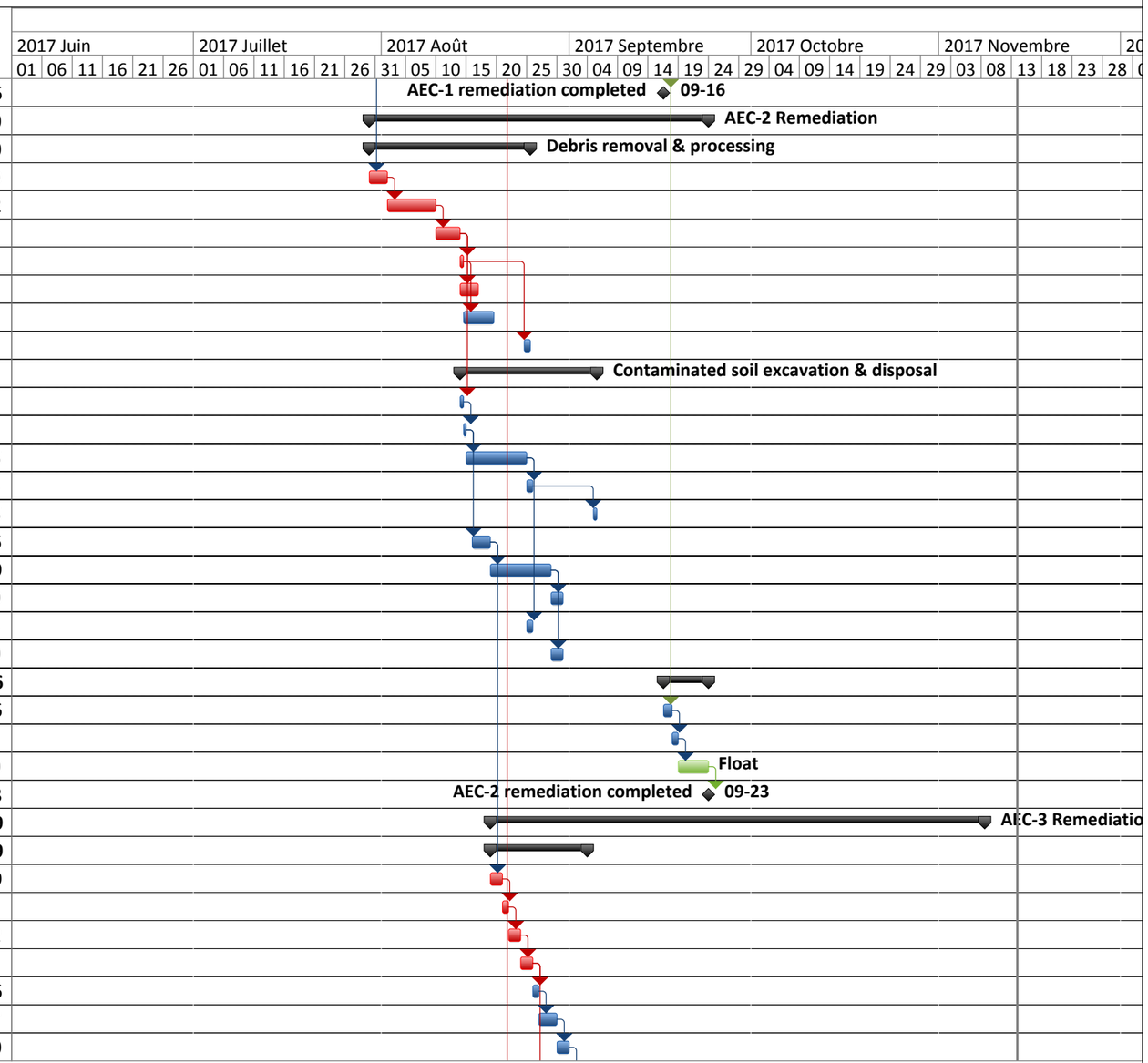

Project: Iqaluit Metal Dump
Kudlik Construction Ltd
Mer 17-07-19

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Task | Project Summary | Inactive Milestone | Manual Summary Rollup | Deadline |
| Split | External Tasks | Inactive Summary | Manual Summary | Critical |
| Milestone | External Milestone | Manual Task | Start-only | Critical Split |
| Summary | Inactive Task | Duration-only | Finish-only | Progress |

Kudlik Construction Ltd

# Iqaluit Metal Dump
## Construction Schedule

| N° | Task Name | Durée | Début |
|---|---|---|---|
| 71 | AEC-1 remediation completed | 0 jour | Sam 17-09-16 |
| 72 | **AEC-2 Remediation** | **56 jours** | **Dim 17-07-30** |
| 73 | **Debris removal & processing** | **26,5 jours** | **Dim 17-07-30** |
| 74 | Build temporary access road | 3 jours | Dim 17-07-30 |
| 75 | Remove ±750 m3 of exposed N-H material and haul it to TWA-1 | 8 jours | Mer 17-08-02 |
| 76 | Remove ±250 m3 of surface /partially buried hazardous material and haul it to TWA | 4 jours | Jeu 17-08-10 |
| 77 | Separate soils from debris and stockpile soils in 20 m3 piles | 0,5 jour | Lun 17-08-14 |
| 78 | Process non-hazardous debris (cut & prepare) | 3 jours | Lun 17-08-14 |
| 79 | Process and containerize hazardous waste material (±250 m3) | 5 jours | Lun 17-08-14 |
| 80 | Soil disposal according to analytical results | 1 jour | Jeu 17-08-24 |
| 81 | **Contaminated soil excavation & disposal** | **22,5 jours** | **Lun 17-08-14** |
| 82 | Excavate PHC impacted soil (±100 m3) & deliver to TWA-1 | 0,5 jour | Lun 17-08-14 |
| 83 | Excavate metal contaminated soil (±100 m3) & deliver to TWA-1 | 0,5 jour | Lun 17-08-14 |
| 84 | Wait for confirmatory samples | 10 jours | Mar 17-08-15 |
| 85 | Additional excavation ? | 1 jour | Ven 17-08-25 |
| 86 | Backfill with approved granular material (±300 m3) | 0,5 jour | Mar 17-09-05 |
| 87 | Excavate PCB contaminated soil (±100 m3) & deliver to TWA-1 | 3 jours | Mer 17-08-16 |
| 88 | Wait for confirmatory samples | 10 jours | Sam 17-08-19 |
| 89 | Install geotextile and Backfill with Rip Rap (±300 m3) | 2 jours | Mar 17-08-29 |
| 90 | Deliver PHC contaminated soil to the treatment facility or containerize | 1 jour | Ven 17-08-25 |
| 91 | Containerize PCB's contaminated soils & transport to waste holding area | 2 jours | Mar 17-08-29 |
| 92 | **Reshape and regrade the AEC-2 area** | **7,5 jours** | **Sam 17-09-16** |
| 93 | Transport and place 300mm thick of type 2 material (±2,500 m2) | 1,5 jours | Sam 17-09-16 |
| 94 | Final reshaping of the area | 1 jour | Lun 17-09-18 |
| 95 | Float | 5 jours | Mar 17-09-19 |
| 96 | AEC-2 remediation completed | 0 jour | Sam 17-09-23 |
| 97 | **AEC-3 Remediation** | **81,5 jours** | **Sam 17-08-19** |
| 98 | **Area preparation** | **16 jours** | **Sam 17-08-19** |
| 99 | Strip topsoil onto zone 1 one extent and prepare surface (±350 m3) | 2 jours | Sam 17-08-19 |
| 100 | Common excavation under zone 1 extents, (±300 m3) | 1 jour | Lun 17-08-21 |
| 101 | Rock excavation beneath landfill embankment, (±100 m3) | 2 jours | Mar 17-08-22 |
| 102 | Finalize embankments for landfill | 2 jours | Jeu 17-08-24 |
| 103 | Strip soil in small pound | 1 jour | Sam 17-08-26 |
| 104 | Excavate ditches and swales (±900 m3), common excavation | 3 jours | Dim 17-08-27 |
| 105 | Excavate ditches and swales (±300 m3), rock excavation | 2 jours | Mer 17-08-30 |



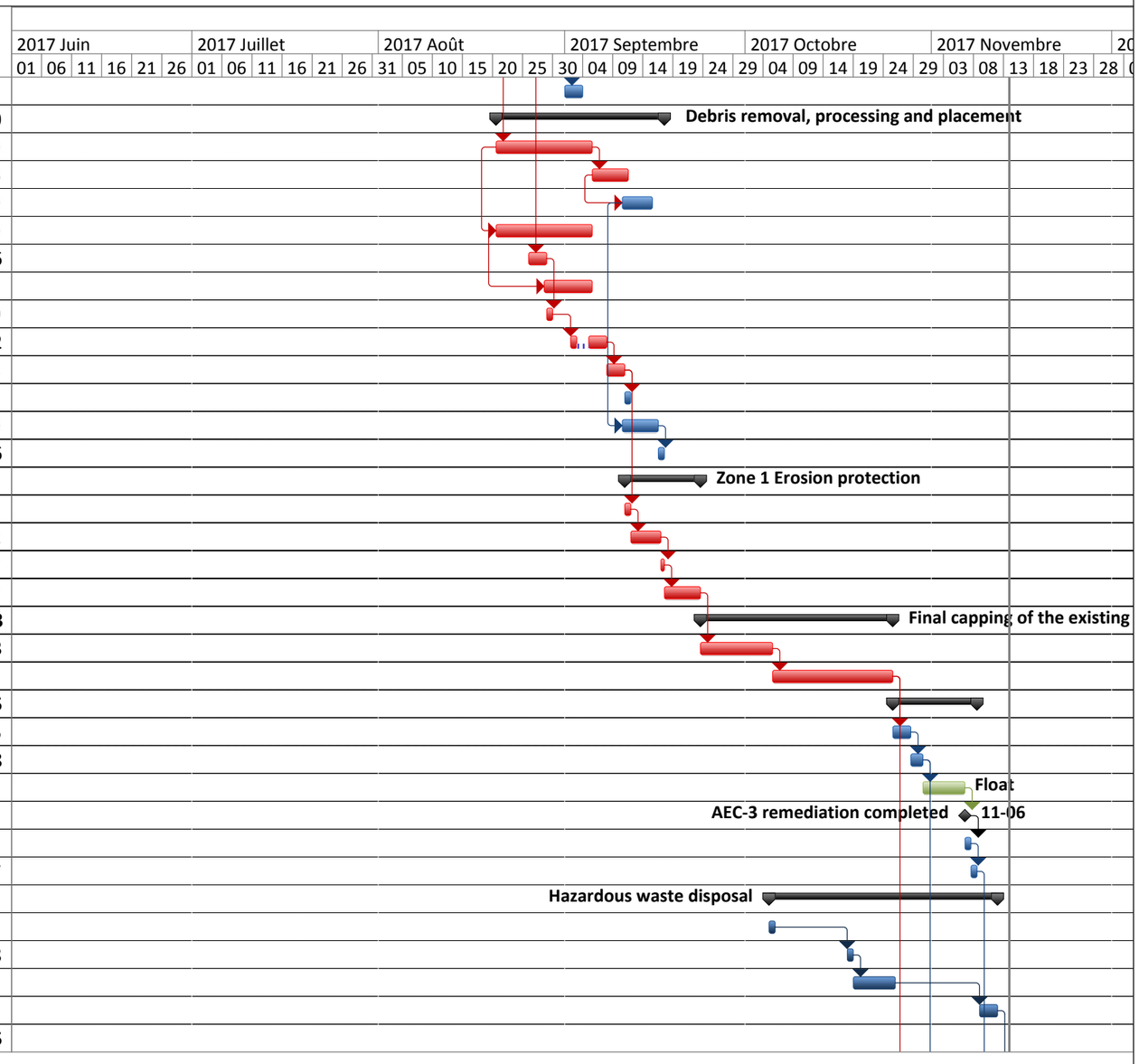

Project: Iqaluit Metal Dump
Kudlik Construction Ltd
Mer 17-07-19

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Task | Project Summary | Inactive Milestone | Manual Summary Rollup | Deadline |
| Split | External Tasks | Inactive Summary | Manual Summary | Critical |
| Milestone | External Milestone | Manual Task | Start-only | Critical Split |
| Summary | Inactive Task | Duration-only | Finish-only | Progress |

Kudlik Construction Ltd

# Iqaluit Metal Dump
# Construction Schedule

| N° | Task Name | Durée | Début |
|---|---|---|---|
| 106 | Place geotextile and fill with Rip Rap (±600 m3) | 3 jours | Ven 17-09-01 |
| 107 | **Debris removal, processing and placement** | **28 jours** | **Dim 17-08-20** |
| 108 | Remove and consolidate ±1,650 m3 of N-H waste and transport to TWA-2 | 16 jours | Dim 17-08-20 |
| 109 | Remove ±650 m3 of surface /partially buried hazardous material and haul it to TWA | 6 jours | Mar 17-09-05 |
| 110 | Remove tires, batteries & liquids, containerize for off-site disposal | 5 jours | Dim 17-09-10 |
| 111 | Process non-hazardous debris (cut & prepare) | 16 jours | Dim 17-08-20 |
| 112 | Transport all non-hazardous debris from TWA-1 and place in first lift ±850 m3 | 3 jours | Sam 17-08-26 |
| 113 | Transport all non-hazardous debris from TWA-2 and place in lifts ±1600 m3 | 8 jours | Lun 17-08-28 |
| 114 | Transport, place and compact metal contaminated soil (200 m3) as intermediate la | 1 jour | Mar 17-08-29 |
| 115 | Place 300 mm of type 1 granular fill over each 500mm waste layer | 4 jours | Sam 17-09-02 |
| 116 | Place 500 mm of type 1 on last layer of debris to the elevation 13.0 m (±1,800 m3) | 3 jours | Ven 17-09-08 |
| 117 | Decommissioning of TWA-2 | 1 jour | Lun 17-09-11 |
| 118 | Process and containerize hazardous waste material (±650 m3) | 6 jours | Dim 17-09-10 |
| 119 | Decommissioning of TWA-1 | 1 jour | Sam 17-09-16 |
| 120 | **Zone 1 Erosion protection** | **12,5 jours** | **Lun 17-09-11** |
| 121 | Strip and remove topsoil on Zone 2 & 3 embankment | 1 jour | Lun 17-09-11 |
| 122 | Place type 2 material on the slope of zone 1, (±4,000 m3) | 5 jours | Mar 17-09-12 |
| 123 | Install geotextile on lower zone 2 slope | 0,5 jour | Dim 17-09-17 |
| 124 | Install Rip Rap on zone 3 slope, (±3,000 m3) | 6 jours | Dim 17-09-17 |
| 125 | **Final capping of the existing landfill** | **32 jours** | **Sam 17-09-23** |
| 126 | Remove type 2 from access road 0+200 to 0+350 & place on Zone 2 (± 11,500 m3) | 12 jours | Sam 17-09-23 |
| 127 | Place type 2 material on the slope of the existing landfill (±8,700 m3) | 20 jours | Jeu 17-10-05 |
| 128 | **AEC-3 Final remediation** | **14 jours** | **Mer 17-10-25** |
| 129 | Reshape disturbed areas | 3 jours | Mer 17-10-25 |
| 130 | Spread left over granular material | 2 jours | Sam 17-10-28 |
| 131 | Float | 7 jours | Lun 17-10-30 |
| 132 | AEC-3 remediation completed | 0 jour | Lun 17-11-06 |
| 133 | Remove temporary erosion protection devices | 1 jour | Lun 17-11-06 |
| 134 | Equipment demobilization from site | 1 jour | Mar 17-11-07 |
| 135 | **Hazardous waste disposal** | **38 jours** | **Jeu 17-10-05** |
| 136 | Hazardous waste loading on sealift | 1 jour | Jeu 17-10-05 |
| 137 | Hazardous waste unloading in Ste-Catherine | 1 jour | Mer 17-10-18 |
| 138 | Ground transportation at appropriate disposal facilities | 7 jours | Jeu 17-10-19 |
| 139 | Disposal certificates | 3 jours | Jeu 17-11-09 |
| 140 | **Inspections** | **14,25 jours** | **Mer 17-10-25** |




Project: Iqaluit Metal Dump
Kudlik Construction Ltd
Mer 17-07-19

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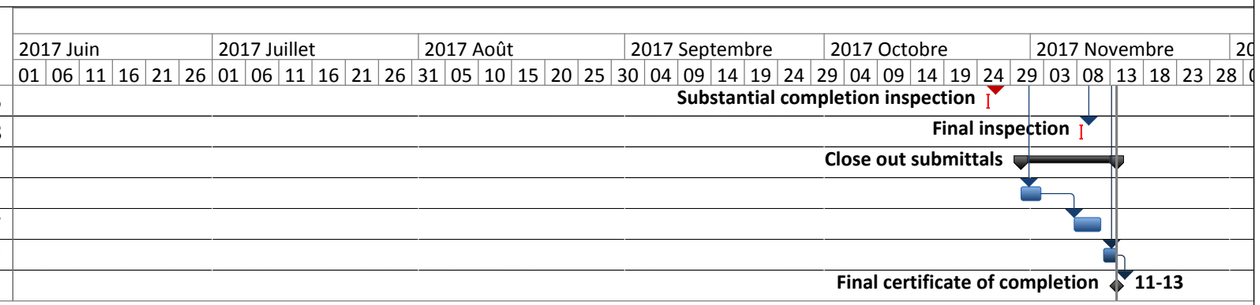
|---|---|---|---|---|---|---|---|
| Task | Project Summary | Inactive Milestone | Manual Summary Rollup | Deadline |
| Split | External Tasks | Inactive Summary | Manual Summary | Critical |
| Milestone | External Milestone | Manual Task | Start-only | Critical Split |
| Summary | Inactive Task | Duration-only | Finish-only | Progress |

Kudlik Construction Ltd

# Iqaluit Metal Dump
# Construction Schedule

| N° | Task Name | Durée | Début |
|---|---|---|---|
| 141 | Substantial completion inspection | 0,25 jour | Mer 17-10-25 |
| 142 | Final inspection | 0,25 jour | Mer 17-11-08 |
| 143 | **Close out submittals** | **14,5 jours** | **Lun 17-10-30** |
| 144 | Final site elevation survey | 3 jours | Lun 17-10-30 |
| 145 | As built drawings | 4 jours | Mar 17-11-07 |
| 146 | Misc. submittals | 2 jours | Dim 17-11-12 |
| 147 | Final certificate of completion | 0 jour | Lun 17-11-13 |




Project: Iqaluit Metal Dump
Kudlik Construction Ltd
Mer 17-07-19

| | | | | | |
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| Task | Project Summary | Inactive Milestone | Manual Summary Rollup | Deadline | |
| Split | External Tasks | Inactive Summary | Manual Summary | Critical | |
| Milestone | External Milestone | Manual Task | Start-only | Critical Split | |
| Summary | Inactive Task | Duration-only | Finish-only | Progress | |

Kudlik Construction Ltd.

# Transmittal

| | |
|---|---|
| No. : | 005 |
| Rev. : | 00 |
| Date : | 2017-07-20 |

**Project :** METAL DUMP REMEDIATION, IQALUIT — **Project No.:** 2017-093

R.083118.001

**Subject :** HEALTH AND SAFETY FOR CONTAMINATED SITES

**Transmitted to :** Arcadis
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**Discipline :**
**Specification :** 01 35 29.14 - Item 1.2
**Drawings reference :**
**Transmitted as :**

**Transmited for :**
**Review requested by :** 2017-07-30
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**Sub contractor or supplier :** Kudlik Construction Ltd
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**Manufacturer :**

**Description :** EMERGENCY RESPONSE PLAN

**Supplier SD No. :**
**Comments :**

**Reviewed and submitted by :**

Prepared by :
François Bourassa, P. Eng.
Project Manager
Kudlik Construction Ltd.

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**Comments and review by :**

Ryan Fletcher July 21/17

Kudlik Construction Ltd.
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# *Emergency Response Plan*

Remediation at Former Metal Dump and Community Landfill
Iqaluit, Nunavut

Project No R.083118.001
Contract No: EW699-180040/001/NCS

Submitted to

Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

*July 2017*

# TABLE OF CONTENTS

PAGE


1. FOREWORD ..... 1

2. SITE LOCATION AND DESCRIPTION OF ACTIVITIES ..... 2

2.1 Site Location ..... 2

2.2 Description of Activities ..... 2

3. POLICY ..... 3

4. DEFINITIONS ..... 4

4.1 Emergency ..... 4

4.2 Emergency Response Plan ..... 4

4.3 Seriously Injured Person ..... 4

4.4 Fire ..... 4

4.5 Spill ..... 4

5. ORGANIZATION AND RESPONSIBILITIES ..... 5

5.1 Emergency Response Coordinator (ERC) ..... 5

5.2 Supervisor/Foreman ..... 5

5.3 Emergency Response Teams ..... 6

6. COMMUNICATIONS IN CASE OF EMERGENCY ..... 7

7. EMERGENCY RESPONSE MEASURES FOR SPILLS ..... 9

8. EMERGENCY RESPONSE MEASURES IN CASE OF FIRE ..... 10

9. EMERGENCY RESPONSE MEASURES IN CASE OF ACCIDENT ..... 11

9.1 Minor Injuries ..... 11

9.2 Major Injuries ..... 11

**FIGURE 1 : Communication diagram in case of emergency** ..... 8


# LIST OF APPENDICES


APPENDIX A Emergency Telephone Numbers ..... 1

# 1. FOREWORD

Kudlik's operations are conducted in such a manner to minimise the possibility of emergency situations arising. However should an emergency take place, we must be prepared to put an Emergency Response Plan into action. Kudlik Construction Ltd. has chosen the D.E.C.I.D.E. method of response as our approach to an emergency situation.

D: Determine if hazard is an I.D.L.H. (Immediately Dangerous to Life and Health) situation

E: Estimate harm without intervention

C: Choose response objectives

I: Identify action plan

D: Do the best action

E: Evaluate progress: have the options achieved desired results?

For the purpose of this plan, an **EMERGENCY** means any situation beyond the normal operating procedures, one that requires specialised resources which may not be available or is available but in insufficient quantity at the site to cope with, or mitigate the problem, at the time of the emergency.

The decision to declare a state of emergency is not necessarily an easy one to make, but when declared, all actions must be swiftly executed. Tasks must be executed in an orderly manner to avoid creating a state of panic.

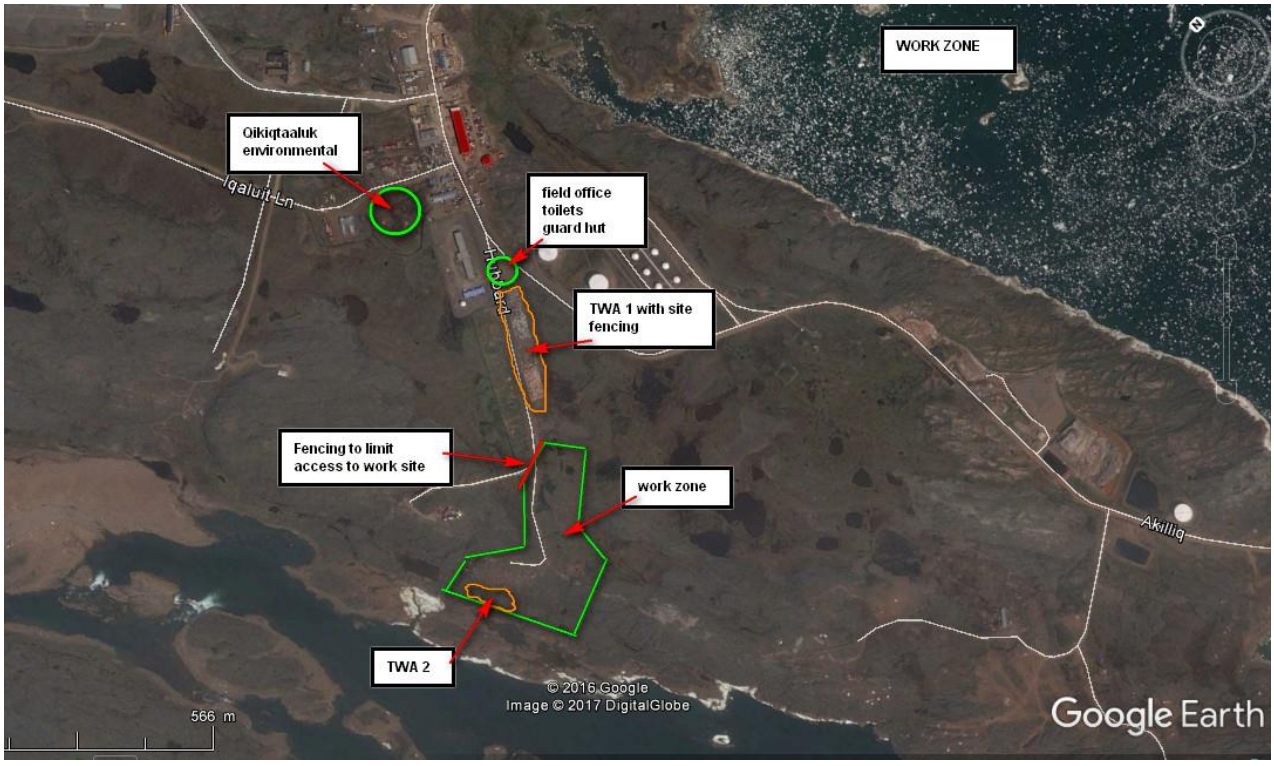
It is imperative that response time in evaluating the situation is rapid and that the appropriate decisions are made. These decisions must take into consideration the following:

- The nature and extent of injuries as well as the number of injured personnel
- The nature and extent of equipment damage and the hazards resulting from the event
- Time of occurrence (day or night)
- Nature of incident and products involved
- Availability of specialised resources

# 2. SITE LOCATION AND DESCRIPTION OF ACTIVITIES

## 2.1 Site Location

### IQALUIT




## 2.2 Description of Activities

Remediation program of a former landfill, a former vehicle storage area and upgradient area where buried debris has been found in Iqaluit, Nunavut.

# 3. POLICY

Through this Emergency Response Plan, Kudlik Construction Ltd demonstrates its commitment to protect:

- People: our employees, as well as surrounding populations
- Goods: equipment, vehicles
- Environment (air, soil, water): by performing all activities conforming with the Canadian Environmental Protection Plan (CEPA)
- Company reputation: as a good corporate citizen, we are interested in acting as responsible professionals in the community
- Company operations: minimise losses and restart operations as quickly as possible
- Our clients: as our operations are carried out at each of our clients' sites, we will respect and safeguard our clients' personnel, goods and reputation

# 4. DEFINITIONS

## 4.1 Emergency

Any situation arising outside of normal operating procedures that requires specialised staff to take care and control of the situation.

## 4.2 Emergency Response Plan

The Emergency Response Plan is a program that defines and assigns responsibilities to individuals, before the occurrence of an emergency situation. The goal of this plan is to structure the reaction to an emergency so that the response is immediate and efficient. Moreover, so that the situation can be returned to normal operating conditions in the shortest time possible and in the best possible safe conditions. Finally, the plan calls for an investigation of all incidents to help prevent reoccurrence of similar situations.

## 4.3 Seriously Injured Person

Any individual (employee, subcontractor or visitor) whose condition requires specialised, medical care (other than First Aid) and transportation by a specialised vehicle. This definition includes illnesses such as heart attack, stroke, etc.

## 4.4 Fire

Any (minor or major) situation where combustion takes place (excluding fire-based process), which involves any equipment or material; it includes the site office, vehicles, stored products and electric facilities.

## 4.5 Spill

Any leak (liquid or solid) outside the retention pan, truck, containers etc., in such a quantity that it cannot be collected with the usual equipment and may not be confined at the spill location.

# 5. ORGANIZATION AND RESPONSIBILITIES

## 5.1 Emergency Response Coordinator (ERC)

The Superintendent is the designated Emergency Response Coordinator (ERC). He is responsible for initiating the emergency response plan, as well as response and communications. In the event of the absence of the project Superintendent, the site Foreman becomes the ERC.

The ERC must familiarise him or herself with the content of this plan and must maintain up to date telephone and communication lists. He or she must make sure the lists are posted in the offices as well as inside the operation units.

The Superintendent is also responsible for the implementation and adherence to Company health and safety policies and procedures on the work site.

The ERC will maintain a liaison with the subcontractors and ensure that the Emergency Response Plan has been presented at every personnel on site.

In an emergency, the ERC will maintain a liaison with Kudlik Construction Ltd. Project Manager who will inform Kudlik Construction Ltd. management personnel.

The ERC will make sure that the emergency response team has free and easy access to the work site.

The ERC will inspect and ensure that protective equipment is in proper working order and readily available in sufficient quantities.

## 5.2 Supervisor/Foreman

The Foreman is responsible for his team and for emergency response should an incident arise.

The Foreman ascertains the safe shut down of operations and the efficient and orderly evacuation of his personnel. He supervises the emergency response team with the resources available. He keeps the ERC informed of the situation and calls for specific needs (equipment and resources).

## 5.3 Emergency Response Teams

Any Kudlik employee may be requested to assist with the response, within the limits of the employee's capability to perform the task.

A trained emergency response team will be on site. Team members shall familiarise themselves with the content of this plan, the material and procedure. The level of training received will depend on the worker’s functions and responsibilities. They shall protect themselves before responding to an event that could endanger their health or safety.

Before the start a project, each employee receives a copy of the health and safety plan. A revision of the plan will be performed before start of the operations. At the initial safety meeting, the plan and its application will be discussed.

Training will provide information and include instructions on the following topics:

- The nature of site activities planned and related hazards.
- The health and safety plan.
- Safe work habits.
- The nature of anticipated dangers.
- Safety measures and rescue methods.
- Safe use of equipment on site.
- The use, maintenance and limitations of PPE.

The Emergency Response Team members are selected for their specific qualifications. The team will be composed of the hazardous waste specialist, one heavy equipment operator, one mechanic and 3 First Aid Helpers.

The names of the Emergency Response Team members will be posted at the Kudlik Office and on each work site. The list will be maintained up to date by the Safety Officer. The list will include the names and qualifications of each crew member.

# 6. COMMUNICATIONS IN CASE OF EMERGENCY

Any emergency occurring on site that requires outside assistance (fire department, health assistance, RCMP, etc.) must be communicated to the ERC who will institute the emergency communication network.

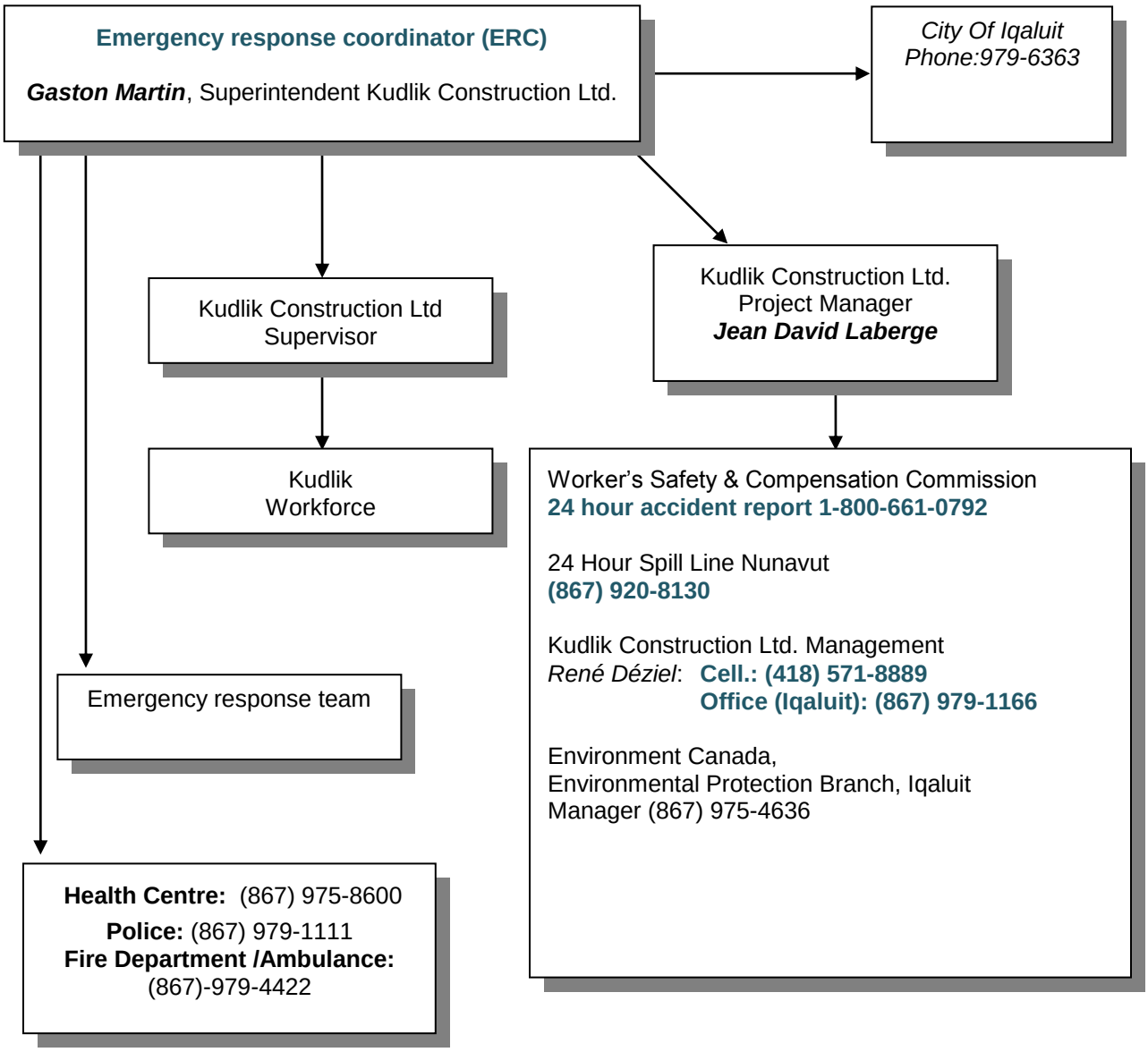
The ERC is responsible for calling the proper authorities, as well as informing the site subcontractors.

The ERC is responsible for communication with the Emergency Response team in order to keep them informed of the situation and obtain any assistance he needs from them to bring the situation back to normal as soon as possible.

Should the ERC become unable to make the communications, the Foreman in service will have the responsibility of instituting the emergency communication network.

The emergency list of phone numbers is presented in Appendix 01. The communication diagram in case of emergency is presented in Figure 1, on the following page.

**FIGURE 1 :Communication diagram in case of emergency**



# 7. EMERGENCY RESPONSE MEASURES FOR SPILLS

Refer to the Spill control Plan

# 8. EMERGENCY RESPONSE MEASURES IN CASE OF FIRE

In case of a fire, it is of utmost importance to avoid aggravation of the situation. Fire spreads at a surprising speed so one must act quickly and safely.

Upon discovery of a fire, immediately summon for help. Cease all operations in the area and evacuate.

If it can be done safely (wearing respiratory protection and using a fire extinguisher), attempt to put the fire out. Keep a free passage way out (do not get stuck between the fire and a wall).

Before using the fire extinguisher, in a safe area, remove the locking pin and depress the handle to check if the extinguisher is in operating condition. If it is in good condition, advance slowly toward the fire. Keep low; do not stand up in the smoke. Spray the powder at the bottom of the flames in a right to left sweeping motion, from front to back.

If after using one (1) extinguisher, the fire is still burning, **evacuate the area**. Flames will increase in strength and extinguishing the fire becomes the responsibility of fire fighters who have more appropriate equipment.

Delegate one person to wait for the fire fighters and direct them to the site of the fire.

Immediately inform the ERC, who will in turn contact appropriate agencies such as the fire department, if necessary.

Evaluate the condition and damage to equipment before re-starting operations. All equipment used in the response must be inspected and extinguishers recharged as soon as possible.

Investigate the cause of the incident and fill out the accident/incident report.

# 9. EMERGENCY RESPONSE MEASURES IN CASE OF ACCIDENT

Emergency response in the case of bodily injury will depend upon the type of injury and the availability of resources at the site. At most sites, only First Aid services are available. First aid kits are available in the construction camp, Kudlik's office, in all sites where operations are underway and in the vehicles. The first aid kits contained a minimum of bandage, gloves, scissor, sterile gauze pads, non-sterile gauze, cotton tip, tape and antiseptic wipes. Furthermore, the eyes wash station, pocket mask for CPR and spine immobilizer should be post on site. Their localisation will be indicating on the evacuation plan.

## 9.1 Minor Injuries

For smaller injuries (cuts, bruises, burns, fall) first aid treatment must be provided without delay by the first aid helper. If after receiving first aid treatment by the site qualified first aid helper, the victim needs more intensive treatment, he/she should change clothes to remove possible contaminated clothing. The supervisor will accompany the victim to the Health Center in a company vehicle.

The WSCC reports as the employer and worker report shall be filled out by the safety officer within 24 hours and sent to Kudlik's office, with a copy given to the site Engineer. When applicable, preventive measures will be taken to avoid recurrence. If the injury is minor, the Project Manager or the superintendent may authorise the employee to return to work after first aid treatment has been provided.

## 9.2 Major Injuries

In the case of a severe injury, the ERC will call the Health Centre and the RCMP if needed. The First Aid helper must provide first aid treatment without delay. The project manager will call Kudlik's operations management to inform them of the situation and provide them with a status report. Also, the Project Manager will call the WSCC within 24 hours to report the accident.

If the accident is the result of a fire or exposure to toxic vapours or gas, carefully move the victim to fresh air, away from the source of danger. The victim may have to be transported without having to go through the decontamination procedure. If the victim

cannot be moved, personnel from health centre shall be allowed access to the site, even in the contaminated area, to rescue the victim under supervision of the Hazardous Waste Specialist.

If the accident is the result of a fall, **and** there is no threat to the life of the victim (fire or gas), **DO NOT MOVE THE VICTIM** (spinal injuries may be suspected). Make sure he is comfortable, check vital signs (respiration, pulse, absence of bleeding).

In a case where the victim is not breathing, immediately begin artificial respiration.

In the case of skin or eye contamination by solvents, PCBs or other chemicals, remove contaminated clothing, wash affected area with plenty of water for a minimum of 15 minutes. Eye wash stations are located on each work site area.

Remove and dispose of the contaminated clothes and equipment in a proper manner.

Administer appropriate first aid treatment as required (bandages, etc.). Keep the victim calm and warm, while waiting for the on-site Kudlik vehicle equipped for severely injured personnel.

Accompany the victim to the Health Centre, bringing the MSDS sheets for the products involved.

# APPENDIX A

## EMERGENCY TELEPHONE NUMBERS

# EMERGENCY TELEPHONE NUMBERS LIST

Table 1: Emergency phone numbers

| ORGANISATION | NAME | PHONE (BUSINESS HOURS) | PHONE (AFTER HOURS) |
|---|---|---|---|
| KUDLIK IQALUIT | Main office | (867) 979-1166 | |
| | Jean-David Laberge Project Manager | (418) 933-5351 | |
| | François Bourassa Technical advisor | (418) 930-0850 | |
| | Melissa Parent Safety officer | (418) 953-2910 | |
| | Gaston Martin, Superintendent | (867) 979-1166 | |
| RCMP | | (867) 979-0123 | |
| HEALTH CENTRE | Qikitani hospital | (867) 975-8600 | |
| FIRE DEPARTMENT | | (867) 979-4422 | |
| CITY OF IQALUIT REPRESENTATIVE | | 867-979-6363 | |
| WORKERS COMPENSATION BOARD NUNAVUT AND NWT | | (867) 979-8500 | |
| 24 HOUR SPILL LINE NW/NUNAVUT | | (867) 920-8130 | |
| ENVIRONMENT CANADA, ENVIRONMENTAL PROTECTION BRANCH, IQALUIT, SID BRUINSMA | | (867) 645-3739 | |

Kudlik Construction Ltd.

# Transmittal

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|---|---|
| **No. :** | **005** |
| **Rev. :** | **00** |
| **Date :** | 2017-07-20 |

**Project :** **METAL DUMP REMEDIATION, IQALUIT** **Project No.:** 2017-093

**R.083118.001**

**Subject :** **HEALTH AND SAFETY FOR CONTAMINATED SITES**

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**Drawings reference :**

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**Manufacturer :**

**Description :** EMERGENCY RESPONSE PLAN

**Supplier SD No. :**

**Comments :**

**Reviewed and submitted by :**

Prepared by :
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Project Manager
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**Comments and review by :**

| Kudlik Construction Ltd. | **Transmittal** | No. : 007<br>Rev. : 00<br>Date : 2017-07-20 |
|---|---|---|

**Project :** METAL DUMP REMEDIATION, IQALUIT — **Project No.:** 2017-093

R.083118.001

**Subject :** SPECIAL PROCEDURES FOR CONTAMINATED SITES

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**Manufacturer :**

**Description :** SITE LAYOUT

**Supplier SD No. :**
**Comments :**

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##
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Ryan Fletcher

Kudlik Construction Ltd.

# Transmittal

**No. :** 007
**Rev. :** 00
**Date :** 2017-07-20

**Project :** METAL DUMP REMEDIATION, IQALUIT
**R.083118.001**
**Project No.:** 2017-093

**Subject :** SPECIAL PROCEDURES FOR CONTAMINATED SITES

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**Specification :** 01 35 13.43 - Item 1.3.3
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867-979-1166

**Manufacturer :**

**Description :** SITE LAYOUT

**Supplier SD No. :**
**Comments :**

**Reviewed and submitted by :**

Prepared by :
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Kudlik Construction Ltd.

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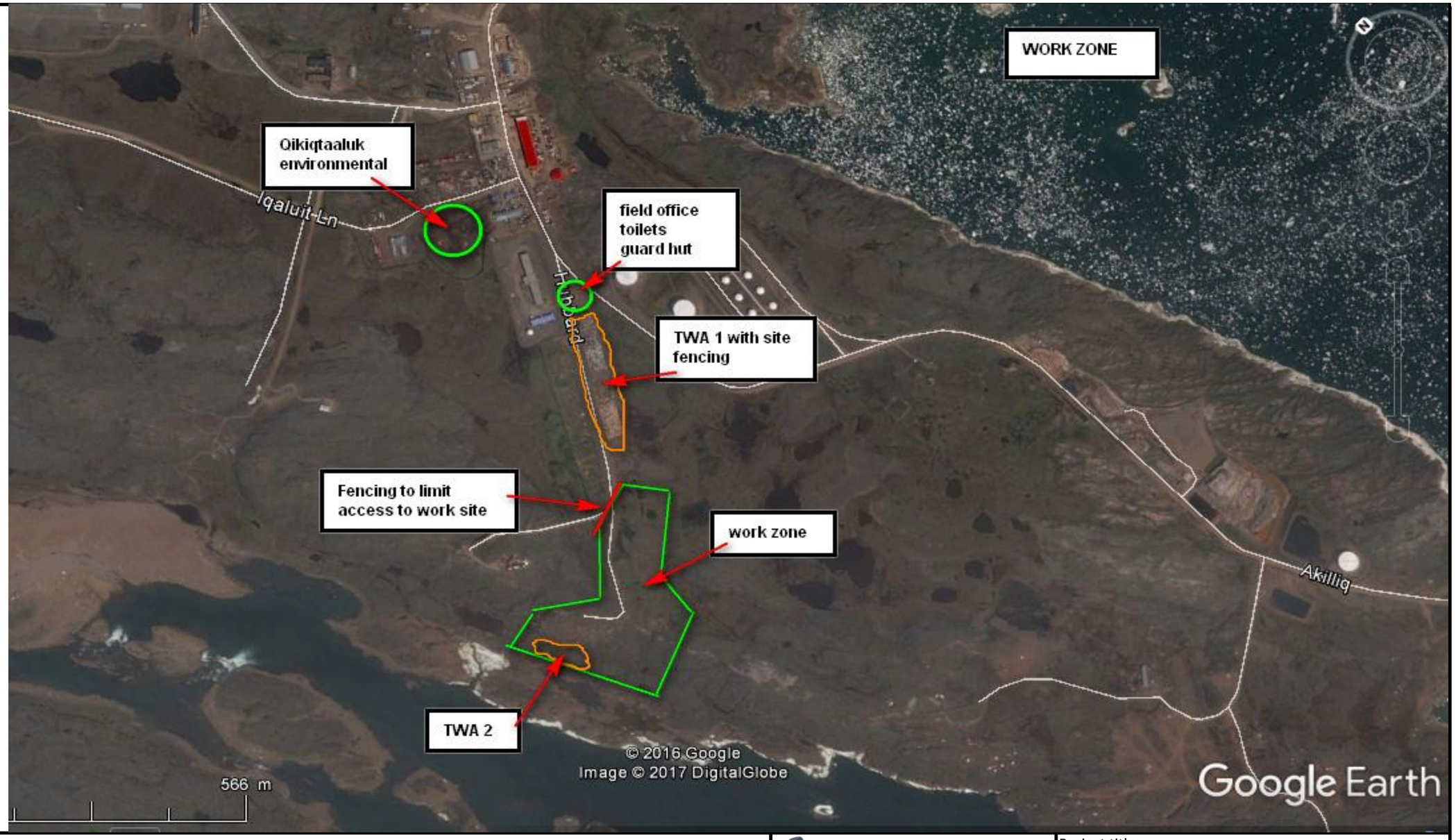
**Comments and review by :**




Kudlik Construction Ltd.

Project title:
**Iqaluit Metal Dump**

Drawing title:
**Figure 5, Site Layout**

Kudlik Construction Ltd.

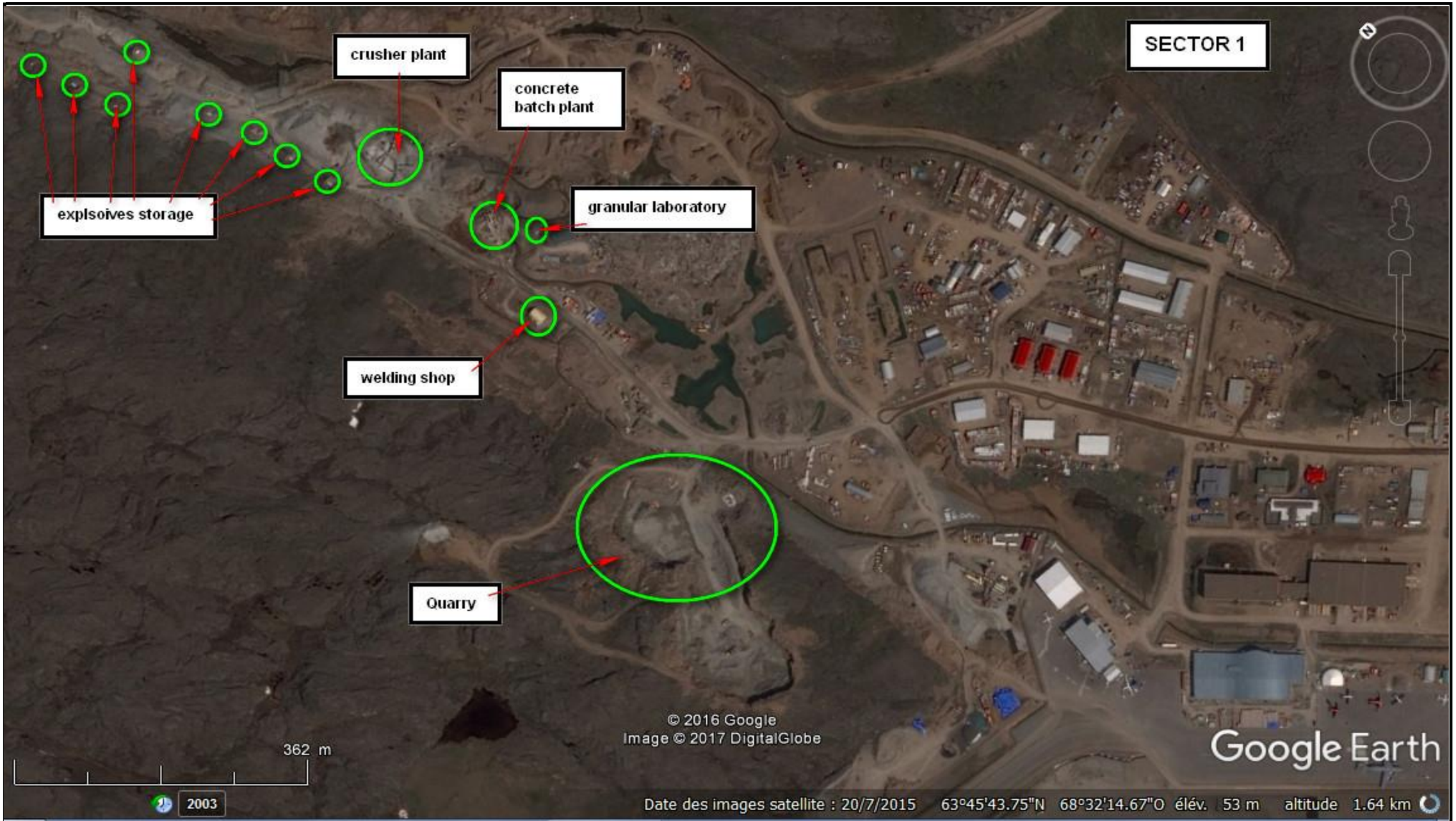
Project title:
**Iqaluit Metal Dump**

Drawing title:
**Figure 4, Lodging Area**

Kudlik Construction Ltd.

Project title:
**Iqaluit Metal Dump**

Drawing title:
**Figure 3, Main Office Area**

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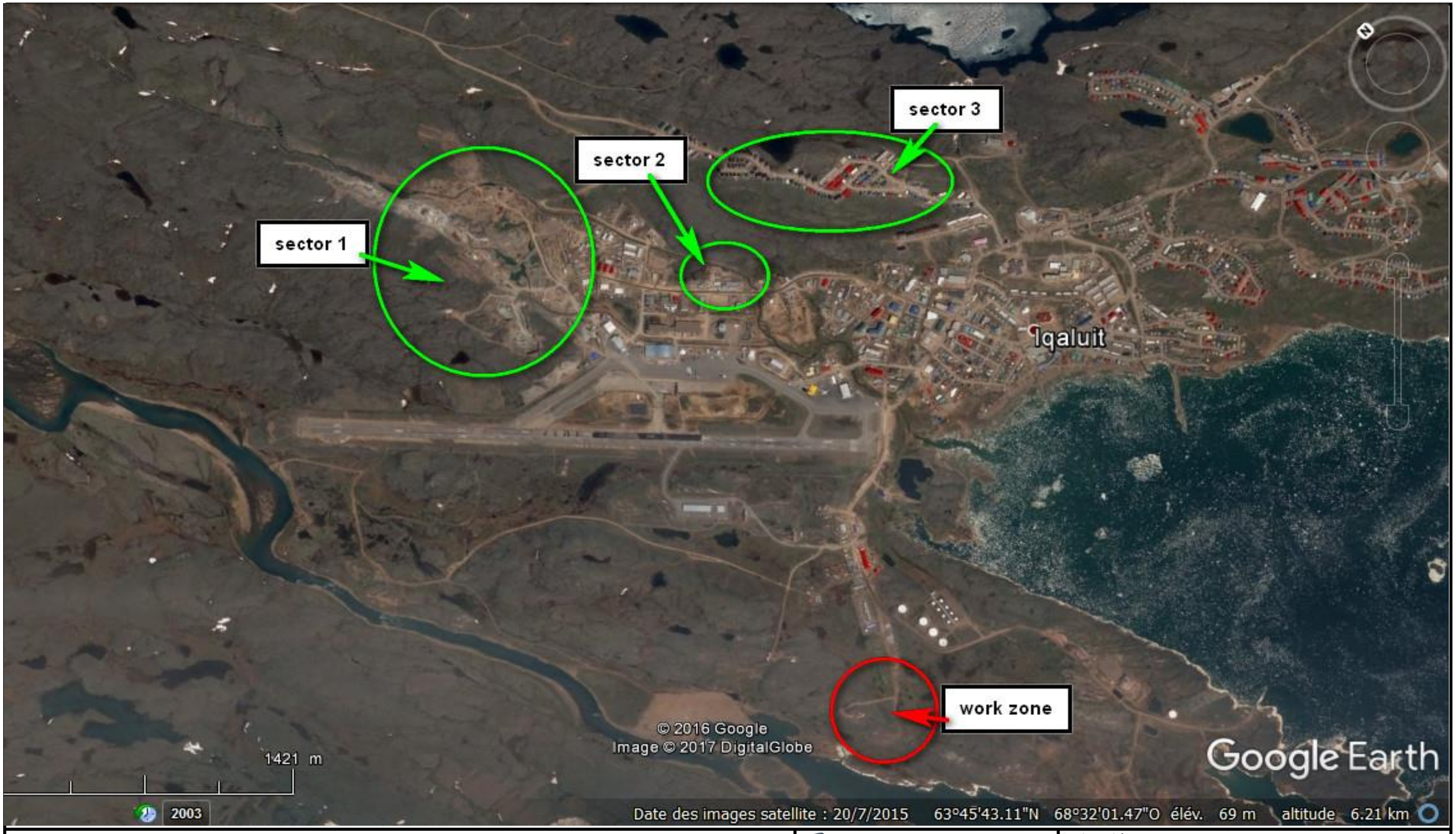
|---|---|---|
| | Kudlik Construction Ltd. | Project title: **Iqaluit Metal Dump** |
| | | Drawing title: **Figure 2, Quarry area** |




Kudlik Construction Ltd.

Project title:
**Iqaluit Metal Dump**

Drawing title:
**Figure 1, General Layout**

2017-07-03

PUBLIC WORKS CANADA
18500 GOVERNMENT OF CANADA
TELUS PLAZA NORTH 10025 JASPER AVE. 5TH FLOOR
Edmonton AB T5J-1S6

**Letter of Good Standing**

Account: 8653 KUDLIK CONSTRUCTION LTD.
Account Trade Name:
Contract/Project No.: EW699-180040/A
Contract Value: $5,436,650.00 for Labour; Equipment; Materials;
Contract Details: Iqaluit Metal Dump
Contract Dates: July 15, 2017 - October 15, 2017

KUDLIK CONSTRUCTION LTD. is registered with the Workers' Safety and Compensation Commission (WSCC) of the Northwest Territories and Nunavut and is in good standing.

When the contract is complete, please request a Final Clearance Letter before releasing final payment.

This letter does not reflect the status of any legislative requirements under the Safety Act.

The Workers' Safety and Compensation Commission is committed to service excellence. Share your suggestions with our President on how to serve you better. Please call (867) 920-3888, toll free 1-800-661-0792, or email feedback@wscc.nt.ca.

Sincerely,

Sandi Hunt
Assessment Representative

CC: KUDLIK CONSTRUCTION LTD.

2017-07-03

PUBLIC WORKS CANADA
18500 GOVERNMENT OF CANADA
TELUS PLAZA NORTH 10025 JASPER AVE. 5TH FLOOR
Edmonton AB T5J-1S6

**Lettre de conformité**

Compte : 8653 KUDLIK CONSTRUCTION LTD.
Nom commercial :
No contrat/Projet : EW699-180040/A Valeur du contract : $5,436,650.00 for Labour; Equipment; Materials;
Détails du contract : Iqaluit Metal Dump
Dates du contrat : July 15, 2017 - October 15, 2017

KUDLIK CONSTRUCTION LTD. est inscrit auprès de la Commission de la sécurité au travail et de l'indemnisation des travailleurs (CSTIT), et est en règle.

Cette lettre ne reflète pas le statut des exigences législatives conformément à la Loi sur la sécurité.

Une fois ce contrat terminé, veuillez demander une lettre de décharge définitive avant de verser le paiement final.

La CSTIT s'engage à assurer l'excellence de ses services. Veuillez partager vos suggestions avec notre président sur la façon de mieux vous servir. Vous pouvez nous appeler au 867 920-3888, sans frais au 1-800-661-0792ou nous envoyer un courriel à feedback@wscc.nt.ca.

Cordialement,

Sandi Hunt
Représentant(e) des evaluations

CC: KUDLIK CONSTRUCTION LTD.

WSCC Workers' Safety & Compensation Commission | ᐃᖃᓗᐊᔨᖏᑎᓄᑦ ᐊᑕᐅᖃᐅᔾᔨᓂᖅ ᐊᒻᒪ ᓇᓕᐅᑦᓯᒪᓂᖅ ᖃᐅᔨᓴᖃᖅᑎᑦ

2017-01-24

REÇU LE 07 FEV. 2017

KUDLIK CONSTRUCTION LTD.
P.O. BOX 727
1519 FEDERAL ROAD
Iqaluit Nunavut X0A-0H0

Dear Employer:

**Claim Cost Summary Report: Employer #8653**

A copy of your current WSCC Claim Cost Summary is enclosed for your review. No payment is required; this is not a statement or invoice.

Your summary represents the actual year to date claim costs paid by the WSCC in the current year for claims registered to your account. We recommend that you review the claims listed against your internal records.

If you have questions related to specific costs, or any claim listed on your summary, please contact NWT Claims Services at 1-800-661-0792 or Nunavut Claims Services at 1-877-404-4407.

Safe Advantage employers with questions on how these costs impact Claims Experience calculations please contact a Safe Advantage Technician at 1-800-661-0792.

The WSCC is your safety partner. We promote workplace safety and care of injured workers and are committed to service excellence. Share your suggestions with our President on how to serve your better. Call 1-867-920-3888, toll free at 1-800-661-0792, or email feedback @wscc.nt.ca.

Working together, we can make the North a safer place to do business.

Sincerely,

Kim Collins-Riffel

Kim Collins-Riffel
VP Stakeholder Services

# Employer Claims Cost Summary

**Employer:** (8653) KUDLIK CONSTRUCTION LTD.

**Account Status:** Active

**Accident Date From:** 1/1/2015 **To:** 12/31/2016 **Payment Year:** 2016 **Jurisdiction:** ALL

| Claim ID | Harvester | Category | Accident Date | Compensation | Medical | Rehab | Pension | Total |
|---|---|---|---|---|---|---|---|---|
| 2015-2720 Palongayak, Alvin | | CATLD | 8/27/2015 | 0.00 | 309.00 | 0.00 | 0.00 | 309.00 |
| 2015-3005 Ohiktook, Daniel | | TLMOD | 9/21/2015 | 0.00 | 334.05 | 0.00 | 0.00 | 334.05 |
| 2015-3046 Ulilkatar, Ron | | NTLSS | 9/27/2015 | 0.00 | 618.00 | 0.00 | 0.00 | 618.00 |
| 2015-3103 Moreau, Patrick | | TLMOD | 10/1/2015 | 0.00 | 775.76 | 0.00 | 0.00 | 775.76 |
| 2015-3302 Beaudoin, Stephane | | NTLSS | 10/15/2015 | 0.00 | 309.00 | 0.00 | 0.00 | 309.00 |
| 2015-3365 Caljeo, Michael | | TLMOD | 10/24/2015 | 0.00 | 395.35 | 0.00 | 0.00 | 395.35 |
| 2015-3571 Forget, Philippe | | TLMOD | 11/7/2015 | 0.00 | 395.35 | 0.00 | 0.00 | 395.35 |
| 2015-3671 Kakee, Adamie | | NTLSS | 11/14/2015 | 0.00 | 309.00 | 0.00 | 0.00 | 309.00 |
| 2015-3722 Kingswatsiak, King | | TLMOD | 11/19/2015 | 0.00 | 380.41 | 0.00 | 0.00 | 380.41 |
| 2016-0729 Gilbert, Dany | | TLMOD | 3/9/2016 | 889.55 | 0.00 | 0.00 | 0.00 | 889.55 |
| 2016-1472 Kakee, Jacopee | | TLMOD | 5/15/2016 | 1,074.50 | 0.00 | 0.00 | 0.00 | 1,074.50 |
| 2016-1518 Illuituq, Liederik | | TLMOD | 5/26/2016 | 485.64 | 670.00 | 0.00 | 0.00 | 1,155.64 |
| 2016-1562 Boulanger, Rene | | TLMOD | 5/31/2016 | 13,764.96 | 1,370.07 | 0.00 | 0.00 | 15,135.03 |
| 2016-1586 Campeau, Eric | | TLMOD | 6/2/2016 | 3,113.76 | 0.00 | 0.00 | 0.00 | 3,113.76 |
| 2016-1850 Martel, Roger | | TLMOD | 6/27/2016 | 10,535.80 | 500.50 | 0.00 | 0.00 | 11,036.30 |
| 2016-2099 Tavo, Jacobie | | TLMOD | 7/23/2016 | 1,482.88 | 0.00 | 0.00 | 0.00 | 1,482.88 |
| 2016-2234 Shalmaiyuk, Peter | | TLMOD | 8/3/2016 | 289.32 | 0.00 | 0.00 | 0.00 | 289.32 |
| 2016-2443 Shalmaiyuk, Peter | | TLMOD | 8/17/2016 | 522.84 | 0.00 | 0.00 | 0.00 | 522.84 |
| 2016-2590 Makkigak, John | | TLMOD | 9/5/2016 | 871.36 | 0.00 | 0.00 | 0.00 | 871.36 |
| 2016-2635 Kakee, Jacopee | | TLMOD | 9/7/2016 | 217.84 | 0.00 | 0.00 | 0.00 | 217.84 |
| 2016-2711 Harvey, Serge | | TLMOD | 8/10/2016 | 18,009.03 | 665.00 | 0.00 | 0.00 | 18,674.03 |
| 2016-2898 Campbell, Mario | | TLMOD | 10/3/2016 | 939.24 | 362.81 | 0.00 | 0.00 | 1,302.05 |
| | | | **Employer Totals** | **52,196.72** | **7,394.30** | **0.00** | **0.00** | **59,591.02** |

** If cost relief/transfer has been applied line total and statement total will equal adjusted amount.*

| | | | | | |
|---|---|---|---|---|---|
| CATLD | Claim Accepted/Time Loss Denied | HRLSS | Hearing Loss | NCOTB | No Claim - Other Board |
| CLDND | Claim Denied | INDSS | Industrial Disease | NCEST | No Claim Established |
| DFATL | Delayed Fatal | IJAIN | Interjurisdictional Agreement In | NTLSS | No Time Loss |
| CLDUP | Duplicate Claim | IJAOUT | Interjurisdictional Agreement Out | TLMAJ | Time Loss Major |
| FATAL | Fatal | MAID0 | No Medical Aid/No Time Loss | TLMOD | Time Loss Moderate |
| | | | | TLNWR | Time Loss No Worker Report |

| Spec Section # | **Provision of Item Breakdown(s)**<br>This form is intended to provide the Contracting Authority with a breakdown of the costs included in the Balance of Project Costs (BOPC). It will assist in determining if the cost represents value for money and are considered "fair and reasonable". **Note:** Refer to 1031-2 article 07 for Non Applicable Costs. Further breakdown may be requested where applicable. | **Amount** |
|---|---|---|
| | **Balance of Project Costs** | |
| 00 00 00 | **Including but not limited to:**<br>• -Any variable Indirect Costs for Overhead and Admin.,<br>• -Profit<br>• -Costs for Expeditors,<br>• -Commercial General Liability (CGL) Insurance,<br>• -All Risk Insurance,<br>• -WSCC costs,<br>• -Business Expenses,<br>• -Contractor's portion of Training Expenses,<br>• -Ancillary Equipment,<br>• -Service Vehicles,<br>• -Supervision,<br>• -Equipment repairs and parts supply & transport | $1,088,000.00 |
| | **Including but not limited to:**<br>• All costs required to complete the Contract in accordance with the Contract Documents that are not subject to measurement and payment under a Unit Price item, as indicated in the following Specifications Sections and all contract drawings: | |
| 01 11 00 | Summary of Work | $5,000.00 |
| 00 14 00 | Work Restrictions | $2,000.00 |
| 01 31 19 | Progress Meetings | $20,000.00 |
| 01 32 16.07 | Construction Progress Schedule – Bar (GANTT) Chart | $5,000.00 |
| 01 33 00 | Submittal Procedures | $35,000.00 |
| 01 35 13.43 | Special Procedures for Contaminated Sites | $15,000.00 |
| 01 35 29.14 | Health and Safety for Contaminated Sites | $60,000.00 |
| 01 35 43 | Environmental Procedures | $5,000.00 |
| 01 41 00 | Regulatory Requirements | $3,000.00 |
| 01 51 00 | Temporary Utilities | $25,000.00 |
| 01 52 00 | Construction Facilities | $15,000.00 |
| 01 56 00 | Temporary Barriers and Enclosures | $5,000.00 |
| 01 71 01 | Examination and Preparation | $5,000.00 |
| 01 77 00 | Closeout Procedures | $3,000.00 |
| 01 78 00 | Closeout Submittals | $3,000.00 |
| 02 41 13 | Selective Site Demolition - Non-Hazardous Materials | $35,000.00 |
| 02 61 00 | Soil Remediation | $50,000.00 |
| 02 81 01 | Hazardous Materials | $45,000.00 |
| 02 82 00.01 | Asbestos Abatement – Minimum Protection | $1,000.00 |
| 31 05 10 | Corrected Maximum Dry Density for Fill | $2,000.00 |
| 31 05 16 | Aggregate Materials | $15,000.00 |
| 31 11 00 | Clearing and Grubbing | $10,000.00 |
| 31 14 13 | Soil Stripping and Stockpiling | $10,000.00 |

| | | |
|---|---|---|
| 31 22 15 | Grading | $10,000.00 |
| 31 23 33.01 | Excavating Stockpiling and Backfilling | $20,000.00 |
| 31 24 13 | Road and Landfill Embankments | $15,000.00 |
| 31 32 19.01 | Geotextile | $3,000.00 |
| 31 37 00 | Rip Rap | $10,000.00 |
| 33 42 13 | Pipe Culverts | $2,000.00 |
| | TOTAL LUMP SUM AMOUNT (LSA) | $1,522,000.00 |

Kudlik Constuction Ltd.
P.O. Box 727, 1519 Federal Road
Iqaluit, Nunavut X0A 0H0
Telephone: 867.979.1166
Fax: 867.979.1169
Kudlikconstruction.com

# SITE VISIT REPORT

No. 1

Project: Metal Dump Remediation Project

Job No.: R.083118.001

Location: Iqaluit, Nunavut

Reported by: Maxime Gaudreau

Date: July 24, 2017

Time: 1:30PM

**Purpose of Site Visit:**

Pre-mobilization site tour with Arcadis representatives

**Comments:**

- Layout of Road "A" (Centerline and Toe of Slopes) and edge of proposed landfill embankment completed.
- Alignment of Road "A" slightly changed between chainage 0+060 and 0+160 to avoid breaking rock and moving the existing ditch on the west side of the road.
- Profile of Road A raised by 400mm at chainage 0+170 to avoid breaking rock.
- Main staging Area shown.
- Crushing installations in the City of Iqaluit's quarry, stockpiles of Type 3 material (Rip Rap) and Type 2 material (0-150mm) shown.

Distribution:

R. Janzen, R. Fletcher – Arcadis

Maxime Gaudreau, Project Manager

Kudlik Construction Ltd.

# Transmittal

| | |
|---|---|
| **No. :** | **008** |
| **Rev. :** | **00** |
| **Date :** | 2017-07-28 |

**Project :** **METAL DUMP REMEDIATION, IQALUIT**
**R.083118.001**

**Project No.:** 2017-093

**Subject :** **ASBESTOS LIABILITY**

**Transmitted to :**
Arcadis
329 Churchill Ave
Ottawa, Ontario, K1Z 5B8

Ryan Janzen
ryan.janzen@arcadis.com
(613) 721 0555

**Copy to :**

**Discipline :**
**Specification :** 02 82 00
**Drawings reference :**
**Transmitted as :**

**Transmited for :**
**Review requested by :** **2017-08-07**
**Color choice :**
**Number of page :** 2 including this cover

**Sub contractor or supplier :**
Kudlik Construction Ltd
1519 Federal Roal
Iqaluit, Nu, X0A 0H0

François Bourassa
fbourassa@kudlik.biz
867-979-1166

**Manufacturer :**

**Description :** ASBESTOS LIABILITY

**Supplier SD No. :**
**Comments :** INSURANCE

**Reviewed and submitted by :**

Prepared by :
François Bourassa, P. Eng.
Project Manager
Kudlik Construction Ltd.

##
##
##
##
##
###

**Comments and review by :**

# CERTIFICATE OF INSURANCE



Travaux publics et Services gouvernementaux Canada / Public Works and Government Services Canada

| Description and Location of Work | Contract No. |
|---|---|
| Dew Line Site Remediation<br>CAM-E (Keith Bay), Nunavut | EW699-160639/B |
| | Project No.<br>R.064013.001 |

| Name of Insurer, Broker or Agent | Address (No., Street) | City | Province | Postal Code |
|---|---|---|---|---|
| Renaud Assurances et Gestion de Risques inc. | 1165, Boul. Lebourgneuf, bureau 320 | Québec | QC | G2K 2C9 |

| Name of Insured (Contractor) | Address (No., Street) | City | Province | Postal Code |
|---|---|---|---|---|
| KUDLIK CONSTRUCTION LTD & KUDLIK AVIATION INC. | P.O BOX 727 | IQALUIT | NUNAVUT | X0A 0H0 |

Additional Insured
**Her Majesty the Queen in Right of Canada as represented by the Minister of Public Works and Government Services**

| Type of Insurance | Insurer Name and Policy Number | Inception Date D / M / Y | Expiry Date D / M / Y | Limits of Liability | | |
|---|---|---|---|---|---|---|
| | | | | Per Occurrence | Annual General Aggregate | Completed Operations Aggregate |
| **Commercial General Liability** | RSA policy COM044542591 | 01-11-2016 | 01-11-2017 | $ 2 000 000 | $ 5 000 000 | $ 2 000 000 |
| **Umbrella/Excess Liability** | EVOLUTION policy EVO12603 | 01-11-2016 | 01-11-2017 | $ 13 000 000 | $ 13 000 000 | $ 13 000 000 |
| **Environmental Impairment Liability**<br>"Pollution Legal Liability - Fixed Site Coverage"<br>"Contractors Pollution Liability" "Storage Tank Third Party Liability"<br>"Contractors Professional Liability"<br>Asbestos and mould contractor | LLOYD'S policy 156713<br>LLOYD'S policy 156714 | 15-08-2016<br>15-08-2016 | 15-08-2017<br>15-08-2017 | $<br>☐ Per Incident<br>☒ Per Occurence<br>Each claim and aggregate | | Aggregate<br>$ 10 000 000<br>10 000 000 |
| **Medical Malpractice insurance** | RSA policy COM044542591 | 01-11-2016 | 01-11-2017 | $ 1 000 000 | | |
| **Aviation Liability Insurance** | GLOBAL AEROSPACE policy: 20006799-QC-15 | 19-10-2016 | 19-10-2017 | 25 000 000$ | | |
| **Aircraft Charter Insurance** | GLOBAL AEROSPACE policy: 20006799-QC-15 | 19-10-2016 | 19-10-2017 | 25 000 000$ | | |
| **Marine Liability Insurance** | | | | | | |
| **Automobile Liability Insurance** | RSA policy CAP044483984 | 01-11-2016 | 01-11-2017 | $<br>☐ Per Incident<br>☒ Per Occurence 2 000 000$ | | Aggregate<br>$ |

**I certify that the above policies were issued by insurers in the course of their Insurance business in Canada, are currently in force and include the applicable insurance coverage's stated on page 2 of this Certificate of Insurance, including advance notice of cancellation / reduction in coverage.**

Ginette Couillard, Courtier en assurance de dommages

Name of person authorized to sign on behalf of Insurer(s) (Officer, Agent, Broker)

RENAUD ASSURANCES
ET GESTION DE RISQUES INC

PAR:

Signature

418-627-9292

Telephone number

05-07-2017

Date D / M / Y

Kudlik Construction Ltd.

# Transmittal

| | |
|---|---|
| **No. :** | **009** |
| **Rev. :** | **00** |
| **Date :** | 2017-07-28 |

**Project :** **METAL DUMP REMEDIATION, IQALUIT** **Project No.:** 2017-093
**R.083118.001**
**Subject :** **CONSTRUCTION EQUIPMENT LIST**

**Transmitted to :**
Arcadis
329 Churchill Ave
Ottawa, Ontario, K1Z 5B8
Ryan Janzen
ryan.janzen@arcadis.com
(613) 721 0555

**Copy to :**

| | | | |
|---|---|---|---|
| **Discipline :** | | **Transmited for :** | |
| **Specification :** | 31 23 33.01 | **Review requested by :** | **2017-08-07** |
| **Drawings reference :** | | **Color choice :** | |
| **Transmitted as :** | | **Number of page :** | 21 including this cover |

**Sub contractor or supplier :**
Kudlik Construction Ltd
1519 Federal Roal
Iqaluit, Nu, X0A 0H0
François Bourassa
fbourassa@kudlik.biz
867-979-1166

**Manufacturer :**

**Description :** TABLE 1 : EQUIPMENT LIST

**Supplier SD No. :**
**Comments :**

**Reviewed and submitted by :**

Prepared by :
François Bourassa, P. Eng.
Project Manager
Kudlik Construction Ltd.

##
##
##
##
##
###

**Comments and review by :**

## TABLE 1: List of Vehicles and Heavy Equipment assigned to the project Iqaluit Metal Dump

| Description | | | Remarks | | | |
|---|---|---|---|---|---|---|
| Units | Type | Brand | Year | Meter (hrs) | Conditions | Picture |
| | **Vehicles / equipment** | | | | | |
| 29-040 | Backhoe Loader | John Deer 810J | 2011 | 2177 | Excellent | 1 |
| 29-040-1 | Gravel Bucket 2 cubic yard | -- | 2011 | -- | Excellent | -- |
| 29-040-2 | Tranch Bucket 30" | -- | 2011 | -- | Excellent | -- |
| 29-040-3 | Set of Fork 60" | -- | 2011 | -- | Excellent | -- |
| 29-040-4 | Ditching Bucket 48" | -- | 2011 | -- | Excellent | -- |
| 08-017 | Bulldozer | Komatsu D-65EX-16 | 2010 | 1895 | Excellent | 2 |
| 10-023 | Compactor 84" Whide | Dynapac CA2500D | 2013 | 624 | Excellent | 3 |
| 19-028 | Compressor 115- CFM | Sullair 900-1150CXHDTQ | 2008 | 3424 | Excellent | 4 |
| 11-025 | Crusher -jaw- 30"x48" | Extec C-12 | 2001 | 3862 | Excellent | 5 |
| 11-026 | Crusher -jaw- 36"x50" | JCI Pionner KO FT2650 | 2012 | 3683 | Excellent | 6 |
| 11-027 | Crusher -cone- 48" | JCI Kodiak JC-FT300K | 2012 | 3352 | Excellent | 7 |
| 18-015 | Drill Top Hammer | Tamrock/Sandvik DC700 | 2008 | 1125 | Excellent | 8 |
| 04-002 | Dump Truck 10 Wheels | Ford LST 9000 | 1995 | 3016 | Good | 9 |
| 04-003 | Dump Truck 10 Wheels | Ford LST 9000 | 1994 | 2139 | Good | 10 |
| 04-024 | Dump Truck 10 Wheels | Freighliner FL 106 | 1998 | 2632 | Good | 11 |
| 04-044 | Dump Truck 10 Wheels | Freighliner FL 80 | 2002 | 2521 | Good | 12 |
| 04-052 | Dump Truck 10 Wheels | International 705 7600 | 2004 | 1631 | Excellent | 13 |
| 04-054 | Dump Truck 10 Wheels | International 705 7600 | 2006 | 898 | Excellent | 14 |
| 04-051 | Dump Truck 10 Wheels | International 705 7600 | 2006 | 1392 | Excellent | 15 |
| 24-065 | Dump Truck Off Road | Volvo A40F | 2011 | 6252 | Excellent | 16 |
| 24-067 | Dump Truck Off Road | Volvo A40F | 2011 | 6050 | Excellent | 17 |
| 09-025 | Excavator | Komatsu PC300LC-8 | 2008 | 5010 | Excellent | 18 |
| 09-025-1 | Rock Bucket | -- | 2008 | -- | Excellent | -- |
| 09-025-02 | Ditch Bucket | -- | 2008 | -- | Excellent | -- |
| 09-025-4 | Ripper | -- | 2008 | -- | Excellent | -- |
| 09-025-5 | Tumb | -- | 2008 | -- | Excellent | -- |
| 09-047 | Excavator | Hitachi 2x350LC3 | 2009 | 2970 | Excellent | 19 |
| 09-047-1 | Shear | Labounty MSD50R | 1992 | -- | Good | 20 |
| 09-047-2 | Rock Bucket | -- | 1998 | -- | Excellent | -- |
| 28-006 | Lifting Magnets | 48LM Walkernational | 2001 | -- | Excellent | 21 |
| 03-010 | Fuel Truck ( 11 000 Liters) | Internationnal 4000-4900 | 2000 | 11718/km | Excellent | 22 |
| 25-004 | Grader With Topcon System | Caterpillar 140 G | 1992 | 6935 | Excellent | 23 |

| Description | | | Remarks | | | |
|---|---|---|---|---|---|---|
| Units | Type | Brand | Year | Meter (hrs) | Conditions | Picture |
| 05-017 | Loader | Komatsu WA-450-3 | 1998 | 14154 | Good | 24 |
| 05-017-1 | Sand Bucket | -- | 1998 | -- | Excellent | -- |
| 05-017-2 | Fork 90" | -- | 1998 | -- | Excellent | -- |
| 05-033 | Loader | Komatsu WA-500-7 | 2014 | 3800 | Excellent | 25 |
| 05-033-1 | Sand Bucket | -- | 2014 | -- | Excellent | -- |
| 05-033-2 | Rock Bucket | -- | 2014 | -- | Excellent | -- |
| 05-033-3 | Fork 96" | -- | 2014 | -- | Excellent | -- |
| 04-028 | Lowbed & Tractor Truck | Western Star 4900 | 1993 | 991 | Good | 26 |
| 02-189 | Minibus 15 passengers | GMC Savana | 2008 | 143231/km | Good | 27 |
| 02-151 | Pick up 4x4 | Ford F150 Flair Side | 2006 | 189698/km | Excellent | 28 |
| 02-123 | Pick up 4x4 | Ford F150 XLT | 2000 | 208226/km | Good | 29 |
| 02-160 | Pick up 4x4 | Ford F250 King Ranch | 2005 | 206090/km | Good | 30 |
| 02-179 | Pick up 4x4 | Ford 250 XL Super Duty | 2007 | 91494/km | Excellent | 31 |
| 03-019 | Service Truck And Tools | Freighliner FL-80 | 2001 | 219598/km | Excellent | 32 |
| 14-017 | Screener 6'x20'x3' Deck | JCI FT 6203 | 2008 | 4730 | Excellent | 33 |
| 14-018 | Screener 6'x20'x3' Deck | PowerScreen H6203R | 2007 | 2246 | Excellent | 34 |
| 30-028 | Tower Light 4x1000w | Magnum MTL3060K | 2012 | 2427 | Excellent | 35 |
| 30-031 | Tower Light 4x1000w | Magnum MTL3060K | 2012 | 3795 | Excellent | 36 |
| 30-034 | Tower Light 4x1000w | Whiteman LT-12D | 2011 | 2954 | Excellent | 37 |
| 30-040 | Tower Light 4x1000w | Magnum MTL3060K | 2013 | 868 | Excellent | 38 |
| 04-077 | Water truck ( 15 400 Liters) | Freighliner FLD 112 | 1996 | 8025 | Excellent | 39 |

Photo 01: Backhoe Loader John Deer 810 J

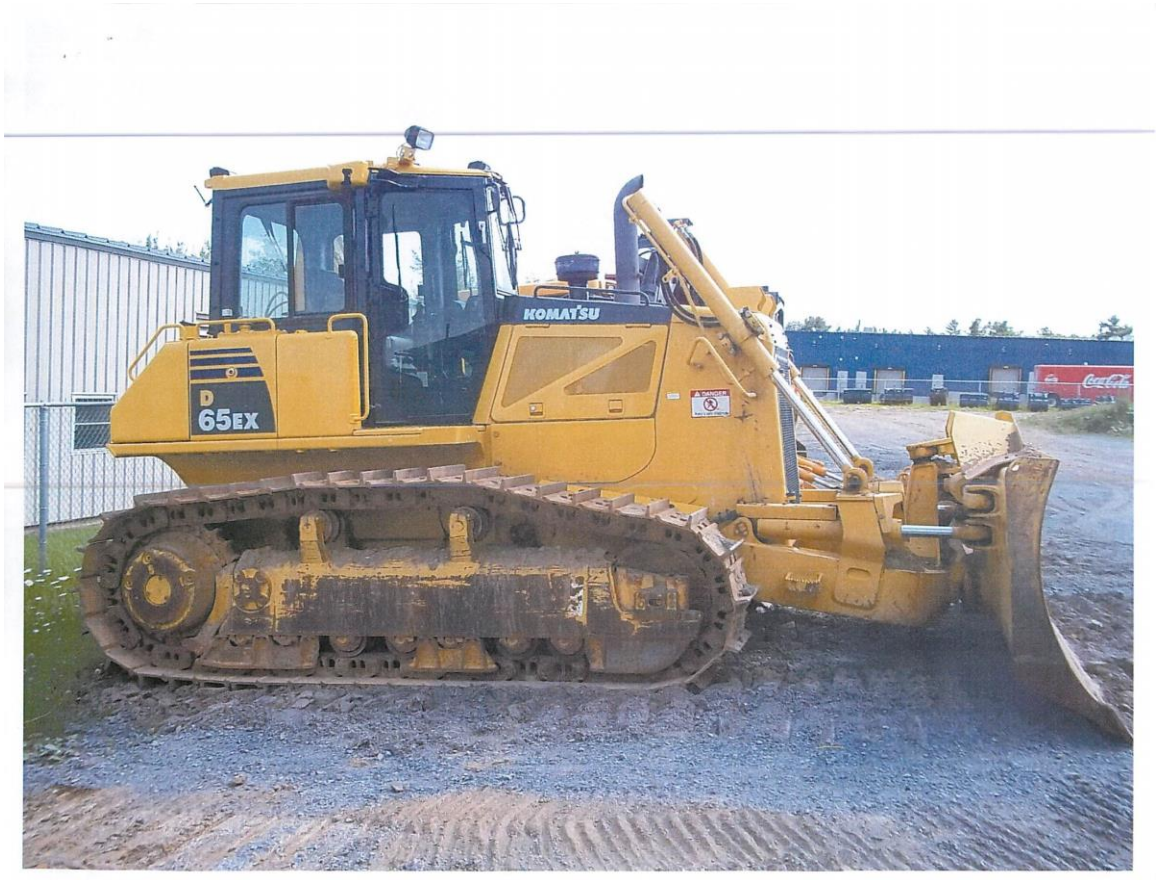



Photo 02: Bulldozer Komatsu D-65EX-16

Photo 03: Compactor Dynapac CA2500D

Photo 04: Compressor Sullair 900 115 CFM

Photo 05: Jaw crusher Extec C-12

Photo 06: Jaw crusher JCL Pionner KO FT2650

Photo 07: Cone crusher JCL Kodiak JC-FT300K

Photo 08: Drill Tamrock/sandvik DC700

Photo 09: Dump truck Ford LST 9000

Photo 10: Dump truck Ford LST 9000

Photo 11: Dump truck Freightliner FL106

Photo 12: Dump truck Freightliner FL106

Photo 13: Dump truck International 705 7600

Photo 14: Dump truck International 705 7600

Photo 15: Dump truck International 705 7600

Photo 16: Off-road dump truck Volvo A40F

Photo 17: Off-road dump truck Volvo A40F

Photo 18: Excavator Komatsu PC300 LC-8

Photo 19: Excavator Hitachi 2x350 LC3

Photo 20: Hydraulic Shear

Photo 21: Lifting magnet 48 LM Walkernational

Photo 22: Fuel truck

Photo 23: Grader Caterpillar 140G

Photo 24: loader Komatsu WA-450-3

Photo 25: Loader Komatsu WA-500-7

Photo 26: Lowbed & tractor Western Star 4900

Photo 27: Minibus GMC Savana

Photo 28: Pickup Ford F-150

Photo 29: Pickup Ford F-150 XLT

Photo 30: Pickup F250 King Ranch

Photo 31: Pickup Ford F-150 XL Super Duty

Photo 32: Service truck Freightliner FL-80

Photo 33: Screener JCI FT 6203

Photo 34: Screener PowerScreen H6203R

Photo 35: Tower Light Magnum MTL3060K (4)

Photo 36: water truck Freightliner FLD 112

Kudlik Construction Ltd.

# Transmittal

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**Subject :** **HAZARDOUS MATERIAL MANAGEMENT PLAN**

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**Manufacturer :**

**Description :** HAZARDOUS WASTE MANAGEMENT

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# WORK METHODOLOGY PLAN

# IQALUIT METAL DUMP SITE REMEDIATION

# SOLICITATION NO. EW699-160795/B

# DRAFT PLAN

Kudlik Construction Ltd.

Kudlik Construction Ltd.
1519 Federal Road
Iqaluit, Nunanut X0A 0H0

July 21, 2017

O/Ref.: QE17-124-2

*Confidential and priviledged document*

Qikiqtaaluk environmental
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# TABLE OF CONTENTS

**1. HAZARDOUS WASTE ..... 1**

1.1 Hazardous Waste Materials Management ..... 1
1.1.1 Proposed Hazardous Waste Material Containers ..... 1
1.1.2 Processing and Storage Areas ..... 2
1.2 Waste Streams ..... 4
1.2.1 Asbestos Containing Materials ..... 4
1.2.2 Equipment, Decontamination Facilities and Preparation of Work Areas ..... 4
1.2.3 Methodology ..... 5
1.2.4 Lead-based Paint Abatement ..... 5
1.2.5 Batteries ..... 5
1.2.6 Other Hazardous Waste Materials ..... 5
1.2.7 Suspected Hazardous Waste Materials ..... 6
1.3 Off-site Transport and Disposal ..... 6
1.4 Other Demolition and Processing ..... 7
1.4.1 Drums ..... 7
1.4.2 POL Tanks ..... 8
1.5 Potential Risks and Mitigation Measures ..... 9
1.6 Regulatory Requirements ..... 11

# LIST OF TABLES

**TABLE 1** Hazardous Waste Material and Proposed Packaging ..... 2

**TABLE 2** Potential Risks and Mitigation Measures Associated with Structure Demolition Activities ..... 10

**TABLE 3** Potential Risks and Mitigation Measures Associated with Packaging, Transport and Disposal of Hazardous Waste ..... 10

**TABLE 4** Hazardous Waste Regulatory Requirements ..... 11

# LIST OF APPENDICES

APPENDIX A Drum Processing Flowchart

# LIST OF ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| **ACM** | Asbestos-containing material |
| **APEC** | Area of potential environmental concern |
| **CEPA** | Canadian Environmental Protection Act, 1999, S.C. 1999, c. 33 |
| **CGSB** | Canadian General Standards Board |
| **DR** | Designated representative |
| **ECCC** | Environment and Climate Change Canada |
| **EIHWHRMR** | Export and Import of Hazardous Waste and Hazardous Recyclable Materials Regulations, SOR/2005-149 |
| **EWPF** | Environmetal waste processing facility |
| **H&S** | Health and safety |
| **HEO** | Heavy equipment operator |
| **HEPA** | High-efficiency particulate air |
| **HWMPA** | Hazardous waste materials processing area |
| **HWS** | Hazardous Waste Specialist |
| **IBC** | Intermediate bulk container |
| **IMDG** | Internation Maritime Dangerous Goods |
| **IMHWR** | Interprovincial Movement of Hazardous Waste Regulations, SOR/2002-301 |
| **IMO** | International Maritime Organizations |
| **JSA** | Job safety analysis |
| **LAP** | Lead-amended paint |
| **LEL** | Lower explosive limit |
| **ODA** | Ozone-depleting substance |
| **PAP** | PCB-amended paint |
| **PCB** | Polychlorinated biphenyls |
| **POL** | Petroleum, oil and lubricant |
| **PPE** | Personal protective equipment |
| **SDS** | Safety data sheet |
| **STOP** | Stop all Tasks and Observe to Prevent |
| **TDGA** | Transportation of Dangerous Goods Act, 1992, S.C. 1992, c. 34 |
| **TDGR** | Transportation of Dangerous Goods Regulations, SOR/2001-86 |

| | |
|---|---|
| **TWSA** | Temporary waste storage area |
| **UN** | United Nations |
| **VOC** | Volatile organic compounds |
| **WHMIS** | Workplace Hazardous Materials Information System |
| **WSCC** | Workers' Safety and Compensation Commission |

# 1. HAZARDOUS WASTE

*Hazardous waste materials* are those designated as "hazardous" or "dangerous goods" under territorial or federal legislation or guidelines, including the TDGA or TDGR, EIHWHRMR under the CEPA. Conversely, *hazardous materials* are also substances that endanger human health or the environment if improperly handled. For example, vented compressed gas cylinders are *hazardous waste* because they remain TDGA regulated, while asbestos *waste* may be classified as non-hazardous even though improper handling with inadequate PPE can cause detrimental long-term health effects. *Hazardous waste materials* refers to both.

The majority of Qikiqtaaluk Environmental's (QE) contracts include hazardous waste abatement and disposal. As such, QE's personnel is highly experienced and knowledgeable of all aspects of hazardous waste abatement, identification, containerization, labelling, shipping and disposal. This section details how hazardous waste materials will be managed and transported for disposal.

## 1.1 Hazardous Waste Materials Management

A waste tracking system will be implemented to properly manage the containerized hazardous waste materials to be shipped off-site. Each individual waste container (e.g., drum, wrangler, cylinder, marine container, etc.) will be identified with a unique sequential number and a hazardous waste identification label, in accordance with TDG/IMDG requirements (UN number, class label(s), proper shipping name). Using a paint marker, this number will be written directly on the container, as well as on the hazardous waste label. For each container of hazardous waste materials, the following information will be recorded in the waste inventory:

- Type of waste;
- Container identification number;
- Volume (L) or estimated weight (kg);
- Type of container (drum, pail, wrangler and whether it is UN-approved);
- Waste origin (APEC number);
- TDG requirements (if regulated under TDGA).

A photographic record of the internal contents of all completed hazardous waste containers, including marine containers, will be provided to the DR prior to being sealed. A copy of the waste inventory will also be provided to the DR.

### 1.1.1 Proposed Hazardous Waste Material Containers

Dangerous goods classified under TDGA (i.e., PAP, flammable liquids, etc.) must be packaged and transported in a UN-standardized means of containment (i.e., containers). Other hazardous waste (not TDGA-regulated) will be packaged and transported in suitable containers, which are not necessarily UN-approved. The Regulations establish the standards and specifications for the packaging of dangerous goods (TDGA and IMDG requirements).

Dangerous goods in Classes 3, 4, 5, 6.1, 8 and 9, transported in small containments, must be packaged in UN-approved containers that meet the CGSB-43.146 or the CGSB-43-150 standard. It is also important to use the containers according to the manufacturer's instructions. The load limit and the danger level are always indicated on the UN container code.

The hazardous waste materials that have been identified, or are most likely to be found at the Iqaluit Metal Dump are listed in the following table. The waste materials are typical of remote Northern sites. Proposed packaging for the various types of waste are also presented in the table. Note that other types of hazardous waste may also be found on-site, and if so, will be managed accordingly.

**TABLE 1**
Hazardous Waste Material and Proposed Packaging

| Description | Proposed Packaging |
|---|---|
| Asbestos waste | • Inner container: 6 or 15 mil polyethylene bag<br>• Outer container: 6 mil polyethylene bag or wrangler (for sharp objects) |
| Organic and aqueous liquid waste | UN or non UN approved closed-top steel drum or salvage drum |
| Total lead and leachable lead-painted and related materials | UN rigid IBC (if suitable size) inside marine container |
| Compressed gas cylinder | Placed in designated rack or crate for cylinders (segregation of incompatible dangerous goods) |
| Fire extinguisher | UN approved wranglers |
| Creosote-treated wood | 6 or 15 mil polyethylene sheeting, strapped on pallet |
| Mercury switches/thermostats | UN certified 20-L pails |
| POL/tank sludge | UN or non UN-certified closed-top drum |
| PAP materials and PCB-related products | UN steel gauge 18 open-top inside a UN salvage drum (double containment) |
| Battery | UN approved battery wrangler |
| Electrical parts | UN certified wrangler |

The marine shipping containers and other types of packaging and containers used for the storage of hazardous waste materials will conform to Section 02 81 01 (Hazardous Waste Materials) of the Specifications. Locks, bracing, strapping, labelling, and signage will be supplied for marine shipping containers. The containerization of hazardous waste materials will meet the requirements of the TDGA, CEPA (IMHWR and EIHWHRMR), and all other applicable regulations.

Kudlik/QE intends to reduce the volume of hazardous waste materials to be disposed of through rigorous on-site segregation and volume reduction (e.g., compaction). A complete Waste Reduction Work Plan will be submitted to the DR in a timely manner once an on-site waste audit has been conducted by the Kudlik/QE team in conjunction with the DR.

### 1.1.2 Processing and Storage Areas

A HWMPA and TWSA will be set-up prior to the start of the Iqaluit Metal Dump remediation activities.

Their respective locations will be at the locations provided in the drawings. The locations will also be on stable, previously disturbed ground, not subject to flooding or seasonal saturation.

Proper signage (including Inuktitut translations for H&S indications), sufficient absorbent materials and approved spill kits will be in place at each of the processing and storage areas.

The HWMPA and TWSA will not be used until baseline sampling has been completed by the DR. The DR will also carry out confirmatory sampling after decommissioning. Kudlik will be responsible for any soil contamination resulting from the improper storage and handling of waste materials over the duration of the Project. In the event of such contamination, Kudlik/QE will submit a plan for Site remediation to be enacted upon immediately following the DR's approval.

#### *1.1.2.1 Hazardous Waste Materials Processing Area*

The HWMPA will be located at the QE hazardous waste facility located in Iqaluit near the airport. Waste will be containerized immediately upon discovery to ensure that there are no spills or leaks. For example, 205 L drums containing liquids will be placed into overpack drums to ensure that any pre-existing leaks are contained. No stockpiling will take place on the project site; once packaged, HW will be transported to QE's transfer center and QE will be responsible for the waste from that point on.

#### *1.1.2.2 Temporary Waste Storage Area*

A TWSA will be established to provide a secure area for hazardous and non-hazardous waste materials storage prior to off-site shipment and disposal. Chemically-incompatible materials will be treated accordingly in the TWSA and will not be stored in proximity to one another.

The TWSA will be established according to Sections 02 81 01, and 31 22 15, Item 3.4 of the Specifications.

Materials will be segregated in the TWSA as follows:

- Zone 1 – Containerized untreatable contaminated soils;
- Zone 2 – Containerized drum and tank contents;
- Zone 3 – Other containerized hazardous waste materials.

Zone 1 will be further segregated by soil contaminant type. Zone 3 will hold the marine shipping containers required for the storage of PAP (if any is found) and leachable-lead painted materials. Minimal incompatibility segregation distance with other dangerous goods will be respected. Note that the volume of hazardous waste liquid is very low, minimizing the potential hazards.

The stacking of marine containers will not be permitted. Marine containers will be offset by 1 m so that container and Environment Canada Registration numbers remain visible. A detailed inventory of the TWSA indicating the locations and contents of each container, the container and assigned Environment Canada Registration numbers, as well as packaging configuration, will be submitted to the DR.

Sorbent materials or an approved spill kit will be stored near the TWSA in the event an emergency clean-up is required.

## 1.2 Waste Streams

The following subsections detail the waste streams that will be encountered and how they will be managed.

### 1.2.1 Asbestos Containing Materials

ACMs may be encountered during debris collection. Kudlik/QE will carry out asbestos removal, containerization and disposal as described below.

#### *1.2.1.1 Administrative and Training Requirements*

The abatement training and removal will be supervised by the HWS, who has received Asbestos Abatement Supervisor training and has experience in all types of removal techniques. It is proposed that local Inuit labourers who assisted in past DEW Line asbestos abatement work, and who have received prior training, be assigned to this task whenever feasible.

#### *1.2.1.2 Respirator Fit Testing*

Asbestos crew personnel will be fitted with respiratory protection using qualitative fit testing methods. Fit tests will be carried out at the beginning of the asbestos abatement work, when a new mask is issued, or when a problem is identified. Workers will perform positive and negative fit tests each time a new mask is used.

A written procedure regarding the selection, use and care of respirators will be reviewed with each worker required to wear a respirator. A register of the fit tests will be kept on-site and be made available for consultation by the DR.

### 1.2.2 Equipment, Decontamination Facilities and Preparation of Work Areas

#### *1.2.2.1 Equipment*

At all times, personnel will be provided with Tyvek® coveralls and fitted with half-face respirators equipped with HEPA filters. Tools, bags, water to dampen the ACMs and a vacuum equipped with a HEPA filter will be available inside the work areas.

#### *1.2.2.2 Inspection and Sampling*

Prior to the start of the abatement work, the work area will be inspected by QE's Asbestos Specialist. The level of protection required will be determined following the specialist's recommendations and the findings during the inspection. ACMs to be removed and containerized will be marked, and materials that could possibly contain asbestos will be sampled and analyzed by the DR, as required.

#### *1.2.2.3 Preparation of Work Areas*

The signage will be as per specifications (e.g. 1.9, section 02 82 00 01). Signage will be translated in Inuktitut.

### 1.2.3 Methodology

A decontamination station will be located near the work areas. The area between the decontamination station and the work area will be defined as an asbestos hazard area.

### 1.2.4 Lead-based Paint Abatement

LAPs will be encountered during the course of the work, notably on the vehicles and drums found in the various APEC's. Kudlik/QE will carry out LAP containerization and disposal, as described below.

LAP packaging/containerization will be performed according to Section 02 81 01 of the Specifications. QE's HWS will participate in the LAP containerization work.

All the material will be placed inside a marine shipping container equipped with a customized drip tray. The placement of leachable-lead painted materials in the marine shipping containers will be as per Clause 3.5 of Section 02 81 01 (Hazardous Waste Materials) of the Specifications. The marine containers will be sealed and locked at the TWSA to restrict access by unauthorized personnel.

The shipping containers will be clearly marked as containing lead-based painted materials. The packaged materials will be included in the movement document (manifest).

### 1.2.5 Batteries

There are known batteries on-site and more are likely to be found. Batteries will be collected and containerized in UN-approved wranglers specifically designed for this use. They will be stacked with the poles upwards and a maximum of 2 rows high. The poles will have electrical tape placed around them to reduce the risk of a short circuit of the battery. Once they are packaged and closed, the bags will be identified with the proper labelling (Class 8, corrosive) and brought to the TWSA (secured in marine containers) before being shipped south to an approved disposal facility. The HWS will complete TDG/IMDG requirements and regulated documentation and recording requirements.

### 1.2.6 Other Hazardous Waste Materials

Other hazardous waste materials that might be found at the Iqaluit Metal Dump include, but are not limited to, those detailed below.

#### *1.2.6.1 Compressed Gas Cylinders*

Pressurized inert gas cylinders will be vented by the HWS in a remote and safe location acceptable to the DR. These cylinders will then shipped off-site for disposal at an approved facility. Cylinders known or suspected to contain regulated ODSs, propane, or acetylene will not be vented and will be properly packaged and labelled according to TDGA and IMDG regulations and shipped off-site for disposal at an approved facility.

#### *1.2.6.2 Creosote-Treated Wood*

Bundles of creosote-treated timbers will be completely wrapped in polyethylene sheeting and strapped on a wooden pallet and/or placed in marine containers. Granular fill will be placed in the holes from which the timber piles were removed. They will be shipped off-site for disposal in an approved facility.

#### *1.2.6.3 Fluorescent Light Ballasts, Capacitors and Transformers*

Some of the transformers or capacitors in the light ballasts may contain PCBs. As such, workers will take the necessary H&S precautions when handling them. The capacitors will be removed from the light ballasts and segregated from other waste for identification by the HWS. Based on the manufacturer, model and other markings that may still be visible, the HWS will determine if the capacitors contain PCBs. The identification will be as per ECCC's publication *Identification of Fluorescent Lamp Ballasts Containing PCBs*, Report EPS 2/CC/2, Revised (1991). The PCB capacitors will be containerized in 20 L plastic UN-approved pails and stored with other PCB waste. The shipping containers will be labelled accordingly. Any transformers or ballasts that have no markings to assist with their identification will be assumed to contain PCB's.

The DR will be immediately notified if any transformers are identified on-site.

Fluorescent light tubes may also contain hazardous mercury vapours. They will be handled with care and containerized in cardboard drums specifically designed for this purpose.

### 1.2.7 Suspected Hazardous Waste Materials

Work will be stopped immediately and the DR notified upon discovery of:

- Material resembling spray or trowel applied asbestos;
- Designated substances such as PCBs, asbestos, and mercury not previously identified;
- Unknown and/or potentially hazardous substances.

Work will be suspended to allow for visual confirmation or the nature of the materials to be established. If the nature of the materials or debris cannot be confirmed, they will be stored at the HWMPA in a secured area or container. The DR will be notified of the findings. Testing for classification will be carried out and paid for by the DR.

Details of the containers selected for handling and disposal of the hazardous waste materials will be provided to the DR for review prior to commencement of the remediation activities. All required approvals, as well as a description of the type, volume and weight of containers will be included.

Note that other types of hazardous waste may also be found on-site. If so, they will be managed accordingly.

## 1.3 Off-site Transport and Disposal

Containerized hazardous waste materials will be shipped off-site for disposal at authorized disposal facilities.

All packaged materials ready for off-site shipment (inventoried, manifested, marked and labelled) will be hauled to the beach one week prior to the ship's arrival in order to avoid major storage at the beach. The marine shipping companies will use barges and tugboats to move containers from Iqaluit to the ship, where a crane will be used to lift containers/materials onto the ship.

QE operates a hazardous waste transfer facility that is registered with the Government of Nunavut, registration number NUF #400006. As such, QE will be wholly responsible for the waste from the time it is packaged in the shipping containers until final disposal. QE will issue the certificates of disposal once final disposal has been completed.

All loading and unloading operations during the off-site transport of hazardous waste containers will be directly supervised by a HWS. The HWS will also be responsible for inspecting the containers prior to each transport leg, and for providing the proper shipping documents. The 24-hour emergency telephone contact number required on shipping documents will be provided by CANUTEC.

The off-site transport of hazardous waste to another province or territory will require the use of various shipping documents. The IMHWR waste manifest is required when hazardous waste is transported through more than one province or territory, which will be the case for the transport of waste from Iqaluit. This waste manifest contains all the information required in Part 3, Documentation, of the TDGR.

Some of the packaged materials will also require the use of the IMO *Dangerous Goods Declaration* form. This document also contains all the information required by the TDGA and the IMDG Code. Additional information required in the waste description section of the marine transport document includes:

- The term "Marine Pollutant" for products so considered;
- The flash point, for Class 3 flammable liquids.

Copies of the certified waybills, bills of lading, receipts, etc., from the disposal facilities for materials removed from Iqaluit will be provided to the DR upon request. Kudlik/QE understands that a written authorization from the DR is required to deviate from the haulers, facilities and/or receiving organizations listed above.

## 1.4 Other Demolition and Processing

Some drums have been identified in areas throughout the Site.

### 1.4.1 Drums

Kudlik/QE's drum processing flowchart is presented in Appendix A.

Each individual drum with contents will be numbered and inspected. A registry will be used to document the inspection process. Generally, the protocol will involve a visual investigation of the drum (removal of the bungs) to determine if liquids are present, a measurement of the drum vapours (using a handheld portable meter) to determine total VOCs and LEL. If the drum appears not to contain a liquid, and the VOC and LEL are within acceptable limits, then the drum can be processed. Drums presenting VOC and LEL readings above required concentrations must be washed. The wash water will be immediately consolidated in a tank and decanted to separate the hydrocarbon and water phases. The water phase will be treated by the water treatment unit to remove traces of petroleum hydrocarbons (activated carbon and ULTRASORPTION™). The treated water will be accumulated, sampled and discharged into the environment upon receipt of laboratory analytical results. The hydrocarbon phase will be pumped and consolidated for on-site incineration or off-site disposal in an authorized facility.

Consolidation of liquid contents will take place at the HWMPA. Drums scattered in the APECs may be vented, then closed, and then transported to a HWMPA for sampling and possible consolidation. Drums with a risk of leaks will be transported in a drip tray or salvage drum.

Liquid contents will be consolidated as directed by the DR. In general, drums containing a liquid depth less than 50 mm may be combined with compatible materials (determined by similarity of colour and viscosity) from other drums prior to sampling; samples inferred to contain only water upon visual examination may be tested prior to consolidation. Contents which consist of black oil will NOT be consolidated. The DR will be responsible for classifying and sampling aqueous or liquid contents. The disposal of drum contents will be performed according to Clause 3.6.6 of Section 02 61 33 (Hazardous Waste Materials) of the Specifications.

Drums emptied of their hazardous contents will be washed to render them non-hazardous. The drums will be crushed using an excavator bucket (or drum crusher) so as to reduce their volume by a minimum of 75%. The crushed drums will then be containerized along with the non-hazardous metal debris and shipped to an authorized recycling facility.

### 1.4.2 POL Tanks

The paint on the surface of the any POL tanks found will be verified by the DR to determine whether it contains leachable lead paint. If the paint is found to contain lead, the POL tank will be treated as lead waste. Manual scraping of paint using a wire brush and some paint remover may first be required to produce a clean cut line. Kudlik/QE does not intend to use the ripper or the multiprocessor steel cutting excavator attachment (both cold cutting equipment) on painted surfaces so as to prevent the spreading of contaminated paint chips into the surrounding environment.

Removal of lead-based paints will be performed according to paragraph 1.2.4 of this document.

POL fluids, if any, from tank bottoms will be pumped out using the mobile vacuum tank unit or into drums using an air-powered diaphragm pump. Once the tank bottoms are liquid- and gas-free, they will be opened to provide easy and safe access to any remaining tank bottom sludge. Sludges will be removed manually, using spades and shovels, by workers equipped with appropriate PPE.

Remaining tank parts will be further cut (where lead-based paint has been completely removed) into manageable pieces. The painted areas will be wrapped in polyethylene and transported to the TWSA. Special precautions will be taken to avoid contamination of the surrounding environment (e.g., tarps on the ground, scraping of loose paint chips, work stopped due to high winds, etc.). The remaining unpainted surfaces will be steam washed to render them non-hazardous. At the end of the Project they will be recycled offsite with other non-hazardous metal.

## 1.5 Potential Risks and Mitigation Measures

Table 2 presents the risks and mitigation measures identified specifically for demolition activities; whereas Table 3 presents those associated with the packaging, transport and disposal of hazardous waste.

**TABLE 2**
Potential Risks and Mitigation Measures Associated with Structure Demolition Activities

| Potential Hazard/Risk | Probability | Mitigation Measures |
|---|---|---|
| Bodily injury due to falling debris | Low | • Assign qualified and trained workers;<br>• Daily toolbox meetings will review risks and repeat safe work methods;<br>• Ensure that all personnel working in and around buildings have (and wear) all necessary PPE and reiterate the importance of wearing hard hats at all times. |
| Accidents with heavy machinery | Low | • All workers should stay clear of heavy machinery and ensure they make eye contact with the HEO if they must go near machinery;<br>• Train workers to use proper signalling techniques;<br>• Use of heavy machinery kept to a minimum. |
| Exposure to contaminants | Low to Medium | • Proper PPE will be worn at all times;<br>• The HWS will oversee the work and implement safe work measures. |

**TABLE 3**
Potential Risks and Mitigation Measures Associated with Packaging, Transport and Disposal of Hazardous Waste

| Potential Hazard/Risk | Probability | Mitigation Measures |
|---|---|---|
| Spills or incident during removal and sorting | Medium to High | • Have an experienced HWS on-site;<br>• Rigorous inspection of the areas before any removal operations;<br>• Well-trained crew for removal operations;<br>• Adequate drip trays and/or overpack drums;<br>• Proper equipment for waste handling/sorting/washing operations;<br>• Sufficiently large HWMPA for sorting/washing operations;<br>• Sufficiently large liquid storage reservoirs and proper water management;<br>• Efficient water treatment unit. |
| Spills during handling and transportation | Low to Medium | • Have an experienced HWS on-site;<br>• Rigorous inspection of the areas before any removal operations;<br>• Well trained crew for removal operations;<br>• Proper equipment for waste handling/sorting/washing operations;<br>• Sufficiently large HWMPA for sorting/washing operations;<br>• Sufficiently large liquid storage reservoirs and proper water management;<br>• Efficient water treatment unit;<br>• Preferential trails that require minimum handling;<br>• Use shortest routes whenever possible; |

| Potential Hazard/Risk | Probability | Mitigation Measures |
|---|---|---|
| | | • Have experienced personnel on-site whenever the containers are being moved or handled;<br>• Always have spill kits and spill handling equipment;<br>• All containers used for the handling of hazardous material will meet TDG specifications;<br>• An Environmental Emergency/Spill Response Plan will be presented to the DR prior to commencement of work. |
| Mismanagement and improper waste tracking procedures | Low | • Implement and follow a rigorous waste tracking system;<br>• Have experienced personnel onsite to monitor all handling and loading operations. |
| Additional quantities of hazardous materials are discovered | Low to Medium | Additional containers may be brought to the Site, if necessary. |
| Employee exposure to hazardous substances is higher than expected or exceeds guidelines | Low | Access will be restricted in areas with high concentrations of hazardous substances and extra PPE will be worn. |

## 1.6 Regulatory Requirements

The following table presents the federal and Nunavut territorial codes, standards, guidelines, and regulations that apply to the tasks of hazardous waste management. Kudlik/QE will comply with these throughout the duration of the project.

**TABLE 4**
Hazardous Waste Regulatory Requirements

| Regulatory Document | Applicability |
|---|---|
| Federal | |
| Canadian Environmental Protection Act, PCB Regulations (SOR/2008-273) | Management of PCB waste (storage and disposal). |
| Controlled Products Regulations (SOR/88-66) a.SOR/2001-254 | Safe handling of hazardous products and waste (WHMIS). |
| Migratory Birds Convention Act, 1994 | Prevention of spills of hazardous materials in waterbodies used by migratory birds. |
| Inter-provincial Movement of Hazardous Waste Regulations (SOR/2002-301) | Transport of hazardous waste from Nunavut to Quebec. |
| Transportation of Dangerous Goods Regulations (SOR/2001-286) a.SOR/2011-60 | Transport of TDG regulated hazardous waste (i.e., considered as dangerous goods) such as propane, asbestos, batteries, fire extinguishers, waste diesel and sludge). |
| Nunavut Waters and Nunavut Surface Rights Tribunal Act S.C. 2002, c. 10 | No person shall deposit waste in waters in Nunavut. |

| Regulatory Document | Applicability |
|---|---|
| Nunavut Territory | |
| Environmental Protection Act, RSNWT (Nu) 1988, c E-7 | No person shall discharge or permit the discharge of a contaminant into the environment. |
| Transportation of Dangerous Goods Act (1990 S.N.W.T. 1990, c.36) | Transport of TDG regulated hazardous waste (i.e., considered as dangerous goods) such as propane, asbestos, batteries, fire extinguishers, waste diesel and sludge). |
| Spill Contingency Planning and Reporting Regulations R-068-93 | Spill reporting requirements. |
| Guideline for Waste Solvents, January 2011 | Management of waste solvents (organic liquid wastes), pollution prevention, storage, transportation and disposal. |
| Guideline for the General Management of Hazardous Waste, Revised April 2010 (Nunavut). | Waste management, storage containers, and transportation. |
| Work Site Hazardous Materials Information System Regulations (R.R.N.W.T. 1990, c.S-2). | Safe handling of hazardous products and waste (WHMIS). |
| Nunavut Environmental Guideline for Waste Asbestos (January 2011). | Management of asbestos (pollution prevention, handling and removal, storage, transportation and disposal). |
| Guideline for the Management of Waste Batteries, January 2011 | Management of waste batteries (pollution prevention, storage, transportation and disposal). |
| Guideline for the Management of Waste Lead and Lead Paint, March 2011 | Management of lead amended painted waste materials (pollution prevention, removal and containment, storage, transportation and disposal). |

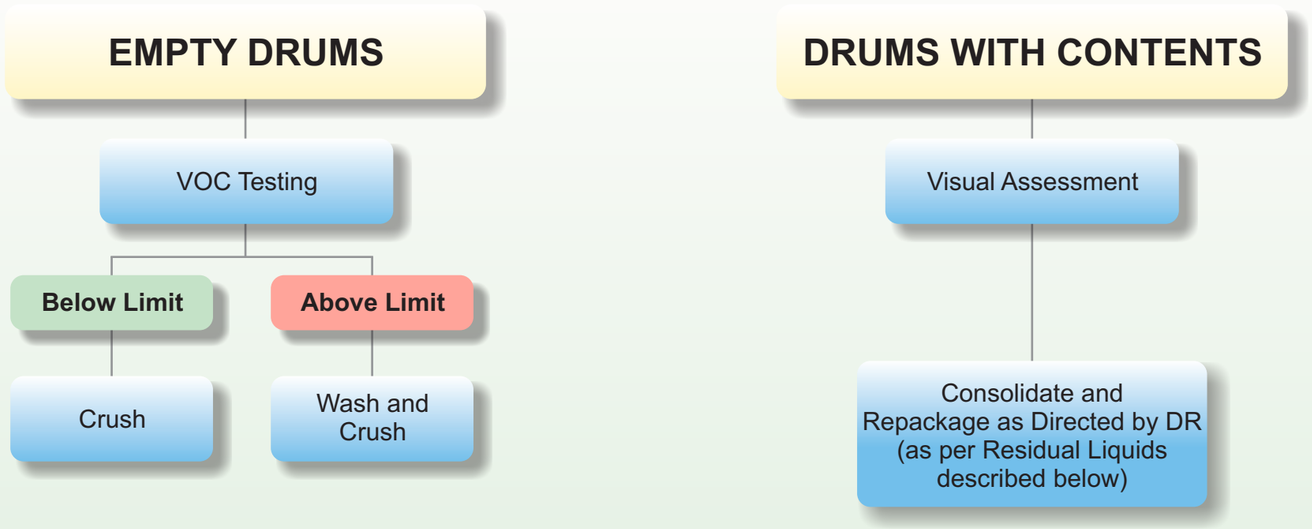
END OF WORK METHODOLOGY PLAN

# APPENDIX A

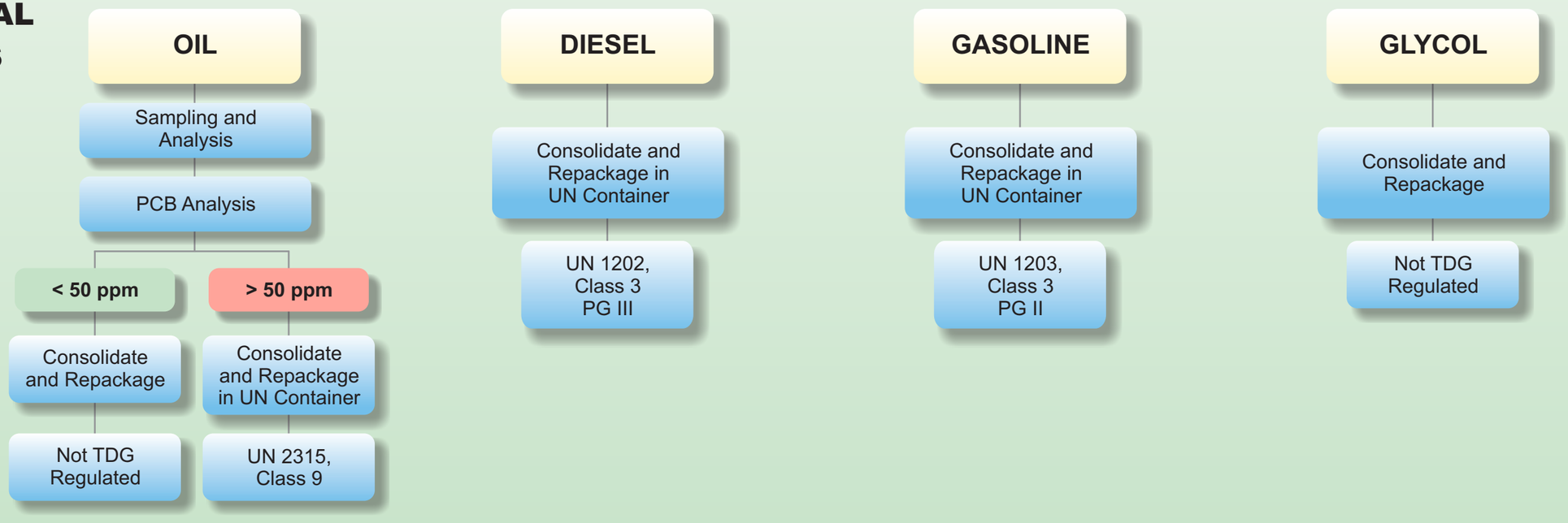
Drum Processing Flowchart

# PROPOSED DRUM PROCESSING PROTOCOL

## DRUMS




## RESIDUAL LIQUIDS




Qikiqtaaluk environmental
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**IQALUIT OFFICE**

2027 Iqaluit Lane
P.O. Box 1228
Iqaluit, Nunavut X0A 0H0

T.: 867 222.8194
info@qenv.ca

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Entrance 1 – Suite 200
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**www.qenv.ca**

Kudlik Construction Ltd.

# Transmittal

| | |
|---|---|
| **No. :** | **011** |
| **Rev. :** | **00** |
| **Date :** | 2017-07-31 |

**Project :** **METAL DUMP REMEDIATION, IQALUIT** **Project No.:** 2017-093
**R.083118.001**
**Subject :** **ASBESTOS DISPOSAL**

**Transmitted to :** Arcadis — Ryan Janzen
329 Churchill Ave — ryan.janzen@arcadis.com
Ottawa, Ontario, K1Z 5B8 — (613) 721 0555

**Copy to :**

| | | | |
|---|---|---|---|
| **Discipline :** | | **Transmited for :** | |
| **Specification :** | 02 82 00 | **Review requested by :** | **2017-08-10** |
| **Drawings reference :** | | **Color choice :** | |
| **Transmitted as :** | | **Number of page :** | 9 including this cover |

**Sub contractor or supplier :** Qikiqtaluuk Environmental — Olivier Simard

, ,

**Manufacturer :**

**Description :** Proof of suitable arrangements for asbestos diposal

**Supplier SD No. :**
**Comments :**

**Reviewed and submitted by :**

Prepared by :
François Bourassa, P. Eng.
Project Manager
Kudlik Construction Ltd.

##
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**Comments and review by :**

Qikiqtaaluk environmental

Re: Proof of suitable arrangements for disposal of asbestos containing material, item 02 82 00

M. Bourassa,

I confirm that Qikiqtaaluk Environmental Inc. has the permits required to accept and dispose of asbestos containing materials. QE is able to accept and process a variety of hazardous materials via our hazardous materials transfer facility. QE holds all the necessary permits with the Nunavut Water Board as well as the Nunavut Ministry of Environment. Find attached a copy of our Water Board License.

If you want to visit our installation, feel free to contact us.

Local contact:

Olivier Simard
Project Manager
osimard@qenv.ca
1-867-222-8194

Please see attached copies of our licenses and permits.

Sincerely,

Benoit Dion
Director, Northern Projects
Portable: 514-718-1230
Office: 450-466-2123

# APPENDIX A
# Licenses and permits

# NUNAVUT WATER BOARD
# WATER LICENCE RENEWAL

Licence No. 1BR-THI1722

Pursuant to the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Agreement Between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in right of Canada*, the Nunavut Water Board, hereinafter referred to as the Board, hereby grants to

**QIKIQTAALUK ENVIRONMENTAL INC.**

(Licensee)

9935 AVE CATANIA, ENTRANCE 1, SUITE 200, MONTREAL, QC J4Z 3V4

(Mailing Address)

Herein after called the Licensee, the right to alter, divert or otherwise use water or dispose of waste for a period subject to restrictions and conditions contained within this Licence renewal:

| | |
|---|---|
| Licence Number/Type: | 1BR-THI1722 TYPE "B" |
| Water Management Area: | FROBISHER BAY WATERSHED (53) |
| Location: | CITY OF IQALUIT / QIKIQTANI REGION, NUNAVUT |
| Classification: | INDUSTRIAL |
| Purpose: | DEPOSIT OF WASTE |
| Quantity of Water use not to Exceed: | USE OF WATER IS NOT AUTHORIZED |
| Date of Amendment Issuance: | MAY 4, 2017 |
| Expiry of Licence: | MAY 3, 2022 |

This Licence amendment, issued and recorded at Gjoa Haven, Nunavut, includes and is subject to the annexed conditions.

**Thomas Kabloona,**
**Nunavut Water Board, Chair**

Department of Environment
Government of Nunavut

# REGISTRATION FORM
# HAZARDOUS WASTE MANAGEMENT FACILITY

## Instructions

1. The following information must be provided in order to register as a hazardous waste management facility in Nunavut and obtain a management facility number. Incomplete applications will be returned to the applicant.
2. Completed registration forms are to be forwarded to the Manager of Pollution Control, Department of Environment, Government of Nunavut, Box 1000, Station 1360, Iqaluit, Nunavut, X0A 0H0. Electronic registration forms are preferred and may be forwarded to EnvironmentalProtection@gov.nu.ca.
3. Use additional pages to provide information as required.
4. Applicants should refer to the accompanying users' guide for further assistance on completing the management facility registration form.

## Section 1 - Identification

Applicant (Legal Name) Qikiqtaaluk Environmental Inc.

Corporate Address PO Box 1228, Building 922, Niaqunngusiaq Road, Iqaluit (Nunavut)

Postal Code X0A 0H0

Facility Address Iqaluit (Nunavut)

Postal Code X0A 0H0

Principle Contact Person Harry Flaherty

Title President

Phone 867-979-8406

Email hflaherty@qcorp.ca

Alternate Contact Person Jacques Dion

Title Vice President

Phone 514-940-3332

Email jdion@qenv.ca

## Section 2 - Description of Waste to be Managed (provide a separate table if required)

Site Location(s) where Waste is Managed Building 1571, Federal Road, corner of Kakivak Court, on Lot 3

| Shipping Name (Description) | TDG Number | TDG Class | Quantity Managed each Month (L or Kg) | Frequency of Acceptance |
|---|---|---|---|---|
| see attached list | | | | |
| | | | | |
| | | | | |
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| | | | | |

**Section 2 – Continued**

Attach a complete description of the proposed facility, safety measures, equipment and management processes to be used. Include engineered drawing where applicable.

## Section 3 - Waste Management Information

Type of Business (check all that apply) Receiver of Waste X Manage Self-generated Waste ____

Type of Activity (check all that apply) Collect and Store X Transfer X

Treat X Recycle ____ Dispose ____

Hazardous Waste Generator(s) Used Qulliq Energy Corporation, City of Iqaluit, Uqsuq Oil, small businesses, garages, schools, households

Hazardous Waste Carriers(s) Used NEAS, NSSI Veolia (Quebec), Solva-Rec (Quebec)

Do you have an approved Emergency Response and Spill Contingency Plan? Yes ____ (attach copy) No X

## Section 4 - Certification

***I certify that the information provided on this form is correct, accurate and complete.***

Signature of Contact Person [signature] Date (dd/mm/yy) 15/08/11

Print Name of Contact Person Jacques Dion Title Vice President

Phone 514-940-3332 Email jdion@qenv.ca

**For Department Use Only**
Management Facility Number NUF# 400006 Approved by [signature] Date 2011-08-23

Department of Environment
Government of Nunavut

# REGISTRATION FORM
# HAZARDOUS WASTE RECEIVER

## Instructions

1. The following information must be provided in order to register as a hazardous waste receiver in Nunavut and to obtain a receiver number. Incomplete applications will be returned to the applicant.
2. A receiver who operates a commercial business for the purpose of collecting, storing, transferring, treating, recycling or disposing of hazardous waste may be required to register the facility as a hazardous waste management facility. Refer to section 3.2.2 of the *Environmental Guideline for the General Management of Hazardous Waste* for further information.
3. Completed registration forms are to be forwarded to the Manager of Pollution Control, Department of Environment, Government of Nunavut, Box 1000, Station 1360, Iqaluit, Nunavut, X0A 0H0. Electronic registration forms are preferred and may be forwarded to EnvironmentalProtection@gov.nu.ca.
4. Use additional pages to provide information as required.
5. Applicants should refer to the accompanying users' guide for further assistance on completing the receiver registration form.

## Section 1 - Identification

Receiver (Legal Name) Qikiqtaaluk Environmental Inc.

Mailing Address PO Box 1228, Building 922, Niaqunngusiaq Road, Iqaluit (Nunavut)

Postal Code X0A 0H0

Principle Contact Person Harry Flaherty

Title President

Phone 867-979-8406

Email hflaherty@qcorp.ca

Alternate Contact Person Jacques Dion

Title Vice President

Phone 514-940-3332

Email jdion@qenv.ca

## Section 2 - Description of Waste Received (provide a separate table if required)

Site Location(s) where Waste is Received Building 1571, Federal Road, corner of Kakivak Court, on Lot 3

| Shipping Name (Description) | TDG Number | TDG Class | Quantity Received each Month (L or Kg) | Frequency of Acceptance |
|---|---|---|---|---|
| see attached list | | | | |
| | | | | |
| | | | | |
| | | | | |

Attach a brief description of the proposed facility.

## Section 3 - Waste Management Information

General Type of Business: Environmental Contractor and Consultant

General Type of Activity: Environmental site remediation and hazardous waste management

Hazardous Waste Generator(s) Used: Qulliq Energy Corporation, City of Iqaluit, Uqsuq Oil, small businesses, garages, schools, households

Hazardous Waste Carriers(s) Used: NEAS, NSSI, Veolia (Quebec), Solva-Rec (Quebec)

Hazardous Waste Management Facilities Used: Qikiqtaaluk Environmental Inc., Veolia (Quebec), Solva-Rec (Quebec)

Do you have an approved Emergency Response and Spill Contingency Plan? Yes ___ (attach copy) No X

## Section 4 - Certification

***I certify that the information provided on this form is correct, accurate and complete.***

Signature of Contact Person: [signature] Date (dd/mm/yy): 15/06/11

Print Name of Contact Person: Jacques Dion Title: Vice President

Phone: 514-940-3332 Email: jdion@qenv.ca

**For Department Use Only**
Receiver Number NUR#: 300001 Approved by: [signature] Date: 2011-08-23

Kudlik Construction Ltd.

# Transmittal

**No. :** 012
**Rev. :** 00
**Date :** 2017-08-04

**Project :** METAL DUMP REMEDIATION, IQALUIT
R.083118.001
**Project No.:** 2017-093

**Subject :** ENVIRONMENTAL PROTECTION PLAN

**Transmitted to :**
Arcadis
329 Churchill Ave
Ottawa, Ontario, K1Z 5B8

Ryan Fletcher
Ryan.Fletcher@arcadis.com
(613) 721 0555

**Copy to :**

**Discipline :**
**Specification :** 01 35 43
**Drawings reference :**
**Transmitted as :**

**Transmited for :**
**Review requested by :** **2017-08-14**
**Color choice :**
**Number of page :** 21 including this cover

**Sub contractor or supplier :**
Kudlik Construction Ltd
1519 Federal Roal
Iqaluit, Nu, X0A 0H0

François Bourassa
fbourassa@kudlik.biz
867-979-1166

**Manufacturer :**

**Description :** Environmental protection plan

**Supplier SD No. :**
**Comments :**

**Reviewed and submitted by :**

Prepared by :
François Bourassa, P. Eng.
Project Manager
Kudlik Construction Ltd.

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**Comments and review by :**

Kudlik Construction Ltd.
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# ENVIRONMENTAL PROTECTION PLAN

Remediation at Former Metal Dump and Community Landfill
Iqaluit, Nunavut

Project No R.083118.001
Contract No: EW699-180040/001/NCS

Submitted to

Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

# TABLE OF CONTENTS


PAGE

**1. INTRODUCTION ..... 1**

**2. PERSONNEL AND TRAINING ..... 2**

2.1 PERSONNEL QUALIFICATION ..... 2
2.2 TRAINING ..... 2

**3. EROSION AND SEDIMENT CONTROL ..... 3**

3.1 SITE GENERAL DESCRIPTION ..... 3
3.2 CONSTRUCTION SITE ..... 3
3.3 SENSITIVE OPERATIONS ..... 4
*3.3.1 Road construction ..... 4*
*3.3.2 Excavation of contaminated soils and buried debris ..... 5*
*3.3.3 Excavation Consolidation and Transportation of PCB Contaminated Sediment ..... 5*

**4. TRAFFIC CONTROL ..... 6**

4.1 TRAFFIC CONTROL ON MUNICIPALITY ROADS ..... 6
4.2 TRAFFIC CONTROL ON SITE ROAD ..... 6

**5. SPILL CONTROL PLAN ..... 8**

5.1 RESPONSE EQUIPMENT ..... 8
5.2 GENERAL PROCEDURES IN CASE OF SPILL ..... 8
5.3 SPECIFIC PROCEDURES IN CASE OF SPILL ..... 9
*5.3.1 Spill on land ..... 9*
*5.3.2 Spill on ice and snow ..... 9*
*5.3.3 Spill on Muskeg ..... 10*
*5.3.4 Spill in water ..... 10*
*5.3.5 Spill in rivers and streams ..... 10*
5.4 REPORTING ..... 10

**6. POLUTION AND CONTAMINANT PREVENTION ..... 12**

6.1 NON-HAZARDOUS SOLID WASTE DISPOSAL ..... 12
6.2 HAZARDOUS WASTE DISPOSAL ..... 12
6.3 SOIL POLUTION ..... 12
6.4 AIR POLLUTION ..... 12
6.5 WATER POLLUTION ..... 12
6.6 WASTE WATER MANAGEMENT ..... 13

**7. RELICS AND ANTIQUITIES ..... 14**

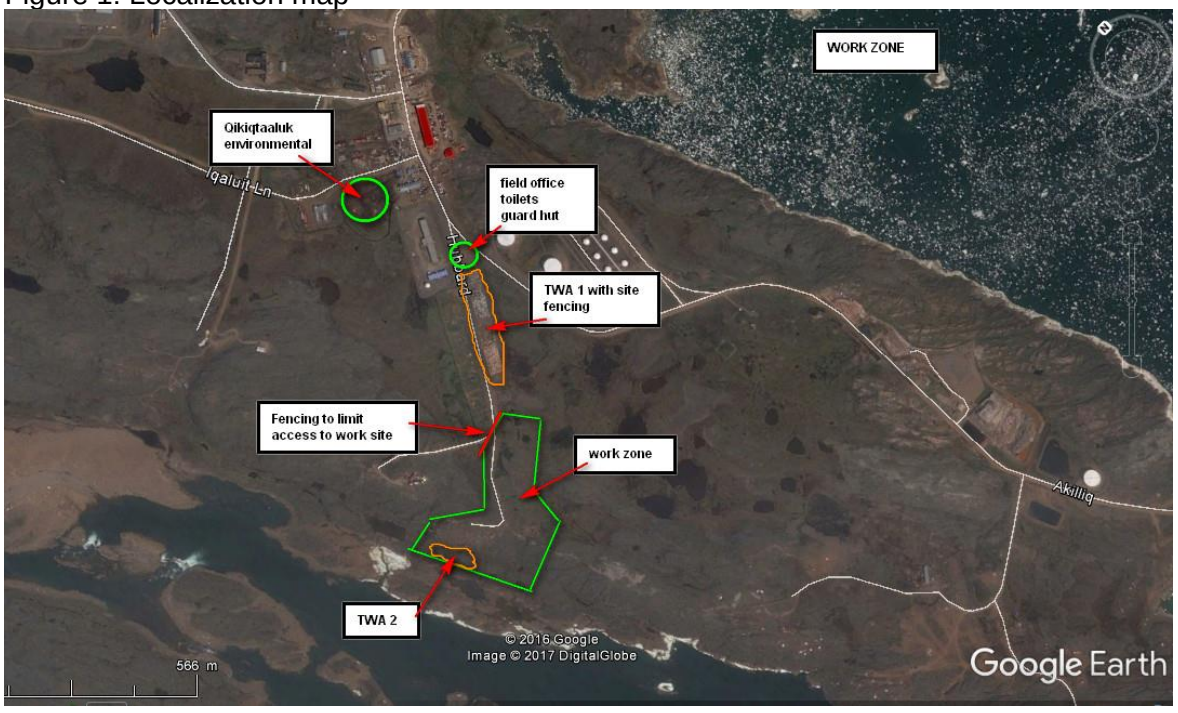
Appendix 1: NWT-NU Spill Report
Appendix 2: Emergency phone numbers

# 1. INTRODUCTION

This Environmental Protection Plan (EPP) has been prepared to minimize or avoid potential adverse environmental impacts associated with the remediation of the metal dump in Iqaluit. The plan describes environmental protection measures that will limit the environmental disturbances associated with all project activities. These measures are considered appropriate for known and anticipated situations and conditions. However, should certain procedures or protection measures proved insufficient or inadequate in field situations, appropriate modifications or substitutions will be proposed in order to correct the situation.

All works will be performed in accordance with all applicable environmental laws, regulations and requirements of Federal, territorial and other regional authorities. All project activities will also be performed in accordance with the Water Use License and the Land Use Permit.

Figure 1: Localization map



# 2. PERSONNEL AND TRAINING

## 2.1 PERSONNEL QUALIFICATION

Most of our personnel assigned to the actual project have been involved on major environmental remediation projects. The crew is well trained in regards to the environmental protection and for spill emergency response. The following employees are responsible for training the on-site personnel, for ensure adherence to the Environmental Protection Plan and for manifesting hazardous waste to be removed from site:

- Gaston Martin, Site superintendent
- Olivier Simard, environmental technician
- Martin Lemay, hazardous waste specialist

## 2.2 TRAINING

All employees assigned to this project will attend to the safety and tool box meetings. The environmental protection plan will be presented and explained to everyone at the orientation meeting. The safe operation of all vehicles, equipment and tools will be enforced, as well as the safely handling of materials in order to prevent and mitigate environmental impacts and to respond adequately to any spill event. A spill response team will be setup and training will be done through daily tool box meetings.

# 3. EROSION AND SEDIMENT CONTROL

## 3.1 SITE GENERAL DESCRIPTION

The Iqaluit Former Metal Dump/Community Landfill (UTM coordinates of E521904.94, N7067812.69) is located at the West 40 area on the border of Sylvia Grinnell Territorial Park and the Sylvia Grinnell River, 1.7 km southwest of the City of Iqaluit. Historically, the site has been referred to as Sylvia Grinnell Park Dump and West 40 – Dump Site #1 and Vehicle Dump and Community Landfill or simply “Site” or “Landfill”. The United States Air Force (USAF) used the site from between 1955 to 1963 as a metal dump for vehicles, truck bodies, barrels and scrap metal. The majority of materials were deposited in 1963 when the US Military left Frobisher Bay. Shops, buildings, and other materials were simply bulldozed over the cliff. The cliff is a bedrock outcrop rising approximately 30 m above the tidal area where the Sylvia Grinnell River meets Frobisher Bay. The area to the north side of the slope was used by the USAF and to a lesser degree the community of Iqaluit as a landfill site for household garbage until sometime in the1970’s.

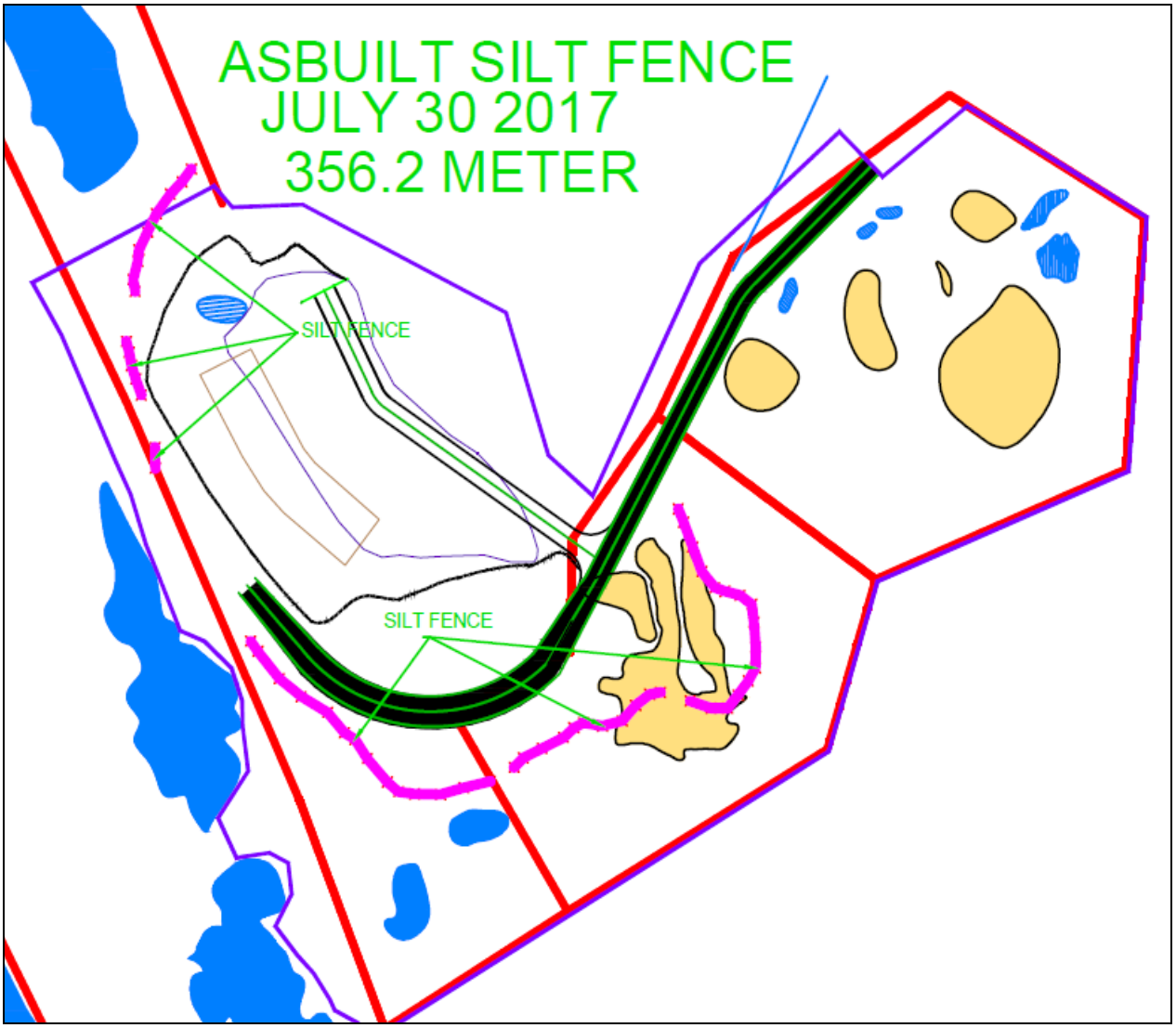
Three main areas of waste are present at the Site: 1) the up-gradient partially buried debris area (AEC-1) 2) the vehicle dump located approximately to the south and parallel with the main landfill (AEC-2) and 3) the main landfill area located in the central portion of the site and spanning the top, side and toe of a bedrock escarpment that runs northwest/southeast (AEC-3).

The Sylvia Grinnell River is the principal drainage system in the region which discharges into Frobisher Bay. The natural drainage around the area is influenced by the bedrock structure and numerous small, elongated ponds that have formed along fault lines and joints.

## 3.2 CONSTRUCTION SITE

In order to prevent runoff of silt through existing drainage paths, a total length of 356 meters of silt fences were installed on the construction site, as presented in the Figure 1. The silt fences will be frequently inspected to make sure that are efficient.

FIGURE 1: Silt fence installation at the construction site




## 3.3 SENSITIVE OPERATIONS

### 3.3.1 Road construction

During the road construction, ditches must be dug on the side of the road and one culvert must be installed. To prevent siltation in the existing drainage paths, the diches must be excavated from the downgradient side firstly. Before joining the new ditches to the existing one, the erosion protection made with geotextile covered with riprap must

have been installed in the new ditch section. According to the flow rate, siltation pounds or silt fence might have to be installed at the exit of the new ditch section.

### 3.3.2 Excavation of contaminated soils and buried debris

Even if all excavations to perform are shallow, erosion can occurs in the surrounding area. Before starting an excavation, if present, water will have to be drained out from the area. The discharge point of pumped water will have to be selected carefully and depending of where the water is discharge, erosion protection might be needed. Once completed, the excavation will be kept open until soil samples analyses show that no further contaminated soil exist. The excavations may be filled with water when analyses will become available. Same care will have to be taken to remove water from the hole. The excavation will be backfilled with appropriate granular material and the area will be reshaped to promote positive drainage.

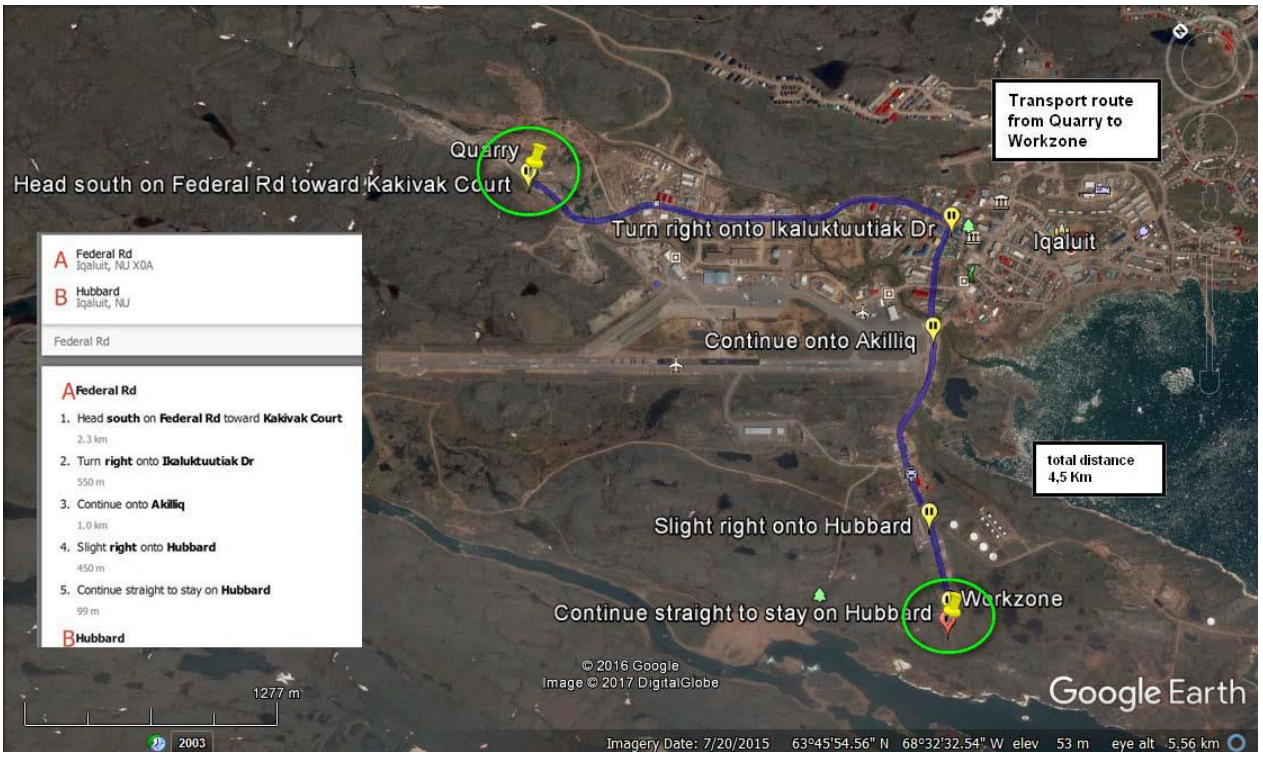
### 3.3.3 Excavation Consolidation and Transportation of PCB Contaminated Sediment

The removal of the 100 $m^3$ of PCB's contaminated sediments identified in the AEC-2 will require the construction of a temporary access road. In addition, the stream where the sediments must be removed, will have to be dried out before doing any work. The water flow will be blocked with a temporary dam at the head of the working area and cumulated in a temporary basin. In the case where the volume of water would become too high, it will be pumped in a sedimentary basin located below the work area. The soil will be excavated to the limit and the depth indicated by the departmental representative, loaded into off road dump trucks and transported off-site. Once it will has been confirmed that all contaminated sediment have been removed, the erosion protection made with geotextile covered with riprap will be installed in the excavated stream bed. Once completed, water accumulated upstream will be slowly released.

# 4. TRAFFIC CONTROL

## 4.1 TRAFFIC CONTROL ON MUNICIPALITY ROADS

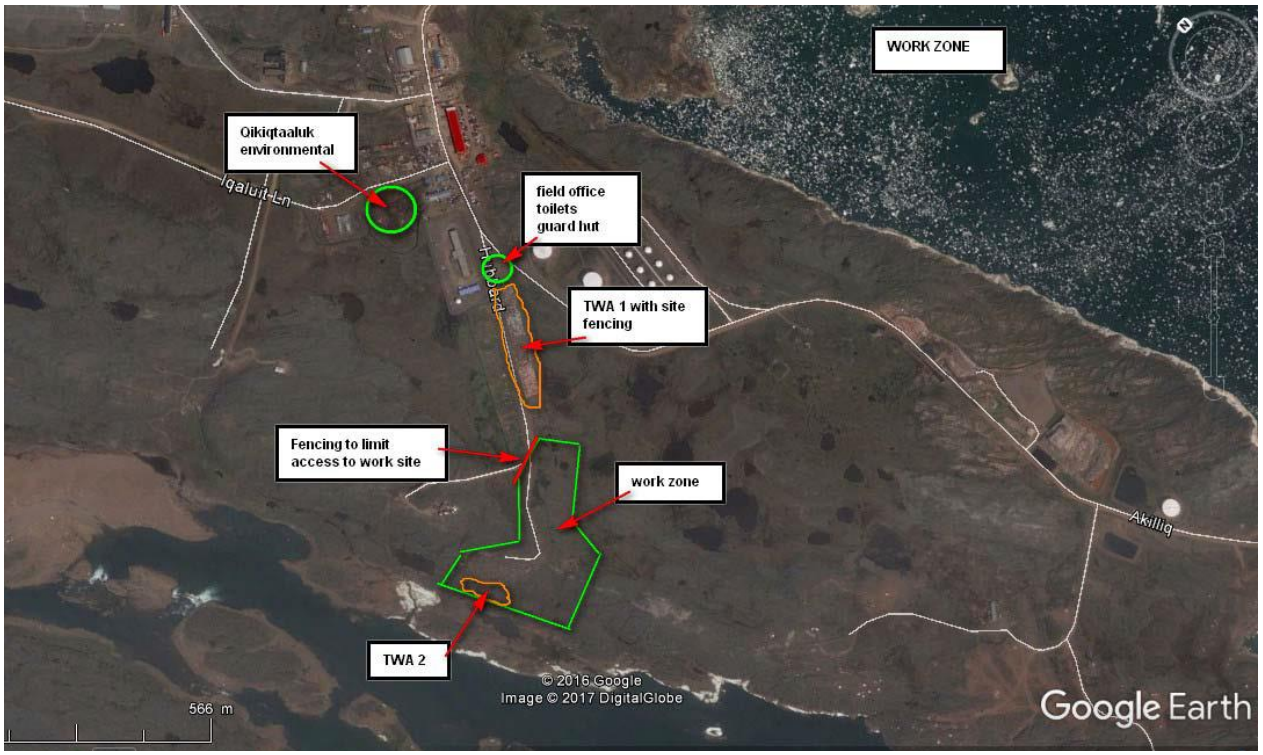
The traffic control for this project can be separated in two sections. The first one is the hauling of the granular material from the Quarry to the work Area. This will be done with 10 wheeled dump trucks circulating on the City roads. The drivers will adhere to the general traffic laws and safety. The speed limit will be enforced by the site supervisor. The city of Iqaluit, the RCMP and the local police will be contacted. If any concerns are expressed by the authorities, proper mitigation measures will be taken.




## 4.2 TRAFFIC CONTROL ON SITE ROAD

The second section of traffic control will take place inside of the work area that includes the temporary work area 1, the temporary work area 2 and the road in between. This road will be maintained during our operations in order to facilitate the transportation. The maximum speed limit will be establish to 40 km/hr and might be lowered when weather conditions deteriorate. The wet weather episode could create some erosion of the roadbed. The road conditions will be monitored and if it becomes unsafe or

excessing rutting occurs, the use of a grader or other appropriate machinery will be used to address the problem.



# 5. SPILL CONTROL PLAN

## 5.1 RESPONSE EQUIPMENT

One complete emergency spill kits will be installed at the following location:

- Construction site
- Staging area
- Borrow area

Each kit is made of the following items and stored into a 55 gallons plastic drum:

- 5 Tyveck coveralls
- 10 pairs of disposable gloves
- 2 x 100 absorbent pad packs
- 1 x 20kg granular absorbent bag
- 4 x 2” diam. Floating absorbent booms
- 10 yellow storage bags
- One shovel

The following additional environmental supplies will be left in the container identified 254 162-3:

- 100 mm diameter hydrophobic sorbent booms
- Silt fences
- Hydrocarbon absorbent pads
- Hydrocarbon absorbent rolls
- All purposes organic absorbents
- Empty drums
- Pumps
- Bags
- Tarps
- Shovels and rakes
- PPE

## 5.2 GENERAL PROCEDURES IN CASE OF SPILL

This general procedure is to be followed in the event of a spill. Steps are listed in the order of importance; however, depending on the circumstances, conditions, and potential injuries, this order may need to be altered to meet specific needs.

1. Identify the product spilled and call for help:

Petroleum products on site are arctic diesel, gasoline and lubricants. Advise as soon as possible the site superintendent and call for help when needed.

2. Assessment of dangers and hazards:

Immediate determinations must be made about the direction of the spill's progress, whether downhill, on the ice, towards the water, or already in the water. As well, careful attention will be paid to the full nature of the incident; is this solely a surface contaminant, or are fumes an additional factor; are there any injuries current or possible.

3. Stop the flow at source:

Has the flow been stopped or is it still leaking? Is there an emergency Shut-off valve? Have holes in the container been patched? Is the container empty? PRECAUTION: ONLY ATTEMPT TO STOP THE FLOW IF IT IS SAFE TO DO SO.

4. Take actions to contain the spill:

Prompt containment can reduce environmental exposure and risk. Containment measures may be land or water based. Land based measures include application of sorbents, construction of berms and diversion/collection trenches. Water based measures could include dams, dykes, and floating booms.

## 5.3 SPECIFIC PROCEDURES IN CASE OF SPILL

### 5.3.1 Spill on land

- Do not flush into ditches or drainage systems.
- Block entry into waterways and contain with earth, snow or other barrier.
- Remove small spills with sorbent pads.
- On tundra, collect as much contamination as possible while to the maximum extent practicable minimizing destruction of the root zone of the tundra grasses.

### 5.3.2 Spill on ice and snow

- Block entry into waterways and contain with snow or other barrier.
- Remove minor spills with sorbent pads and/or snow.
- Use ice augers and pump to recover diesel under ice.

- Slots in ice can be cut over slow moving water to contain oil.
- Burn accumulated diesel from the surface using Tiger Torches if feasible and safe to do so.

### 5.3.3 Spill on Muskeg

- Do not deploy personnel and equipment on marsh or vegetation.
- Remove pooled diesel with pumps and skimmers.
- Flush with low pressure water to herd diesel to collection point.
- Burn only in localized areas, e.g., trenches, piles or windrows.
- Do not burn if root systems can be damaged (low water table).
- Minimize damage caused by equipment and excavation.

### 5.3.4 Spill in water

- Contain spill as close to release point as possible.
- Use spill containment boom to concentrate slicks for recovery.
- On small spills, use sorbent pads to pick up contained oil.
- On larger spills, use skimmer on contained slicks.
- Do not deploy personnel and equipment onto mudflats or into wetlands

### 5.3.5 Spill in rivers and streams

- Prevent entry into water, if possible, by building berm or trench.
- Intercept moving slicks in quiet areas using (sorbent) booms.
- Do not use sorbent booms/pads in fast currents and turbulent water.

## 5.4 REPORTING

All spills must be reported to Kudlik management, to Dillon consulting and to the client. For every spill, the attached form “NWT-NU Spill Report” must be filled. Pictures must be taken during and after the cleanup progress. The GPS coordinates of the spill location must be recorded. All information and pictures will be used for the spill report. Any spill graters than 100 litres must be reported the Nunavut 24-hours spill report line (see emergency phone number list). The person reporting the spill shall give as much of the following information as possible. Please note that the operators at the Hotline are NOT spill management experts. They can only relay information to the appropriate authorities/protection agencies. Reportable information includes but is not limited to the following:

- Date and time of spill;
- Direction spill is moving (or if it has stopped);
- Name and phone number of persons close to the location of the spill;
- Type of contaminant spilled and quantity spilled;

- Cause of spill;
- Whether the spill is continuing or has stopped;
- Description of the existing containment;
- Actions taken to recover, clean-up and dispose of spilled contaminant;
- Name, address and phone number of person reporting the spill;
- Name of person in charge of management or control at time of spill;

# 6. POLUTION AND CONTAMINANT PREVENTION

## 6.1 NON-HAZARDOUS SOLID WASTE DISPOSAL

All non-hazardous solid waste collected during the site remediation will be disposed at the AEC-3 landfill.

## 6.2 HAZARDOUS WASTE DISPOSAL

All hazardous waste found during the site remediation will be collected and packaged for off-site disposal.

## 6.3 SOIL POLUTION

The known contaminated soil will be excavated to the limits and depths indicated on drawings. According to the analytical results, the excavated soil will be used as intermediate cover on each debris layers at the BD3-landfill, transported to the Iqaluit treatment facilities or ship off-site for final disposal. The contaminated soil be excavated and transported in a way to prevent cross contamination and spills. The excavator will be staying outside of the limits of the contaminated soil areas and the soil will be loaded into leak proof dump truck boxes. Any soil contaminated by fluid spill from our equipment will be collected and addressed properly by the hazardous waste specialist.

## 6.4 AIR POLLUTION

All of our equipment and vehicles are equipped with regulated anti-pollution system. When dry weather conditions occur during a long period, dust could be generated along the haul road and at the construction site. In this case, water will be spread on the road and at the site to reduce the dust production.

## 6.5 WATER POLLUTION

There is mainly 3 potential sources of water pollution that could occur during the site remediation. The first one is from the fine material as silt that could travel within the on-site water drainage. This was already addressed in the section 3 through our erosion and sediment control prevention measures. The second type of water pollution that

could possibly occur is from a spill from our equipment. This was already addressed in the section 5. The last source of potential water pollution could come from the excavation activities where soils containing heavy metals, petroleum hydrocarbons and PCB's can be found. Unless no other methodology is possible, the water will be kept out of contact during the contaminated soils excavation. Any water generated during these activities will be addressed according to the water licence conditions.

## 6.6 WASTE WATER MANAGEMENT

No waste water will be generated by the construction activities.

# 7. RELICS AND ANTIQUITIES

Any relic antiquities and items of historical or scientific interest such as, but not limited to, cairns, tent rings, commemorative plaques, inscribed tablets, and similar objects that could be found must be protected. In the event of any of such items is discovered, the following procedures must be followed:

- Cease work immediately
- Report discovery of archaeological or artefacts to the site superintendent and the local authorities;
- Do not disturb archaeological sites or artefacts discovered until appropriate authorities are notified;
- Do not resume activities in the vicinity of the find until confirmation and direction from appropriate authorities is received

# APPENDIX 1
# NWT-NU Spill Report Form

# NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

| | | | | |
|---|---|---|---|---|
| | | | | REPORT LINE USE ONLY |
| A | REPORT DATE: MONTH – DAY – YEAR | REPORT TIME | ☐ ORIGINAL SPILL REPORT, OR | REPORT NUMBER - |
| B | OCCURRENCE DATE: MONTH – DAY – YEAR | OCCURRENCE TIME | ☐ UPDATE # TO THE ORIGINAL SPILL REPORT | |
| C | LAND USE PERMIT NUMBER (IF APPLICABLE) | WATER LICENCE NUMBER (IF APPLICABLE) | | |
| D | GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM THE NAMED LOCATION | REGION ☐ NWT ☐ NUNAVUT ☐ ADJACENT JURISDICTION OR | | |
| E | LATITUDE DEGREES MINUTES SECONDS | LONGITUDE DEGREES MINUTES SECONDS | | |
| F | RESPONSIBLE PARTY OR VESSEL NAME | RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION | | |
| G | ANY CONTRACTOR INVOLVED | CONTRACTOR ADDRESS OR OFFICE LOCATION | | |
| H | PRODUCT SPILLED | QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES | U.N. NUMBER | |
| | SECOND PRODUCT SPILLED (IF APPLICABLE) | QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES | U.N. NUMBER | |
| I | SPILL SOURCE | SPILL CAUSE | AREA OF CONTAMINATION IN SQUARE METRES | |
| J | FACTORS AFFECTING SPILL OR RECOVERY | DESCRIBE ANY ASSISTANCE REQUIRED | HAZARDS TO PERSONS, PROPERTY OR ENVIRONMENT | |
| K | ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS | | | |

| | | | | | |
|---|---|---|---|---|---|
| L | REPORTED TO SPILL LINE BY | POSITION | EMPLOYER | LOCATION CALLING FROM | TELEPHONE |
| M | ANY ALTERNATE CONTACT | POSITION | EMPLOYER | ALTERNATE CONTACT LOCATION | ALTERNATE TELEPHONE |

| | | | | | |
|---|---|---|---|---|---|
| **REPORT LINE USE ONLY** | | | | | |
| N | RECEIVED AT SPILL LINE BY | POSITION **Station operator** | EMPLOYER | LOCATION CALLED **Yellowknife, NT** | REPORT LINE NUMBER **(867) 920-8130** |

| | | |
|---|---|---|
| LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED |

| AGENCY | CONTACT NAME | CONTACT TIME | REMARKS |
|---|---|---|---|
| LEAD AGENCY | | | |
| FIRST SUPPORT AGENCY | | | |
| SECOND SUPPORT AGENCY | | | |
| THIRD SUPPORT AGENCY | | | |

Page 1 of

# APPENDIX 2
# Emergency phone numbers

EMERGENCY PHONE NUMBERS

| ORGANISATION | NAME | PHONE (BUSINESS HOURS) | PHONE (AFTER HOURS) |
|---|---|---|---|
| KUDLIK IQALUIT | Main office | (867) 979-1166 | |
| | François Bourassa Project Manager | (418) 930-0850 | |
| | Melissa Parent supervisor | (418) 953-2910 | |
| | Gaston Martin, Superintendent | (867) 979-1166 | |
| RCMP | | (867) 979-0123 | |
| HEALTH CENTRE | Qikitani hospital | (867) 975-8600 | |
| FIRE DEPARTMENT | | (867) 979-4422 | |
| CITY OF IQALUIT REPRESENTATIVE | | 867-979-6363 | |
| WORKERS COMPENSATION BOARD NUNAVUT AND NWT | | (867) 979-8500 | |
| 24 HOUR SPILL LINE NW/NUNAVUT | | (867) 920-8130 | |
| ENVIRONMENT CANADA, ENVIRONMENTAL PROTECTION BRANCH, IQALUIT, SID BRUINSMA | | (867) 645-3739 | |

# APPENDIX C

## Weekly Construction Reports

# Daily Operations Report

Date: 24-Jul-17 Monday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF/RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 10 | Condition: | Sun and cloud |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen (RJ) | Arcadis | Departmental Representative |
| Ryan Fletcher (RF) | Arcadis | Departmental Representative |
| Jean-David Laberge (JL) | Kudlik | Project Manager |
| Maxime Gaudreau (MG) | Kudlik | Project Manager |
| Gaston Martin (GM) | Kudlik | Superintendent |
| | | |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 8:00 | RJ and RF mobilized to Iqaluit |
| 13:00 | Arrived iun Iqaluit and located accomodations and rental vehicle |
| 14:00 | RJ and RF met with Kudlik at the site for a brief introduction and general site walk through. Discussed slight re-alignment of municipal road access through AEC-1 (field fit), and road upgrades in this area. |
| 15:30 | Picked up shipped supplies at Canadian North Cargo - everything arrived as scheduled |
| | |
| | The remainder of the day was spent setting up the Arcadis mobile office and shopping for extra required equipment and supplies |
| | |
| | |
| | |
| | |
| | |

| Health and Safety |
|---|
| No health and safety concerns or issues today |

| Aggregate Summary | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 0 | |
| Type 2 | 0 | 0 | |
| Type 3 | 0 | 0 | |
| Type 4 | 0 | 0 | |

| Comments: |
|---|
| |
| |

Photo Log Follows Weekly Report:

# Daily Operations Report

Date: 25-Jul-17 Tuesday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF/RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 10 | Condition: | Sun and cloud |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen (RJ) | Arcadis | Departmental Representative |
| Ryan Fletcher (RF) | Arcadis | Departmental Representative |
| Andre Aubry | Kudlik | operator |
| Danik Mazerolle | Kudlik | surveyor |
| Nicholas Bouchard | Kudlik | labourer |
| Gaston Martin (GM) | Kudlik | Superintendent |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 8:00 | Shopping for remaining field supplies and some administrative office work in the am |
| 11:00 | RF and RJ on site. Confirmed the staked out locations of soil impacts and road allowances. Arcadis marked all exposed metal debris as lead amended or acceptable for placement in landfill. Arcadis utilised field lead paint testing kits to characterize any unknown or suspect paint encountered. Metal debris as marked with red (lead amended) or green (acceptable for landfill). |
| 11:00 | Kudlik worked the am hauling aggregate to the temporary work area (TWA)#1 near the site office. This area will be used to sort and containerize lead ammended painted materials. |
| 14:30 | Kudlik began hauling road base to begin the construction of the site access road. Worked on access road construction until the end of the day. |
| 18:00 | off-site |
| | |
| | |
| | |
| | |
| | |
| | |

| Health and Safety |
|---|
| No health and safety concerns or issues today |

| Aggregate Summary | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 0 | |
| Type 2 | 249 | 249 | |
| Type 3 | 0 | 0 | |
| Type 4 | **0** | **0** | |

| Comments: |
|---|
| Kudlik removed any debris present (in the way of the access road) and placed to the side prior to laying down any aggregate material. |
| |

Photo Log Follows Weekly Report:

# Daily Operations Report

Date: 26-Jul-17 Wednesday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF/RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 7 | Condition: | Sun and cloud, light wind |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen (RJ) | Arcadis | Departmental Representative |
| Ryan Fletcher (RF) | Arcadis | Departmental Representative |
| Andre Aubry | Kudlik | operator |
| Danik Mazerolle | Kudlik | surveyor |
| Nicholas Bouchard | Kudlik | labourer |
| Gaston Martin (GM) | Kudlik | Superintendent |
| truck drivers | Kudlik | |
| | | |

| Summary of Work Activities | |
|---|---|
| 7:00 | Began work on access road culvert installation and continued working TWA#1 grading and compacting with a roller compactor |
| 11:00 | RF and RJ attended project kick off meeting and conducted some administrative tasks |
| 11:30 | Completed the culvert installation |
| 13:00 | Kudlik continued the construction of the access roadway |
| | Main access road (from the intersection to the landfill access road) was re-graded and re-tamped and completed at 16:30 |
| 13:30 | RF and RJ marked out areas of silt fence installation and AEC 2 exclusion zones with flags in the field. Also provided copies of CBC article on the job and |
| 18:00 | off-site |
| | |
| | |
| | |
| | |
| | |

**Health and Safety**

No health and safety concerns or issues today. Work around excavators and heavy equipment while installing the culvert. Good communications and safety precaustions were observed.

Site signage was installed and site access restrictions were also discussed and Kudlik indicated they are to be installed tomorrow.

| Aggregate Summary | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 0 | |
| Type 2 | 291 | 540 | |
| Type 3 | 0 | 0 | |
| Type 4 | 60 | 60 | |

| Comments: |
|---|
| Culvert was installed as per contract documents |
| The installation of silt fencing was discussed with Kudlik and is to begin the installation tomorrow |
| Water truck worked and kept roadway wetted for dust control during activities today |
| |
| |

# Daily Operations Report

Date: 27-Jul-17 Thursday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF/RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 3-Feb | Condition: | rain with high winds 40-60 km/h |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen (RJ) | Arcadis | Departmental Representative |
| Ryan Fletcher (RF) | Arcadis | Departmental Representative |
| Andre Aubry | Kudlik | operator |
| Danik Mazerolle | Kudlik | surveyor |
| Colin Kanayuk | Kudlik | labourer (Inuk) |
| Peter Shaimaiyuk | Kudlik | labourer (Inuk) |
| Gaston Martin (GM) | Kudlik | Superintendent |
| truck drivers | Kudlik | |
| Jean-Christophe Lambert | Kudlik | Operator |

| Summary of Work Activities | |
|---|---|
| 7:00 | H&S meeting |
| 7:15 | Continued hauling type 2 agregate and constructing access road A. Two labourers on site to help install silt fence between AEC 1 and AEC 2 |
| 10:15 | Kudlik began excavating previously identified PHC soil zone in AEC 2 at the curve of the existing roadway. The excavated material was heavily mixed with landfill debris of all sorts from industrial metal to domestic waste. This material was stored on top of the landfill embankement in AEC 3. Prior to excavation, the large waste items were segregated and stored in AEC 3 in a seperate pile using the excavator and thumb. Some material manually sorted by labourers. It was noted by RF and RJ that no real soil was present in the mixture, as it was mostly landfill waste and debris. The area was excavated to bedrock and RF/RJ gave Kudlik the go ahead to backfill and continue roadway construction, as no floor samples were required. |
| 15:30 | RF/RJ had a discussion with Kudlik about the specifications regarding the compaction of the type 2 material. Kudlik is of the opinion that this material does not require compaction. Based on time restraints, RJ gave the okay for Kudlik to commence with the placement of type 4 capping material on the current roadway without compaction testing the type 2 road base material as Arcadis believed the compaciton to be adequate. |
| 16:00 | Kudlik began top coating the access road to the top of the crest at AEC 3 to the end of the day. Alternating lifts of type 4 aggregate with grading and compacting using the roller compactor. |
| 18:00 | off-site |

| Health and Safety |
|---|
| Cold and high winds today. Machinery operators had decreased visibility; therefore extra care was required while walking the site. Slippery surfaces. |

| Aggregate Summary | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 0 | |
| Type 2 | 465 | 1005 | For access road base to top of landfill |
| Type 3 | 0 | 0 | |
| Type 4 | 150 | 210 | For access road A topping to top of landfill |

| Comments: |
|---|
| |
| |

# Daily Operations Report

ARCADIS Design & Consultancy for natural and built assets

Date: 28-Jul-17 Friday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF/RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 5 | Condition: | Overcast, drizzle, light to moderate wind. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen (RJ) | Arcadis | Departmental Representative |
| Ryan Fletcher (RF) | Arcadis | Departmental Representative |
| Andre Aubry | Kudlik | Equipment Operator |
| Danik Mazerolle | Kudlik | Surveyor |
| Gaston Martin (GM) | Kudlik | Superintendent |
| Bernard Coutu | Kudlik | Welder/Labourer |
| Jean-Christophe Lambert | Kudlik | Equipment Operator |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Peter Shaimaiyuk (Inuk) | Kudlik | Labourer |
| Martin Tremblay | Kudlik | H&S Officer |

| Summary of Work Activities | |
|---|---|
| 6:45 | H&S/daily briefing. There will be no material deliveries today while Kudlik repairs the municipal roads. |
| 7:00 | Arcadis on site. Observed tri-lingual signage was installed and spill kit signage installed. |
| 7:20 | Kudlik on site, installing more silt fencing. |
| 8:30 | Kudlik H&S officer on site (Martin Tremblay) to do a Planned Job Observation (PJO) inspection of the workers and site conditions. |
| 8:50 | Danik on site to conduct survey work and confirm road alignment. |
| | Excavator conducted some preliminary material consolidation in AEC 1 on one of the mounds. Care was taken to avoid any waterways and ponded areas. |
| 1200 | Kudlik offsite for lunch. RF at airport for flight back to Ontario. |
| 1300 | Kudlik returns to site. Shaping, compacting Road A shoulder with excavator. Silt fence installation at bottom of AEC-3. |
| 1430 | Andre offsite. |
| 1450 | RCMP visits site to enquire about activities. |
| 1800 | All off site. |

| Health and Safety |
|---|
| Discussed eye protection, equipment and vehicle safety/cleanliness, no smoking in equipment, equipment checks, and bad road conditions. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 0 | |
| Type 2 | 0 | 1005 | |
| Type 3 | 0 | 0 | |
| Type 4 | 0 | 210 | |

| Comments: |
|---|
| Slow day today. |
| |

# Daily Operations Report

Date: 29-Jul-17
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 7 | Condition: | Sun and cloud, moderate winds. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen (RJ) | Arcadis | Departmental Representative |
| Gaston Martin (GM) | Kudlik | Superintendent |
| Danik Mazerolle | Kudlik | Surveyor |
| Andre Aubry | Kudlik | Equipment Operator |
| Nicolas Bouchard | Kudlik | Equipment Operator |
| | | |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Daily briefing. The new H&S Officer (covering for Melissa while she is on vacation) is introduced to the group. Kudlik will finish regrading the municipal road; deliveries to site are expected to resume around 0900. |
| 0930 | Kudlik equipment operators on site. Compacting road. |
| 1000 | Geotextile delivered to site in Desgagnes sea can. |
| 1035 | Material deliveries begin. Four truck rotation dumping at the crest of the hill. Dozer spreads, compactor compacts. |
| 1150 | Kudlik off site for lunch. |
| 1300 | Kudlik back on site. Continue hauling, spreading, compacting. Danik on site to confirm targets. |
| 1350 | Access road gate assembled at top of AEC-1. Site office moved to top of AEC-1 as well. |
| 1720 | Spill kit relocated to crest of hill, beside work area. |
| 1800 | All off site. |

| Health and Safety |
|---|
| Kudlik briefing introduces new H&S Officer. Gives a rundown of where to find information, etc. |
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 0 | |
| Type 2 | 411 | 1416 | |
| Type 3 | 0 | 0 | |
| Type 4 | 36 | 246 | |

| Comments: |
|---|
| Road A construction continues. Lovely day. |
| |

Photo log follows.

# Daily Operations Report

Date: 30-Jul-17
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 5 | Condition: | Foggy morning, becomes overcast. Moderate to heavy winds. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen (RJ) | Arcadis | Departmental Representative |
| Gaston Martin (GM) | Kudlik | Superintendent |
| Danik Mazerolle | Kudlik | Surveyor |
| Andre Aubry | Kudlik | Equipment Operator |
| Nicolas Bouchard | Kudlik | Equipment Operator |
| | | |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Daily briefing. Health and safety moment/topic and the daily tasks for different crews. |
| 0900 | Kudlik on site. Work starts later today, equipment was needed elsewhere to finish a small job at the dump. |
| 0930 | First load (Type 2) arrives. Initially just trucks dumping, building a stockpile. |
| 1020 | Dozer back on site and spreading the stockpile down the slope. |
| 1030 | Compactor operating as well. Roadbase progressing down the slope. |
| 1140 | Kudlik off site for lunch. |
| 1300 | Work resumes. DFO agent is on site, she has some fish survey locations to check in the river adjacent the site. She asks a couple questions about the nature of the work, procedures. Expresses the opinion that the project is a good one. |
| 1415 | Heavy winds and fog beginning to set in. Work continues steadily throughout conditions. |
| 1750 | All off site. |
| | |

| Health and Safety |
|---|
| Kudlik briefing focus was on refuelling safety and procedures. Additional note to the truck drivers to drive more slowly, for safety and to avoid excessive road degradation. |
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 0 | |
| Type 2 | 636 | 2052 | |
| Type 3 | 0 | 0 | |
| Type 4 | 0 | 246 | |

| Comments: |
|---|
| First lift of Type 2 aggregate is about halfway down the slope at the end of the day. |
| |

Photo log follows.

# Daily Operations Report

Date: 31-Jul-17
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 8 | Condition: | Sun and cloud, moderate winds |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen (RJ) | Arcadis | Departmental Representative |
| Gaston Martin (GM) | Kudlik | Superintendent |
| Danik Mazerolle | Kudlik | Surveyor |
| Andre Aubry | Kudlik | Equipment Operator |
| Nicolas Bouchard | Kudlik | Equipment Operator |
| | | |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Extended safety briefing on Mondays. A 20 minute powerpoint and video on truck maintenance and checks. Job briefing: Type 2 material delivery again all day today. |
| 0715 | Equipment operators arrive on site. |
| 0730 | Danik on site to verify grades and provide targets. |
| 0750 | First load of Type 2 material arrives. Delivery, spreading and compacting all day. |
| 0940 | First lift now extends to the bottom of the slope. |
| 1100 | RJ to site office for weekly construction meeting. |
| 1145 | Kudlik off site for lunch. |
| 1315 | Kudlik returns to site, Type 2 material deliveries resume. |
| 1750 | All off site. |
| | |

| Health and Safety |
|---|
| Extended Kudlik briefing today. Video dealing with proper checks for key components. |
| Slope limiters are present in the newer equipment (e.g. compactor). |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 0 | |
| Type 2 | 891 | 2943 | There will be a lot of this. |
| Type 3 | 0 | 0 | |
| Type 4 | 0 | 246 | |

| Comments: |
|---|
| Pleased to find there are slope limiters on equipment. The equipment will just put itself in 'park' if it detects the slope is too steep. This is a good safety feature. |

Photo log follows.

# Daily Operations Report

Date: 1-Aug-17
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 10 | Condition: | Cool, foggy morning becomes sun and cloud, light winds. Beautiful. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen (RJ) | Arcadis | Departmental Representative |
| Gaston Martin (GM) | Kudlik | Superintendent |
| Danik Mazerolle | Kudlik | Surveyor |
| Andre Aubry | Kudlik | Equipment Operator |
| Nicolas Bouchard | Kudlik | Equipment Operator |
| Martin Tremblay | Kudlik | Health and Safety Officer |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Type 2 material deliveries all day today. Safety briefing concerns truck transport. |
| 0700 | Equipment operators on site, Danik surveying and settings targets. Nicolas uses excavator to remove debris from road path. |
| 0717 | First truck arrives with Type 2. Dumping and spreading. |
| 1130 | Martin onsite for a job site safety inspection. He is pleased with operations. |
| 1140 | Kudlik off site for lunch. |
| 1300 | Site activity resumes. |
| 1315 | Nicolas uses excavator to dig a test pit in the PHC contaminated area in AEC-1. Trying to determine how much is soil, how much is debris. Soil/debris are stockpiled adjacent, on the area to be excavated later. Find at least one drum full of what appears to be waste oil. 75% debris. |
| 1515 | Nicolas resumes compacting (leaves AEC-1 excavation). |
| 1750 | All off site. |

| Health and Safety |
|---|
| Briefing: good work keeping truck speeds low, keep it up. Come to a full stop, use signals in town - lets the public know we are professional and safe. Reminders about parking trucks in the Kudlik yard - proper places. |
| Martin performs another surprise health and safety inspection. No problems noted. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 0 | |
| Type 2 | 996 | 3939 | System is going well, not much down time between load cycles now. |
| Type 3 | 0 | 0 | |
| Type 4 | 0 | 246 | |

| Comments: |
|---|
| Full day of hauling. |
| AEC-1 PHC soils excavation will have more debris than initially assumed, based on test pit. |

Photo log follows.

# Daily Operations Report

Date: 2-Aug-17
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 7 | Condition: | Fog and calm in the morning; clear skies and heavy winds in the afternoon. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Max Lagueux | Kudlik | Superintendent |
| Danik Mazerolle | Kudlik | Surveyor |
| Andre Aubry | Kudlik | Equipment Operator |
| Nicolas Bouchard | Kudlik | Equipment Operator |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Same activities as yesterday, but we will start collecting/sorting debris with the manual clean up crew today. |
| 0700 | Kudlik has submitted numbers for their July progress draw. Other than listing TWA-1 at 200%, quantities are accurate. I talk to Max G about it, he will revise and send an electronic copy. |
| 0712 | All on site, first delivery. Danik verifying grades and giving targets. |
| 1050 | Max Lagueux, the backup superintendant, is on site to do an inspection and learn about the project. He will be the superintendant while Gaston is on leave. |
| 1115 | Manual clean up crew arrives at site and begins staging their equipment. Will temporarily use the office sea can as their dry until another sea can can be brought over to site. |
| 1130 | Kudlik off site for lunch. |
| 1230 | Site activities resume. Manual clean up crew begins collecting surface debris in AEC-1. Debris is contained in garbage bags and stored at TWA-1. |
| 1430 | Visitor stops by to ask if he can traverse the site to go fishing. I steer him around the active part of the site, down to the river. |
| 1805 | All off site. |

| Health and Safety |
|---|
| Kudlik briefing: reminder to truck drivers to keep the speed low. Equipment operators should take periodic breaks, get out of the equipment and walk, stretch, etc. during the day. |
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 0 | |
| Type 2 | 1005 | 4944 | Four truck rotation in full swing. |
| Type 3 | 0 | 0 | |
| Type 4 | 0 | 246 | |

| Comments: |
|---|
| A full day of hauling. |
| Debris collection has started. |

Photo log follows.

# Daily Operations Report

Date: 3-Aug-17
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 5 | Condition: | Overcast, light rain, light to moderate winds. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Danik Mazerolle | Kudlik | Surveyor |
| Andre Aubry | Kudlik | Equipment Operator |
| Nicolas Bouchard | Kudlik | Equipment Operator |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Same activities as yesterday. |
| 0700 | Andre and myself on site. The others are starting the day elsewhere (metal dump). |
| 0715 | First delivery (Type 2) arrives. Five truck rotation. Danik on site verifying grades. |
| 0918 | Saw a stoat in the landfill area, at the crest of the slope. |
| 1120 | Kudlik off site for lunch. |
| 1230 | Site activities resume. Manual clean up crew is now on site in AEC-1. |
| 1545 | Danik back on site, marking out the path and grades for Road B. |
| 1750 | Kudlik off site. |
| 1805 | RJ off site. |
| | |
| | |

| Health and Safety |
|---|
| Morning briefing emphasized safety around the magnet and metal cutting shears. Saty well away from the magnet - it will pull small metal pieces from a distance. When using the shears material can twist, fall and spring away with the release of tension. This equipment is not on site yet, but will be soon. |
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 0 | |
| Type 2 | 1059 | 6003 | Five truck rotation. |
| Type 3 | 0 | 0 | |
| Type 4 | 0 | 246 | |

| Comments: |
|---|
| Road A has advanced out onto the flats past the toe of the slope. |
| |

Photo log follows.

# Daily Operations Report

Date: 4-Aug-17 Friday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 6 | Condition: | Overcast, calm morning gives way to a clear and breezy afternoon. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Andre Aubry | Kudlik | Equipment Operator |
| Martin Tremblay | Kudlik | Health and Safety Officer |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Olivier Benoit | QE | Hazardous Materials Specialist |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. We will not have the manual clean up crew today, they will be helping at the metal dump. Four truck rotation for most of the day. Six Kudlik guys are going off rotation, resources are being reallocated across projects so today will be slower. |
| 0650 | Equipment maintenance today. A leaky hose on the compactor gets replaced and Andre greases the joints on the dozer. 360 checks, component inspections, etc. |
| 0715 | First delivery. Tipping and spreading aggregate (Type 2). |
| 0826 | The compactor returns to service and begins compacting the slope. |
| 0903 | Martin is on site for a health and safety check. He goes through the spill kit to verify contents. |
| 1130 | Kudlik off site for lunch. |
| 1230 | Site activities resume. RJ to airport to pick up RF. Once he is here, the truck promptly breaks down, leaking from the transmission. Everything went smoothly while I was here, just saying. |
| 1600 | Colin and Simon spend the afternoon cleaning up their sea can. Getting a fresh coat of paint on the walls and floor. |
| 1740 | GM, RF/RJ, OB have a meeting to discuss the hazardous waste and sorting strategy, and to discuss the schedule for QE's presence on site. Brief site tour to assess the scope, site facilities. |
| 1800 | Kudlik off site. |
| 1810 | RF, RJ off site. |

| Health and Safety |
|---|
| Briefing today dealt with slips, trips and falls. There is uneven footing all over the site, exercise caution. |
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 0 | |
| Type 2 | 969 | 6972 | Four trucks for most of the day. |
| Type 3 | 0 | 0 | |
| Type 4 | 0 | 246 | |

| Comments: |
|---|
| RF has returned, RJ leaves tomorrow. |
| |

# Daily Operations Report

Date: 5-Aug-17 Saturday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 5 | Condition: | rainy with some fog |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Andre Aubry | Kudlik | Equipment Operator |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Danik Mazerolle | Kudlik | Surveyor |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 6:45 | Kudlik briefing. We will have minimal manual clean up crew today (Simon), others will be helping at the metal dump. Four truck rotation for most of the day. Plan is to haul type II all day and work on building up the grade of Access Road A |
| 7:11 | RF/RJ on site - Andre on site. A bit of machine maintenance (greasing etc.) |
| 7:15 | First delivery. Tipping and spreading aggregate (Type 2). |
| 9:30 | RF has discussion with Gaston about progress for the next week. Objectives are to 1 - complete the road to the base of the landfill. 2 - Begin building the type II aggregate anchor. 3 - Begin some material sorting and consolidation into zone 1. 4 - begin construction on the lined sorting area in TWA-1. |
| | Discussion was had about the construction and need for TWA-2. Kudlik may elect to not construct this zone and simply use the area within the Zone 1 as a work area. RF agreed to this approach. |
| | RF and GM discussed road B and the need for an approximate 1 metre cut in one portion. The idea of not conducting this cut and instead bringing up the grade was discussed. This would be beneficial to avoid cutting into waste/debris etc. and to ease in the construction of the drainage swale by eliminating the need for rock excavation. This will be re-addressed at a later point in time. RF agrees with this field fit approach; however, further discussions will be required to figure out the details. |
| 10:00 | RF/RJ demarcated the area of silt fence installation around AEC 1 |
| | Simon picking up debris manually with the ATV around the upper drainage ditched on the north side of Access Road A. |
| 11:45 | off site for lunch |
| 12:45 | Activities resume |
| 14:15 | Begin laying down silt fence in AEC 1 and continuing to haul and place type II on Access Road A |
| 18:10 | Off site |

| Health and Safety |
|---|
| No health and safety issues today. |
| |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | | | |
| Type 2 | 930 | 7902 | Four trucks for most of the day. |
| Type 3 | | | |
| Type 4 | 48 | 294 | |

| Comments: |
|---|
| RJ off site at noon |
| |

# Daily Operations Report

Date: 6-Aug-17 Sunday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 8 | Condition: | rainy, mist, fog - clearing in afternoon and raising to 10 C |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher (RF) | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Andre Aubry | Kudlik | Equipment Operator |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Danik Mazerolle | Kudlik | Surveyor |
| | | |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 6:45 | H&S briefing at the Kudlik Office. Signage for visitors and pedestrians. Had two visitors last evening coming back from fishing. |
| 7:00 | RF onsite. Andre on site. |
| 7:20 | First truck on site. Kudlik hauling type 4 aggregate to top off the crest of Road A to make it better for the trucks |
| 9:15 | Hauling type 2 to continue working on building up the road A base. Some levelling along the bottom of the slope. |
| 10:30 | Danik on site to check road alignment and add new stakes for levels |
| 11:45 | off site for lunch |
| 12:50 | Activities resume - hauling more type II aggregate, placing and compacting |
| 18:00 | off site |
| | |
| | |
| | |

| Health and Safety |
|---|
| Signage for the site is being made for visitors. Had a couple on site yesterday am who were intoxicated, assumed to be walking home from their camp. Low visibility in the fog. Slippery surfaces |
| |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 0 | |
| Type 2 | 1005 | 8907 | Four trucks in rotation most of the day |
| Type 3 | 0 | 0 | |
| Type 4 | 9 | 303 | |

| Comments: |
|---|
| |
| |

Photo log follows.

# Daily Operations Report

Date: 7-Aug-17 Monday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 10-12 | Condition: | foggy in am clearing around 10 am to sun and light wind |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher (RF) | Arcadis | Departmental Representative |
| Jean-David Laberge | Kudlik | Project Manager |
| Gaston Martin | Kudlik | Superintendent |
| Andre Aubry | Kudlik | Equipment Operator |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Danik Mazerolle | Kudlik | Surveyor |
| Melissa Parent | Kudlik | H&S Officer |

| Summary of Work Activities | |
|---|---|
| 6:45 | H&S meeting at the Kudlik office |
| 7:00 | on site |
| | Andre greasing dozer. Labourers getting ATV ready for the days work. |
| 7:15 | First truck arrives with aggregate (Type II) |
| 7:20 | Labourers begin working collecting debris from areas surroundiung AEC 1 |
| 11:00 | RF attends weekly construction meeting. Was decided to collect samples from below TWA1 prior to establishing and lining the area with membrane to establish a baseline. |
| 12:00 | Off site for lunch |
| 13:00 | Activities resume - continue hauling, placing and compacting type II aggregate for the access road A |
| 14:15 | RF and GM discuss alignment of the drainage ditch at the toe of the landfill. Determined its exact layout and location based on some survey work Danik had completed. |
| | RF and GM discuss the installation of the silt fence in AEC 1. Kudlik is out of fencing, GM to talk with Q.E. to see if they have any available to use. |
| 15:20 | JD on site for a quick walk through to see the progress. Approximately 10-15 minutes on site. |
| 16:50 | GM states that Kudlik does not have enough silt fence to complete the fencing around AEC 1 and that Q.E. also does not have any available. Also states that according to JD, Kudlik was not to supply any silt fencing under this contract. |
| 17:10 | RF drafts e-mail correspondance with JD with regards to silt fencing |
| 17:30 | Melissa Parent on site for a H&S inspection. Completes a site walk through. Was her first time back from shifting out for 10-12 days. |
| 16:15 | off site |
| | |

| Health and Safety |
|---|
| Foggy this am. Watch visibility and watch for site visitors. It's a long weekend and lots or people are out fishing and some are coming onto the site. |
| |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | | |
| Type 2 | 891 | 9798 | three to four trucks in rotation |
| Type 3 | 0 | | |
| Type 4 | 0 | 303 | |

| Comments: |
|---|
| Road A is nearing completion. Some final shaping to be completed tomorrow. |
| |

# Daily Operations Report

Date: 8-Aug-17 Tuesday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 10-12 | Condition: | sunny |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher (RF) | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Andre Aubry | Kudlik | Equipment Operator |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Danik Mazerolle | Kudlik | Surveyor |
| Jean-David Laberge | Kudlik | Project Manager (a few visits) |

| Summary of Work Activities | |
|---|---|
| 6:45 | H&S meeting at Kudlik office. Topics discussed were to keep your tailgates closed. Two times yesterday, truck left the pit with tailgates still open. This is not acceptable. Again, keep your speeds down through town. Keep eye contact at all times between machinery, trucks, and ground crews. |
| 7:00 | On-site - Andre brought dozer up to the top to prepare for road topping today. De-mobilization of the excavator. |
| 7:20 | Talk with GM about finishing silt fence installation. |
| | Danik on site to conduct survey work |
| 11:00 | Some type II aggregate delivery starts to fill in some gaps |
| 11:30 | Off site for lunch |
| 13:30 | Activity resumes |
| | Kudlik cutting geotextile for silt fencing |
| | Installation of silt fence in AEC 1 continues |
| 15:15 | GM installed "Authorized personnel only" sign at the front entrance to the site |
| 16:00 | Completed installation of the silt fencing |
| | Continuing grading and tamping the road |
| 18:05 | Off site |
| | |

| Health and Safety |
|---|
| Maintain visual contact between truck drivers, machine operators and ground personnel at all times. Truck drivers watch your speed on the roads, especially in the residential areas. Watch for rocks when loading and make sure that the loads are even with the top of the truck beds and not over flowing because rocks could fall off on transit. Use your covers. |
| |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | | |
| Type 2 | 126 | 9924 | No real hauling today. Mostly re-shaping the roadway slopes |
| Type 3 | 0 | | |
| Type 4 | 0 | 303 | |

| Comments: |
|---|
| Road A ready for top coat and AEC 1 silt fence is complete |
| |

# Daily Operations Report

Date: 9-Aug-17 Wednesday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 10 | Condition: | light rain |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher (RF) | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Andre Aubry | Kudlik | Equipment Operator |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Danik Mazerolle | Kudlik | Surveyor |
| Jean-David Laberge | Kudlik | Project Manager (a few visits) |

| Summary of Work Activities | |
|---|---|
| 6:45 | H&S meeting at Kudlik office. Topics discussed were to keep your tailgates closed. Two times yesterday, truck left the pit with tailgates still open. This is not acceptable. Again, keep your speeds down through town. Keep eye contact at all times between machinery, trucks, and ground crews. |
| 7:00 | On-site - Andre brought dozer up to the top to prepare for road topping today. De-mobilization of the excavator. |
| | Excavator was mobilized off site |
| 7:20 | First truck arrives with Type 4 aggregate for top coating |
| 8:00 | Gaston completing layout for proposed coffer dam to create a proposal and schematics |
| 11:45 | Off site for lunch |
| 12:40 | Activity resumes. Continuing hauling, placing, levelling, and tamping the Type 4 aggregate road topping. |
| 13:30 | Danik on site to check levels and continue layouts |
| 17:00 | RF and SL had a call with PSPC to give a brief update on the progress to date since he was absent from the weekly meeting. |
| 18:10 | off-site |
| | |

| Health and Safety |
|---|
| No health and safety concerns today |
| |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | | |
| Type 2 | 66 | 9990 | |
| Type 3 | 0 | | |
| Type 4 | 366 | 669 | |

| Comments: |
|---|
| |
| |

# Daily Operations Report

Date: 10-Aug-17 Thursday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 8 to 10 | Condition: | rainy, mist, fog - clearing to sun by 10:00. Light breeze. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher (RF) | Arcadis | Departmental Representative |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Danik Mazerolle | Kudlik | Surveyor |
| Jean-David Laberge | Kudlik | Project Manager (a few visits) |
| Gaston Martin | Kudlik | Superintendent |
| Andre Aubry | Kudlik | Equipment Operator |
| Jean-Christophe Lambert | Kudlik | Equipment Operator (grader) |
| Max Lagueux | Kudlik | Superintendent (taking over to Gaston) |
| Steve Livingstone | Arcadis | Project Manager |

| Summary of Work Activities | |
|---|---|
| 6:45 | H&S meeting at Kudlik office. Road speeds, especially with wet roads. Visibility with the morning fog. Be careful on the slopes, particualarily if backing down. Keep eye contact between operators and spotters/ground personell. Keep an eye out for others on site at all times. |
| 7:00 | On-site. Andrwe starts work on AEC 2 access roads (2 of them). RF prepares to collect samples of TWA1 |
| 8:00 | RF sampling below the pad of TWA1 to determine a baseline concentration. Collected a total of four samples and one duplicate - will analyze for PHCs, PCBs, PAHs, Metals and VOCs. |
| | The grader is on-site and working on levelling the Road A. JC is operating. |
| 9:00 | Q.E. on site to inspect the liner that Kudlik proposed to use in TWA1. Accepted. RF agrees. RF instructs Kudlik to ensure that some small berms are constructed around the soil stock pile area to ensure any run-off is captures. GM agrees. |
| 10:30 | RF completes from field testing of the stream flow using the float/velocity methodology. This was done to determine stream flow quantities and output. |
| 11:45 | off site |
| 12:35 | Activities resume |
| 13:00 | RF picks up SL at the airport. Arcadis conducts a site walk through with SL and RF. |
| | Gaston and Max laying out the elevations for the zone 1 area |
| | Kudlik working on the toe of the landfill outside of the zone 1 area. |
| 14:00 | Kudlik working on constructing small berms in TWA1 with some fine aggregate to ensure the liner is not compromised when loaded. RF approves. |
| | Kudlik continues laying type II aggregate and extending the landfill toe to the north |
| | JC continues grading and tamping the access road in alternation. RF approves of methodology |
| 18:05 | off-site |
| | |

| Health and Safety |
|---|
| Several intoxicated residents attempted to enter the site at approximately 15:00. RF intercepted and directed them to another entrance ot the river. They obliged. |
| |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | | |
| Type 2 | 644 | 10634 | 90 to road A and access to AEC 2 and the remaining 554 to AEC 3 for landfill toe |
| Type 3 | 0 | | |
| Type 4 | 295 | 964 | |

| Comments: |
|---|
| Work is progressing well. Arcadis is very happy with the progress to date. |
| |

# Daily Operations Report

Date: 11-Aug-17 Friday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 5-8 | Condition: | rainy, mist, fog - clearing to cloudy in the afternoon |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher (RF) | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Andre Aubry | Kudlik | Equipment Operator |
| Jean-Christophe Lambert | Kudlik | Equipment Operator (grader) |
| Max Lagueux | Kudlik | Superintendent (taking over to Gaston) |
| Steve Livingstone | Arcadis | Project Manager |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 6:45 | H&S meeting. Visibility, speed, eye contact. Slippery surfaces. |
| 7:00 | On-site. |
| | JC grading the access road a and tamping with the roller tamper. |
| | Andre on the dozer working on the toe of AEC 3 |
| | Continuing to haul type II aggregate and extending the landfill toe |
| 7:20 | First truck of the day arrives |
| 7:40 | RF prepping samples for shipment |
| 8:00 | RF ships samples from TWA1 |
| 8:30 | RF discusses with GM and ML about tracking of metal and haz-waste segregation. Discussed daily tracking and end of day agreement of volumes. RF agrees with proposed approach. |
| 11:45 | Off site for lunch |
| 12:45 | Activities resume |
| 13:30 | Continuing to haul, place, and compact type II aggregate |
| 18:00 | off site |
| | |

| Health and Safety |
|---|
| No H&S concerns. The amount of visitors to the site has decreased significantly and no pedestrians have been noted in recent days. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | | |
| 18:00 | 1053 | 11687 | Type II today went to AEC 3 |
| Type 3 | 0 | | |
| Type 4 | 126 | 1090 | Some final grading on the access road |

| Comments: |
|---|
| Good progress today |
| |

Photo log follows.

# Daily Operations Report

Date: 12-Aug-17 Saturday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 6 | Condition: | rainy, mist, fog |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher (RF) | Arcadis | Departmental Representative |
| Steve Livingstone | Arcadis | Project Manager (off site at noon) |
| Andre Aubry | Kudlik | Equipment Operator |
| Yvan Garneau | Kudlik | Equipment Operator (shears) |
| Max Lagueux | Kudlik | Superintendent (taking over to Gaston) |
| Danik Mazerolle | Kudlik | Surveyor |
| Jean-David Laberge | Kudlik | Project Manager (a few visits) |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Melissa Parent | Kudlik | H&S Officer |

| Summary of Work Activities | |
|---|---|
| 6:45 | H&S meeting at Kudlik main office. Lifting using proper technique. |
| 7:00 | on site |
| | Kudlik mobilized the shear to the site over night. |
| | Andre on the dozer at the toe of AEC 3 landfill |
| | Labourers sorting out material by hand (e.g.., tires etc.) from the toe of AEC 3 |
| 7:20 | First truck arrives |
| 8:00 | Shear mobilizes to AEC 2 to begin sorting out painted and non-painted materials using the magnet and shears. One labourer working with excavator checking drums etc. for liquid. |
| | Material is being sorted and sheared in the spot and being transported afterwards. |
| 10:45 | Steve Livingstone on site for final walk through. RF and SL walked the site. |
| 11:45 | Off site for lunch. RF took SL to the airport. |
| 12:45 | On site - activities above resume |
| 13:30 | MP on-site to complete and H&S inspection on the site, check that all safety protocols are being followed and complete an inventory of the on-site first aid kits. |
| | Work continued as described above |
| 18:05 | Off-site |
| | |

| Health and Safety |
|---|
| Health and Safety inspection was completed today by Melissa Parent (Kudlik health and safety officer). No issues were noted. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | | |
| Type 2 | 657 | 12344 | into AEC 3 |
| Type 3 | 0 | | |
| Type 4 | 231 | 1321 | |

| Comments: |
|---|
| Steve Livingstone heads home. Great day - lots of activity and progress. |
| |

Photo log follows.

# Daily Operations Report

Date: 13-Aug-17 Sunday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 9 | Condition: | rain in the am, clearing around 11, becoming cloudy at 16:00 |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher (RF) | Arcadis | Departmental Representative |
| Andre Aubry | Kudlik | Equipment Operator |
| Yvan Garneau | Kudlik | Equipment Operator (shears) |
| Max Lagueux | Kudlik | Superintendent (taking over to Gaston) |
| Danik Mazerolle | Kudlik | Surveyor |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |

| Summary of Work Activities | |
|---|---|
| 6:45 | H&S meeting at Kudlik office |
| 7:05 | On site. |
| | Q.E. on-site to discuss and take a look at the staging area. Andre begins creating an access area into AEC 1 with some type II aggregate and the dozer. Yvan continuing to sort material in AEC 2. |
| 7:40 | Danik on site to check levels |
| | Trucks arriving with Type II aggregate, unloading in AEC 1 for temporary access roads. |
| | Maintenance truck on-site, checking in on shears |
| | 4 truck in rotation today |
| | labourers are manually sorting out hazardous waste from AEC 3 |
| 9:30 | RF established and completed the first round of performance monitoring using the proposed LTM monitoring locations. Field chemistry collected using a Horiba U-500 water quality meter. |
| 10:00 | Andre finishing up with AEC 1 temporary access road. Now starting to remove some minor surface debris using a small 305 excavator. |
| | Access road being compacted with the roller tamper. |
| 11:35 | Off site for lunch |
| 12:40 | On-site and activities resume |
| | Kudlik working in TWA1 to prepare the liquid handling area and clean up to the south of the metal storage area to place tires etc. and establish a bit more room to work. |
| | Continuing sorting material in AEC 2. Material is being placed into a rock truck (Volvo A40F) which has a 17 m3 capacity. |
| | Work continued as described above |
| 18:05 | Off-site |
| 15:00 | Dozer mobilizes from TWA1 back to AEC 3 |
| | Begin hauling type II aggregate to AEC 3 again. Unloading at the north end of the toe. |
| 15:15 | Total of 3 rock trucks of material have be hauled to AEC 3 from AEC 2 |
| | Andre levelling type II aggregate in AEC 3 |
| 15:30 | Danik on-site to check levels |
| 18:00 | Small loader on site to transfer drums containing suspect liquid up to the sorting and transfer area in TWA1. Drums are being transferred in large tubs to ensure no liquids are lost or spilled. |
| 16:30 | Shear begins work in AEC 3 at the northern extent of the slope. Continuing trucking in Type II aggregate to AEC 3. |
| 18:05 | Off-site. Note that Yvan will return to site to work an additional 1-1.5 hours this evening to make up time. RF approved and will inspect work completed in the am. |
| | |
| | |
| **Health and Safety** | |
| No health and safety issues today. Kudlik has been observed to work in a very safe manner at all times. | |
| | |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | | |
| Type 2 | 519 | 12863 | into AEC 1 - temporary access roadway and a few loads down to AEC 3 |
| Type 3 | 0 | | |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| Excellent progress today. |

# Daily Operations Report

Date: 14-Aug-17 Monday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 14 | Condition: | sun and cloud, light breeze |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher (RF) | Arcadis | Departmental Representative |
| Andre Aubry | Kudlik | Equipment Operator |
| Yvan Garneau | Kudlik | Equipment Operator (shears) |
| Max Lagueux | Kudlik | Superintendent (taking over to Gaston) |
| Danik Mazerolle | Kudlik | Surveyor |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Martin Lemay | Q.E. | Environmental Technician |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |

| Summary of Work Activities | |
|---|---|
| 6:45 | H&S meeting at Kudlik office |
| 7:00 | On-site |
| | Q.E. transferring liquids at TWA1 |
| | Labourers manually sorting material in AEC 1 |
| | Shear working to sort material in AEC 3 |
| 7:20 | First truck arrives |
| | Hauling rock dust (Type 1) to stockpile in preparation to begin material lifts in zone 1 |
| | RF discussed with Martin (Q.E.) about skimming the PHCs from the excavation in AEC 1 |
| 8:00 | Q.E. mobilized the vacuum to site to skim PHCs |
| | Labourers working in AEC 1 still |
| 9:30 | RF conducted monitoring of the LTM stations |
| 9:45 | One rock truck of lead amended material was hauled from AEC 3 to TWA1 |
| | Q.E. continues liquid transfer from old drums |
| 10:00 | Labourers found a rifle hidden in an old culvert on site. Kudlik contacted the RCMP. |
| 11:00 | Work continued as described above |
| 18:05 | Off-site |
| 11:35 | off site for lunch |
| 12:30 | on site - activity resumes |
| | Some hauling of Type I, sorting of debris in AEC 3, liquid transfer and manual sorting of debris |
| 16:00 | JD and Q.E. on site to discuss liquid treatment. Upon skimming the PHCs from the excavation, Q.E. estimated that they have nearly 2000L of liquid. This is at the limit of the current contract. JD wanted to ensure we did not exceed the contract value prior to receiving approval. RF is to relay this information onto PSPC for authorization to proceed. |
| 17:15 | RF measured volume of waste processed yesterday (August 13, 2017) with ML to confirm volumes. |
| 18:00 | off site |
| | Note: shear will work an additional hour. Kudlik provided a city of Iqaluit permit for the additional hours of work that the shear will require. |
| | |

| Health and Safety |
|---|
| A firearm was found by the labourers at approximately 10:00. Work was stopped and no one touched the firearm. The RCMP was contacted and work resumed in a different area until the RCMP arrived to remove the firearm. This incident was handled in a safe and professional manor. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 174 | 174 | to AEC 3 to stockpile for later use when doing material lifts |
| Type 2 | 9 | 12872 | to AEC 3 |
| Type 3 | 0 | | |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| Great work progress today. We are at the limit (2000L) for treatment of liquids based on the contract values. |
| |

Photo log follows.

# Daily Operations Report

Date: 15-Aug-17 Tuesday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 14 | Condition: | sunny, light breeze |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher (RF) | Arcadis | Departmental Representative |
| Andre Aubry | Kudlik | Equipment Operator |
| Yvan Garneau | Kudlik | Equipment Operator (shears) |
| Max Lagueux | Kudlik | Superintendent (taking over to Gaston) |
| Danik Mazerolle | Kudlik | Surveyor |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Martin Lemay | Q.E. | Environmental Technician |
| Sylvain St-Onge | Kudlik | Operator (Volvo Rock Truck) |
| | | |

| Summary of Work Activities | |
|---|---|
| 6:45 | H&S meeting at Kudlik office. Vehicle speeds. Complete tailgate checks when leaving the site. Slope stability. Keep clear of metal crushing operations. Beware of possible projectiles. |
| 7:00 | On-ste |
| 7:10 | RF counted drums on-site to pre-determine volumes (crushed volumes) so they could be removed to make space. |
| 7:30 | Excavator mobilized to the site to aid in sorting material at the toe of AEC3 |
| 7:50 | RF inspected TWA1, metal stockpiles and liquid processing area. Identified some potential asbestos within the metal debris. Q.E. to bag. |
| 8:30 | ML on site. RF requests that a small dam be built at the northern extent of the toe of AEC3 as a precautionary measure to deter any run-off from leaving the site in the case of any rains. ML agrees. |
| | Kudlik identified a full drum of what appeared to be aviation fuel in a drum. No fuel was spilt. Q.E. was notified and the drum was transported in a tote to the liquid transfer area in TWA1. |
| 10:00 | RF and ML measure current metal stock piles located at AEC 3 to determine and agree upon volumes. |
| 10:20 | Kudlik identified another drum of fuel buried within the landfill toe. The same procedure outlined above was followed. |
| 10:30 | Began crushing previously sorted drums in AEC 3 to make more working area |
| 10:40 | One tub (dumpster - 20m3) of debris was moved from AEC 1 to AEC 3 with the small loader |
| | One full sized loader was mobilized to the site to help move around material (metal debris etc.) |
| 11:35 | Off site |
| 12:40 | On-site, activities resume |
| | Work continued as described above |
| 18:05 | Off-site |
| | RF and ML measure additional volume from days work to agree upon volumes. |
| 17:55 | off-site |
| | Note - shear will work an additional hour |

| Health and Safety |
|---|
| No H&S concerns today. |
| |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 174 | no material brought to site today |
| Type 2 | 0 | 12872 | no material brought to site today |
| Type 3 | 0 | | no material brought to site today |
| Type 4 | 0 | 1321 | no material brought to site today |

| Comments: |
|---|
| Good progress, additional liquid (fuel) was found today (two drums) - which was handled by Q.E> |

# Daily Operations Report

Date: 16-Aug-17 Wednesday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 5-7 | Condition: | rainy |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher (RF) | Arcadis | Departmental Representative |
| Max Lagueux | Kudlik | Superintendent (taking over to Gaston) |
| Yvan Garneau | Kudlik | Equipment Operator (shears) |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Danik Mazerolle | Kudlik | Surveyor |
| Steeven Levesque | Kudlik | Operator |
| Sylvain St-Onge | Kudlik | Operator (Volvo Rock Truck) |
| Jonathan Bouchard | Kudlik | Jr. Engineer |

| Summary of Work Activities | |
|---|---|
| 6:45 | H&S meeting at Kudlik office. Clean all equipment before you leave it. Have respect for your other co-workers. |
| 7:00 | On-site. |
| | Labourers continuing manually collecting debris and sorting hazardous and non-hazardous material |
| | Welder on site to re-build the cutting edge on the shears (regular maintenance) |
| 8:00 | Using the small 305 excavator to remove some surface debris from AEC 1 in order to minimize the impact as much as possible. Placing into a dumpster for transport to AEC 3. |
| 8:30 | Preping to backfill the main landfill toe with debris and Type I aggregate |
| | Constructing a small dam at the down-gradient (north) end of the landfill toe to ensure no run-off from any potential precipitation. Based on request by RF. |
| 9:00 | Some additional material from AEC 1 being hauled down using the mini-loader in a dumpster |
| | Kudlik conducted a base survey of the landfill toe prior to beginning material lifts to ensure accurate calculations later. |
| | A small layer of type II was added to some areas to get a more flat surface to begin lifts from (this was done prior to the baseline survey |
| 10:00 | Beginning material lifts as per specifications. RF directs. |
| 11:30 | off site lunch |
| 12:30 | On-site. Activity resumes. |
| 12:45 | RF and ML discuss method compaction during placement. The lifts are being done in two stages of 0.25m with type I used on each stage. The lifts are bing first bucket packed to vibrate all of the aggregate down into the voids and then track packed using the excavator. |
| 13:45 | Work continued as described above |
| 18:05 | Off-site |
| | Excavator working on material lift in the center of AEC 3 zone 1 |
| | Small excavator working in AEC 1 to remove surficial debris and place in dumpster |
| 17:15 | Shear moved to AEC 2 to continue working on metal segregation and reduction in that area |
| 18:00 | Off site |
| | |
| 18:00 | |

| Health and Safety |
|---|
| No H&S concerns today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 54 | 228 | one truck hauling in afternoon only |
| Type 2 | 0 | 12872 | |
| Type 3 | 0 | | |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| Good progress. Began material lifts in AEC 3 with processed waste debris. |
| |

# Daily Operations Report

Date: 17-Aug-17 Thursday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 6-7 | Condition: | rainy in the am, clouds in the afternoon |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher (RF) | Arcadis | Departmental Representative |
| Max Lagueux | Kudlik | Superintendent (taking over to Gaston) |
| Yvan Garneau | Kudlik | Equipment Operator (shears) |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Danik Mazerolle | Kudlik | Surveyor |
| Jonathan Bouchard | Kudlik | Jr. Engineer |
| Steeven Levesque | Kudlik | Operator |
| Sylvain St-Onge | Kudlik | Operator (Volvo Rock Truck) |
| | | |

| Summary of Work Activities | |
|---|---|
| 6:45 | H&S meeting at Kudlik main office. |
| 7:00 | RF on-site |
| 7:20 | Kudlik on-site. Continuing work on AEC 3 material lifts. |
| | Shear working in lower portion of AEC 2 to reduce and sort metal debris etc. |
| | Excavator working on material lifts at AEC 3 toe |
| | One truck hauling Type I aggregate |
| | Labourers working on final sweep of AEC 1 and tagging any further buried debris |
| 9:30 | RF conducted performance monitoring at LTM stations |
| 11:30 | Off-site lunch |
| 12:30 | On-site, activities resume |
| | Shear loading rock truck in AEC 2 to haul to AEC 3 |
| | Continue hauling Type I aggregate |
| | Work continued as described above |
| 18:05 | Off-site |
| 14:00 | Another rock truck load of non-haz to AEC 3 |
| 15:15 | ML on site to check on material lifts and check elevations to ensure within specs. RF approves. |
| 15:50 | ML and JB on site to measure material from AEC 2 with RF. 35 m3. |
| 16:20 | Shear and magnet mobilize to AEC 3 to further reduce waste ready for material lifts. |
| | Excavator mobilised to top of AEC 3 to load rock truck to transport waste from top to the bottom of AEC 3. |
| 18:00 | One rock truck load from top of AEC 3 to bottom. Piled separately from the waste from AEC 2. |
| 18:05 | Off-site |
| | |

| Health and Safety |
|---|
| No H&S concerns to note. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 261 | 489 | for material lifts - to AEC 3 |
| Type 2 | 0 | 12872 | |
| Type 3 | 0 | | |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| Metal quantities in AEC3 are lower than anticipated. This will likely require a higher quantity of aggregate to account for some of the missing volume. |

Photo log follows.

# Daily Operations Report

Date: 18-Aug-17 Friday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 10 | Condition: | sun and cloud, wind 20 km/h |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher (RF) | Arcadis | Departmental Representative |
| Max Lagueux | Kudlik | Superintendent (taking over to Gaston) |
| Yvan Garneau | Kudlik | Equipment Operator (shears) |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Danik Mazerolle | Kudlik | Surveyor |
| Jonathan Bouchard | Kudlik | Jr. Engineer |
| Steeven Levesque | Kudlik | Operator |
| Sylvain St-Onge | Kudlik | Operator (Volvo Rock Truck) |
| | | |

| Summary of Work Activities | |
|---|---|
| 6:45 | H&S meeting at Kudlik office. Wear your hard hat at all times when outside of your equipment. Refill the spill kit and check the inventory to ensure enough material is present in the case of a spill. |
| 7:00 | On-site |
| | Continuing with material lifts in AEC 3. |
| | Sorting material at the top of AEC 3 and moving to the toe to include in material lifts. |
| | Labourers continue with debris pick up in AEC 2 and 3. Moving tires to TWA1 |
| 8:00 | RF inspects TWA 1 - all is good. |
| 8:30 | First truck arrives hauling Type I aggregate for material lifts. |
| 11:35 | off-site for lunch |
| 12:30 | On-site. Activities resume. |
| | Continuing with material lifts in AEC 3. |
| | Sorting material at the top of AEC 3 and moving to the toe to include in material lifts. |
| | Labourers continue with debris pick up in AEC 2 and 3. Moving tires to TWA1 |
| 18:00 | Off-site |
| | One more material lift at south end of AEC 3 toe completed and tamped. |
| | |

| Health and Safety |
|---|
| No health and safety concerns today |
| |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 81 | 570 | to AEC 3 for material lifts |
| Type 2 | 0 | 12872 | no Type II hauled today |
| Type 3 | 0 | 0 | |
| Type 4 | 0 | 1321 | no Type IIII hauled toaday |

| Comments: |
|---|
| Good progress on material lifts this am |
| |

Photo log follows.

# Daily Operations Report

Date: 19-Aug-17 Saturday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 12 | Condition: | sunny, light breeze |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher (RF) | Arcadis | Departmental Representative |
| Max Lagueux | Kudlik | Superintendent (taking over to Gaston) |
| Yvan Garneau | Kudlik | Equipment Operator (shears) |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Danik Mazerolle | Kudlik | Surveyor |
| Jonathan Bouchard | Kudlik | Jr. Engineer |
| Steeven Levesque | Kudlik | Operator |
| Sylvain St-Onge | Kudlik | Operator (Volvo Rock Truck) |
| Jean-David Laberge | Kudlik | Project Manager |

| Summary of Work Activities | |
|---|---|
| 6:45 | H&S meeting at Kudlik office. |
| 7:00 | On site |
| 8:30 | ML and JD on site. Completed a site walk-through with RF to discuss progress. |
| | Two concerns were raised. |
| | 1 - NWB permit for work in water at AEC 2. This work will need to commence very shortly in order to keep the progress moving forward with the material lifts in AEC 3. |
| | 2 - A large cliff band (big rock) appears unstable in the north end of AEC 3. Kudlik will inspect and propose an appropriate approach to deal with this situation in the safest possible way. |
| | Completed inspection of AEC 1 - everything looks good here. Discussed capping strategy. Kudlik will work to complete AEC 1 capping as time allows, but will be focussing energy on AEC 3 as much as possible. RF agrees with this strategy. |
| 9:30 | RF completes performance monitoring at LTM staitons. |
| 10:00 | Tamping area at the north end of AEC 3 tow where small levelling lift was completed with debris brought down from the top of AEC 3 yesterday. |
| 11:30 | Off site for lunch |
| 12:30 | Activities resume |
| | Shear working on top of AEC 3 |
| | Excavator on top of AEC 3 loading debris and soil for transport to landfill toe (using the rock truck) |
| 13:36 | Rock truck top to bottom of AEC 3 |
| 14:00 | Excavator mobilizes back to AEC 3 base to sort material and prepare another material lift. |
| | Shear loads metal debris into truck with the magnet on top of AEC 3 |
| | Mixtures of soil and debris are being transported to toe to go into material lifts |
| 14:15 | Beginning another material lift in AEC 3 toe in the central/north portion of AEC3 |
| | Shear mobilizes up to TWA1 to reduce lead ammended metal |
| 15:30 | Float arrives to get the mini excavator (305) |
| | Hauling some type 3 (rip rap) |
| 18:00 | Off site |
| | |

| Health and Safety |
|---|
| No health and safety concerns today |
| |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 9 | 579 | |
| Type 2 | 0 | 12872 | |
| Type 3 | 63 | 63 | rip rap hauled to AEC 3 |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| |
| |

# Daily Operations Report

Date: 20-Aug-17 Sunday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 12 | Condition: | sun, light breeze |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher (RF) | Arcadis | Departmental Representative |
| Max Lagueux | Kudlik | Superintendent |
| Yvan Garneau | Kudlik | Operator - hydraulic shears |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Jonathan Bouchard | Kudlik | Jr. Engineer |
| Steeven Levesque | Kudlik | Operator - compactor |
| Sylvain St-Onge | Kudlik | Operator - rock truck |
| Jean-David Laberge | Kudlik | Project Manager |

| Summary of Work Activities | |
|---|---|
| 6:45 | H&S meeting at Kudlik office. Lifting equipment is for lifting only - always inspect all equipment prior to using. Be careful when backing up heavy machinery, if you are not sure, get out of the machine look and/or have a spotter. Watch for ground crews at all times. |
| 7:00 | On site |
| | Labourers gathering material from top of AEC 3 along the northern extent |
| | Excavator working with rock truck at northern end of AEC 3 landfill toe to remove organic material (as per specifications). The material is being temporarily stored on top of AEC 3 for testing and potential re-use as topping. |
| | Shear is working in TWA1 to reduce the size of lead ammneded painted material to prepare for packaging. |
| 8:30 | RF observd that the organic material excavation was on bedrock within 0.3 to 0.4 m of surface. |
| | RF discussed with ML and JD about not using the rip-rap to backfill this area as was specified. The reasoning is to prevent the creation of a seepage plane. The initial spec for rip-rap assumed that the area was highly organic and the rip-rap was to provide a solid base. |
| 11:00 | ML on site to discuss progress. Excavated area has been filled with Type II aggregate instead of rip-rap. ML indicates that Q.E. will mobilize their screener to deal with the PHC soils either later this afternoon or tomorrow am. |
| | ML indicated that Kudlik will begin the Type II aggregate lifts to raise the level up to that of the current waste lifts. More truck drivers are expected to arrive in Iqaluit tomorrow and hauling will increase at that time. |
| 11:30 | off site lunch |
| 12:30 | on-site |
| | Excavator cleaning up some material from the work areas (impacted type II aggregate from metal and material processing) and incorporating this material into the next material lift. |
| 14:30 | JD came to site to discuss the fractured rock. The intention is to backfill with Type II aggregate from the side and allow it to fall in below the rock. Then some fine material will be used (such as Type 4 aggregate) to fill in the smaller crevases and cracks. This will provide stability in case the rock does decided to decouple. RF agrees to this approach. |
| 15:30 | Dozer mobilized to the site. |
| | Spreading some Type II aggregate into the former organic material excavation. |
| 17:30 | Continuing to haul Type II aggregate to the site. Only one truck in rotation. |
| 17:55 | Off-site |

| Health and Safety |
|---|
| No health and safety concerns to note. |
| A plan was developed to safely handle a precarious looking cliff face at the northern extent of AEC 3. Everyone on site was made aware of the hazard and was instructed to stay clear. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 579 | |
| Type 2 | 198 | 13070 | Material to AEC-3 for toe of landfill slope. Filling around Zone 1. |
| Type 3 | 27 | 90 | Armour stone for landfill toe. |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| |

# Daily Operations Report

Date: 21-Aug-17 Monday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 10 | Condition: | Sunny, light wind |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher (RF) | Arcadis | Departmental Representative |
| Ryan Janzen (RJ) | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Yvan Garneau | Kudlik | Operator - hydraulic shears |
| Steeven Levesque | Kudlik | Operator - compactor/magnet |
| Sylvain St-Onge | Kudlik | Operator - rock truck |
| Jean-David Laberge | Kudlik | Project Manager |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Type 2 material deliveries to AEC-3 today, and Type 4 to the area around the loose rock face, hold it in place. |
| 0700 | Site activities begin. |
| 0740 | First delivery, Type 2 material. Two trucks in rotation. |
| 1100 | Weekly construction meeting. |
| 1300 | Pick up RJ at airport for start of new rotation. |
| 1350 | Rock truck of debris from TWA-1 to AEC-3 (Zone 1). Non-hazardous material for landfill. |
| 1400 | Magnet is sorting debris from the excavation in AEC-1 into rock truck. |
| 1430 | No manual clean up crew on site today. |
| 1800 | Kudlik off site. |
| 1905 | RVJ off site. |

| Health and Safety |
|---|
| Kudlik safety briefing discusses the 'loose' boulder overhang on the northern end of the landfill scarp. No one is to approach this area, it will be backfilled for stability. |
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 579 | |
| Type 2 | 561 | 13631 | |
| Type 3 | 0 | 90 | |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| Relatively quiet day of hauling aggregate to landfill. Kudlik is in statis until Water Licence is in place. |
| |

Photo log follows.

# Daily Operations Report

Date: 22-Aug-17 Tuesday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 10 | Condition: | Sun and cloud, breezy. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher (RF) | Arcadis | Departmental Representative |
| Ryan Janzen (RJ) | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Pierre-Luc Paradis | Kudlik | Operator |
| Jean-Christophe Lambert | Kudlik | Operator |
| Jean-David Laberge | Kudlik | Project Manager |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Running out of work before we need to access AEC-2. Hauling to toe today. |
| 0700 | Site activities begin. Spreading and compacting material in the toe/Zone 1. |
| 0720 | First delivery. Two trucks in rotation today. |
| 0910 | Sorting metal debris from soil near AEC-1 excavation. One rock truck to TWA-1. |
| 1130 | Kudlik off site for lunch. |
| 1230 | Site activities resume. Magnet is now off site (and operator). |
| 1305 | Stray dog sighting in AEC-1. Appears one of the sled dogs got off its chain. |
| 1320 | Manual clean up crew is now on site cleaning debris in AEC-1. |
| 1425 | Excavator to AEC-2, picking metal debris in area bordering stream. Not approaching stream or disturbing silt fence. |
| 1600 | Discuss unit rates for liquid disposal with JL. He says a unit rate was included in the bid submission, and they will be using that rate. |
| 1630 | GM and RJ discuss slight discrepancy with respect to survey between sections 1 and 2 of drawings. 3:1 slope in that area carries the toe of the landfill out beyond the area marked on drawings, though not far. Decision is made to keep the slope at 3:1 and extend the toe slightly. This will mean the drainage swale alignment at the base of the toe will change somewhat. |
| 1640 | GM laying out toe of slope targets for Type 2 and 3 material. |
| 1810 | All off site. |

| Health and Safety |
|---|
| Kudlik briefing discusses keeping an eye out for unauthorized visitors. Stop machine operation if they come close to work zone. |
| Stray dog sighted on site today. It did not approach any personnel, and was only seen once. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 72 | 651 | |
| Type 2 | 477 | 14108 | Slowly progressing up the slope in Zone 1. |
| Type 3 | 0 | 90 | |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| Toe of landfill slope is taking shape. We will not be able to go much further without the last of the metal debris put into Zone 1 (need to leave Zone 1 open while we wait, can only advance so far up slope). |

# Daily Operations Report

Date: 23-Aug-17
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 9 | Condition: | Sunny, alternately breezy and calm. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Pierre-Luc Paradis | Kudlik | Operator |
| Jean-Christophe Lambert | Kudlik | Operator |
| Jean-David Laberge | Kudlik | Project Manager |
| | | |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. We will continue hauling material to AEC-3. There is not much work for the shear or magnet on site, they will only be there for half the day. |
| 0700 | Site activities begin. Hauling and discharging around Zone 1 in AEC-3. |
| 0800 | First delivery, Type 2 material. |
| 0830 | GM and RJ again discuss the toe of the slope close to Pond 3. The new alignment is not much different from the old; the toe does not progress much further out. The extra material required is considered minimal, and will maintain the slope stability - significant as the natural surface ground slope above this area is actually an overhang, the steepest on site. |
| 1130 | Kudlik off site for lunch. |
| 1230 | Site activities resume. We have now placed and compacted all the metal debris available, need to wait for more. |
| 1300 | Excavator laying exact toe of slope as per targets (Type 2 material). |
| 1400 | Water truck on site to moisten roads, mitigate the dust. |
| 1600 | GM and RJ discuss field fit of the drainage swale. Want to make it fit the natural alignment as closely as possible. |
| 1800 | All off site. |

| Health and Safety |
|---|
| Kudlik safety briefing discusses staying alert. Operators, drivers are sitting all day, get out of the equipment and take breaks, walk around, drink water, etc. |
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 9 | 660 | |
| Type 2 | 648 | 14756 | |
| Type 3 | 0 | 90 | |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| Hauling and placing. JD is discussing sending guys off rotation if we don't get Water Licence soon. |
| |

# Daily Operations Report

Date: 24-Aug-17
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 8 | Condition: | Overcast and calm in the morning, moderate to high winds in the afternoon. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Pierre-Luc Paradis | Kudlik | Operator |
| Jean-Christophe Lambert | Kudlik | Operator |
| Johnathan Bouchard | Kudlik | Jr. Engineer |
| Olivier Benoit | QE | Hazardous Materials Specialist |
| Cameron DeLong | City of Iqaluit | Parks Manager: Planning and Operations |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. We will be bringing Type 2 and 3 material to the toe today, shaping and compacting the toe. Today will see geotextile laid and the north edge of the toe laid complete. |
| 0700 | Site activities begin. Prepping toe area for deliveries, getting out geotextile. |
| 0750 | First delivery. Three truck rotation today. |
| 0900 | Delivering Type 2, spreading and compacting. RJ speaks to a journalist taking photos/videos of work activity from the hill to the southeast. It is fine to take photos, but please do not approach the work zone. |
| 0915 | RJ and GM discuss the extent of the rip rap cover. The drawings show rip rap on Section 1, but not on Section 0. GM wants to know how far over to continue the rip rap cover. The goal of the rip rap was to cover and anchor below Zone 1, RJ helps to delineate the extent of placement. |
| 1130 | Kudlik off site for lunch. |
| 1230 | Site activities resume. Same as before lunch. |
| 1315 | Cameron from the City of Iqaluit visits the site. Take him down the haul road, remains in the truck. |
| 1330 | First layer of geotextile is laid out over the shaped and compacted Type 2 material at the toe. |
| 1415 | RJ takes LTM readings with the Horiba meter. |
| 1540 | Discuss Kudlik's next progress claim with Johnathan. He is heading off rotation; their next claim may only inlcude works up to today's date. JL to confirm. |
| 1640 | RJ and GM discuss the section of drainage swale to be installed past the toe of the slope to the north, leading to Pond 2. RJ explains which swales were to be constructed and which were considered 'existing' on the figures. Decision is made against constructing the short section of ditch parallel the toe in the area of Pond 2. The 'existing' ditch in that area is not apparent, and the natural grade of the land in the area promotes drainage away from the slope already. Also, rock outcrops are present and it is possible that attempting construction of the swale would require blasting. Given all of this, the decision is made that a constructed drainage swale is not required here. |
| 1720 | Olivier from QE visits the site for an update. He asks after the progress of the Water Licence, and when/how much further hazardous material is expected. None in the immediate future. |
| 1800 | All off site. |

| Health and Safety |
|---|
| Kudlik briefing today discussed load size; excavator operators please do not overfill trucks. Drivers, do not leave site/quarry without being inspected, putting tarps down and being brushed off if necessary. Do not want to be dropping material at site entrance/exits. Additional reminder about truck speeds as well. |
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 660 | |
| Type 2 | 495 | 15251 | Landfill lifts, bringing the level up to Zone 1. |
| Type 3 | 153 | 243 | Armour stone for landfill toe. Field fit on exact coverage area. |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| The toe of the slope in the secton north of the main landfill is complete. |
| |

# Daily Operations Report

ARCADIS Design & Consultancy for natural and built assets

Date: 25-Aug-17
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 12 | Condition: | Sunny and breezy. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| Barry Cooke | Arcadis | Chief Engineer |
| Gaston Martin | Kudlik | Superintendent |
| Pierre-Luc Paradis | Kudlik | Operator |
| Jean-Christophe Lambert | Kudlik | Operator |
| Andre Aubry | Kudlik | Operator |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Hauling Type 2 and 3 material, spreading, compacting landfill lifts today. |
| 0700 | Site activities begin. |
| 0716 | First delivery, Type 2 material. Spreading, compacting lifts. |
| 0945 | RJ to collect BC from the Frobisher. Earthworks inspection and project discussion. Details regarding section transitions from 2:1 to 3:1 slope grades, extents of rip rap cover and slope stability, etc. No discrepancies or corrective action recommended at this point in time. |
| 1140 | BC off site to airport, site breaks for lunch. |
| 1230 | Site activities resume. Stray dog seen in AEC-1, does not approach any personnel. |
| 1400 | Excavator is out of commission for the remainder of the day for routine maintenance. Maintenance crew on site to replace timing belt, etc. |
| 1410 | RJ and GM discuss whether to bring mini-ex on site to collect debris from AEC-1, grading and backfill strategy. |
| 1520 | RJ does the daily LTM stream/pond water parameter measurements. |
| 1545 | Mini ex is on site and plucking debris in AEC-1. RJ and GM do AEC-1 walkaround to verify areas in need of clean up, how debris is to be sorted, etc. Mini ex works the rest of the day in AEC-1. |
| 1600 | RJ and GM outline the metals impacted soil in need of excavation. |
| | Also call Olivier (QE) to send vac truck for PHC impacted excavation draining tomorrow. There is free product present on the surface of the water collected in the excavation again. |
| 1805 | All off site. |
| | |

| Health and Safety |
|---|
| Kudlik briefing discusses clean up crew PPE, with an emphasis on protective eyewear. Additional reminder to truck driver to watch their speed, there is no rush. |
| Stray dog sighted in AEC-1 again, appears to be the same one. Does not approach any personnel. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 660 | |
| Type 2 | 345 | 15596 | Landfill lifts. |
| Type 3 | 252 | 495 | Armour stone for toe of landfill. |
| Type 4 | 0 | 1321 | |

| Comments: |
| --- |
| Excavation of impacted areas in AEC-1 to continue/begin tomorrow. Will need to drain PHC excavation. |
| Work continues at a slow pace. |

Photo log follows.

# Daily Operations Report

Date: 26-Aug-17
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 8 | Condition: | Sunny and calm gives way to overcast afternoon. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Pierre-Luc Paradis | Kudlik | Operator |
| Andre Aubry | Kudlik | Operator |
| Martin Lemay | QE | Hydrovac Technician |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Max Gaudreau is back from his swim competition in Budapest, and will be taking over the aggregate and material tracking duties from Johnathan. The quarry is into their reserve stockpile, making more Type 2 material for the landfill. They will need to blast again soon, and plans are in place for that. |
| 0700 | Site activities begin. Delivering, spreading and compacting Type 2 lifts in the main landfill. |
| 0716 | 450 excavator mobilizes to the PHC excavation. The new "check in" trilingual sign is here. |
| 0730 | QE hydrovac rig and technician are on site, begin vacuuming free product and contaminated water from the base of the excavation. RJ and ML estimate the volume at 1000L. |
| 0805 | Hydrovac done, QE off site. The PHC excavation is deepened down to the frost layer. This layer is impermeable, and excavation is halted here. PHC soils are loaded directly into the off-road dump truck and taken to the lined temporary staging area in TWA-1. Two loads (32$m^3$) today. |
| 0840 | Excavation is at full depth. Cleaning up the edges of the excavation, smoothing with clean soil. Sorting metal debris uncovered during the further excavation, loading into off-road dump truck. |
| 1020 | Load of metal debris goes down to Zone 1. |
| 1130 | Kudlik off site for lunch. |
| 1230 | Site activities resume. Deliver, spread and compact Type 2 material, picking debris in AEC-1. |
| 1320 | RJ does the LTM water parameter measurement round. |
| 1345 | The metals impacted area is cleared of debris using the excavator. Excavation will happen tomorrow. |
| 1630 | GM and RJ stake out the full extent of the metals-impacted zone for excavation. |
| 1805 | All off site. |

| Health and Safety |
|---|
| Kudlik briefing discusses getting visual acknowledgement from operators before coming in to equipment area of influence. Operators, use three points of contact when entering/exiting equipment. |
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 660 | |
| Type 2 | 621 | 16217 | Landfill lifts. |
| Type 3 | 0 | 495 | |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| Landfill lifts are currently at about 10.5masl, the top of Zone 1 will finished at 14masl. We can continue to work for a little longer, but not much without the debris from AEC-2 (requires water licence). |

Kudlik is into their aggregate reserve stores, and is crushing more material for this project. They will need to blast again soon to make the full amount for this project. Plans are in place to do so.

Photo log follows.

# Daily Operations Report

Date: 27-Aug-17
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 7 | Condition: | Sunny and breezy in the morning, overcast and scattered showers later. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Pierre-Luc Paradis | Kudlik | Operator |
| Andre Aubry | Kudlik | Operator |
| | | |
| | | |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. We will be hauling Type 2 and 3 material to AEC-3 today, shaping the slopes and excavating the metals-impacted area in AEC-1. |
| 0700 | Site activities begin. Three truck rotation hauling Type 2 and 3 to AEC-3 all day. |
| 0713 | First delivery. Delivering, spreading and compacting. |
| 1130 | Kudlik off site for lunch. |
| 1230 | Site activities resume. GM verifying slopes and elevations of landfill lifts, Zone 1. |
| 1330 | Begin excavating metals-impacted area. The soil is deposited in Zone 1, used to fill void space in the lifts of metal debris. |
| 1422 | Load load of impacted soil to Zone 1. |
| 1445 | Using the long boom excavator with attached chain to pluck metal debris from AEC-2 without disturbing the stream. Provides extra reach for the excavator, so it can remain far from the steam edges. The chain is manually attached to a piece of debris and the excavator bucket, then used to haul one piece at a time up and out. Slow going, with a spotter constantly watching to see that debris does not shift, excavator does not move close to stream, etc. |
| 1730 | Mini excavator is use higher on the slope to sort retrieved debris into hazardous and non-hazardous piles. |
| 1800 | Kudlik off site. |
| 1815 | RJ off site. |

| Health and Safety |
|---|
| Kudlik briefing discusses the role of spotters when picking debris with excavators. Remain well clear of the work zone, and be careful of sudden releases/jumping when debris is pulled clear. Specifically, cables can come out of the ground and cover a significant distance when released from tension. |
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 660 | |
| Type 2 | 750 | 16967 | Landfill embankment lifts. |
| Type 3 | 0 | 495 | |
| Type 4 | 0 | 1321 | |

| Comments: |
| --- |
| We have 3-4 days worth of Type 2 aggregate remaining. Blasting scheduled for next week (first week of September). |
| JL will provide gradation tests on the new aggregate produced prior to use for this project. |

Photo log follows.

# Daily Operations Report

Date: 28-Aug-17
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 8 | Condition: | Overcast with light winds. Scattered showers in the evening. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Pierre-Luc Paradis | Kudlik | Operator |
| Andre Aubry | Kudlik | Operator |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Melissa Parent | Kudlik | Health and Safety Officer |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Monday morning, so there is a longer 20 minute safety briefing.<br>JL, GM and RJ discuss the amount of aggregate remaining. We will have to mix and manufacture some to spec with existing aggregate, to tide us over until blasting is complete and new aggregate is being produced. |
| 0700 | Site activities begin. Delivering material, spreading and compacting landfill lifts. |
| 0720 | Manual clean up crew is spreading geotextile across the shaped slope at the toe of the landfill. |
| 0722 | First delivery. Three (or four, sometimes) trucks today. |
| 0830 | Laying geotextile complete, manual clean up crew heads to AEC-2 to sort material and collect debris. |
| 1100 | Weekly construction call, in the site office. Current status of project, etc. |
| | Melissa stops by for a health and safety site inspection. |
| 1130 | Kudlik off site for lunch. |
| 1230 | Site activities resume. Hauling, spreading, compacting, material in AEC-3. Sorting and shearing metal debris in AEC-2. Clean up crew collecting debris. |
| 1300 | Landfill lifts have now filled the overhand section. |
| 1450 | Off-road loads of chopped, sorted metal debris to Zone 1. Clean up crew ferrying hazardous metal debris to TWA-1, including tires, etc. |
| 1530 | GM and RJ layout area PHC-2, the second PHC contaminated material excavation. We will excavate this tomorrow, beginning with the mini ex. |
| 1545 | RJ does the LTM water parameter measurement round. |
| 1805 | All off site. |

| Health and Safety |
|---|
| Kudlik longer safety briefing on Mondays, led by MP. Topics covered include: different types of caution tape and what they mean, blind spots for trucks and equipment - including precautions to take in town, procedures for underground and overhead cable strikes. |
| MP came by for a site safety inspection while RJ was on the weekly construction call. |
| No health and safety issues to report. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 660 | |
| Type 2 | 267 | 17234 | Landfill lifts. |

| | | | |
|---|---|---|---|
| Type 3 | 480 | 975 | Armour stone on landfill toe. |
| Type 4 | 0 | 1321 | |

| Comments: |
| --- |
| Starting to get noticeably darker earlier in the day. |
| |

Photo log follows.

# Daily Operations Report

Date: 29-Aug-17
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 6 | Condition: | Overcast, steady rain with light winds. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Pierre-Luc Paradis | Kudlik | Operator |
| Andre Aubry | Kudlik | Operator |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Delivery, spreading and compaction of landfill lifts. Clean up crew to help with shearing, sorting and collection of metal debris in AEC-2. |
| 0700 | Site activities begin. AA prepping landfill embankment, PL beginning shearing, sorting in AEC-2. |
| 0737 | First delivery, Type 2 for landfill. |
| 0800 | Regrading Road A with the dozer. Road degrading due to traffic and rain. |
| 1115 | Trilingual "Visitors Check In At Site Office" sign is up. |
| 1130 | Kudlik off site for lunch. |
| 1230 | Site activities resume. Deliver, spread and compact in AEC-3, shearing and sorting in AEC-2. Clean up crew collecting debris, garbage in AEC-2 around stream. |
| 1300 | RJ verifying Kudlik progress draw, checking against quantities, etc. |
| 1500 | Decide not to excavate the other PHC contaminated zone today due to heavy rain. Don't want excavation filling up with water. |
| 1600 | RJ takes LTM water parameter measurements. |
| 1750 | All off site. |

| Health and Safety |
|---|
| Kudlik briefing discusses using care while grinding, and keeping your distance from the shear. 20m minimum. |
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 660 | |
| Type 2 | 864 | 18098 | Four/five trucks today. Landfill lifts. |
| Type 3 | 0 | 975 | |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| Metal debris from AEC-2 and smaller size of Zone 1 means it is progressing upwards relatively quickly. Allows us to keep raising the total level of the landfill embankment, keep working. |

Photo log follows.

# Daily Operations Report

Date: 30-Aug-17
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 4 | Condition: | Steady wind and rain. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Pierre-Luc Paradis | Kudlik | Operator |
| Andre Aubry | Kudlik | Operator |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| | | |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Deliver, spread and compact landfill lifts. Shearing and sorting debris. |
| 0700 | Site activities begin. CK cleaning debris in AEC-2. |
| 0721 | First delivery. Hauling, spreading and compacting landfill lifts. |
| 0900 | Using the mini ex to retrieve metal debris from the other side of the stream in AEC-2. Shear is cutting, sorting metal debris. |
| 1130 | Kudlik off site for lunch. |
| 1230 | Site activities resume. |
| 1452 | Shear off site to work in the adjacent metal dump. |
| 1500 | Again due to rain, we will not excavate PHC-2 in AEC-1 today. |
| 1800 | All off site. |
| | |
| | |

| Health and Safety |
|---|
| Kudlik briefing discusses the poor conditions of the road. Take your time, lower speeds. |
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 660 | |
| Type 2 | 963 | 19061 | Landfill lifts. |
| Type 3 | 0 | 975 | |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| Slow day. |
| Rain continues. |

Photo log follows.

# Daily Operations Report

Date: 31-Aug-17
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 5 | Condition: | Overcast, steady wind and scattered showers. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Pierre-Luc Paradis | Kudlik | Operator |
| Andre Aubry | Kudlik | Operator |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Pierre-Yves Dumouchel | Kudlik | Office Administration |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. We will be adding landfill lifts and excavate the PHC-impacted area today. |
| 0700 | Site activities begin. AA preping AEC-3, PL and clean up crew in AEC-2. |
| 0720 | First delivery. Type 1 and 2 material coming to site today. |
| 0830 | Decision is made to close Zone 1 after the latest amount of debris is added. >95% of the metal debris is now in Zone 1, the remainder can be added close to the face as we progress. This is done to enable us to keep working; the landfill lifts are currently ~1m higher than Zone 1, and to progress further we need to level off the surface. To do this, it will be filled to the current level of the landfill lifts (11.5masl) with Type 1 material and compacted as per spec. |
| 0840 | PD is on site to hook up wireless internet for the night watchman, who will be starting tonight. |
| 0900 | Collecting metal debris in AEC-1 and -2 with the magnet. |
| 1000 | Excavate the second PHC-impaced zone in AEC-1. Frost is <1mbgs. |
| 1100 | Call with Arcadis project team to discuss quantities, relevant contingecy expectations moving forward. Will test living models and compute expected quantities to provide a useable estimate. |
| 1130 | Kudlik off site for lunch. |
| 1230 | Site activities resume. Delivery of Type 1 and 2 material, spreading and compacting. Clean up crew in AEC-2 collecting debris, magnet also collecting metal debris from AEC-1 and -2 scrap piles. |
| 1312 | GM and clean up crew spreading geotextile on the shaped slope of the landfill embankment. |
| 1410 | Begin closing Zone 1 with Type 1 material. |
| 1500 | Clean up crew moves into the ravine area at the north end of the future landfill embankment. There is some lead-contaminated material here, RJ tests to confirm and directs those pieces to be moved to TWA-1. The rest of the debris in this area constitute the northern slope face of the landfill. |
| 1800 | All off site. |

| Health and Safety |
|---|
| Kudlik briefing discusses keeping away from the magnet - debris can fly up from quite a distance away. Eye protection is mandatory on site. Also, heavy rain last night/yesterday means footing today - especially on rocky slopes - will be uncertain. Exercise caution. |
| No health and safety issues today. |

# Daily Operations Report

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 501 | 1161 | |
| Type 2 | 519 | 19580 | |
| Type 3 | 0 | 975 | |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| By tomorrow, the landfill embankment should be one level lift. |
| |

Photo log follows.

# Daily Operations Report

Date: 1-Sep-17 Friday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 7 | Condition: | Overcast, light to moderate winds, scattered showers. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Andre Aubry | Kudlik | Operator |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Placement of armour stone, landfill lifts and debris clean up. |
| 0700 | Site activities begin. Clean up crew on site. |
| 0722 | First delivery. Bringing Type 3 material to spread on slope. |
| 0900 | A visit from City of Iqaluit employee looking for Kudlik, I send him to their office. |
| 1130 | Kudlik off site for lunch. |
| 1230 | Site activities resume. Deliver, spread and compact Type 2 and 3 material, collect debris. |
| 1330 | Discussion with geotechnical team regarding closing Zone 1. Going to bring it up to grade. |
| 1530 | Water parameter measurements. Raining again by the time I finish. |
| 1640 | Conversation with GM regarding the painted locker pieces. Several have passed, but most have failed the lead content test. We will treat them all as hazardous debris. |
| 1755 | All off site. |

| Health and Safety |
|---|
| Kudlik briefing discusses road speeds and rules. The roads are in very poor condition due to all the rain. Keep an eye out for the clean up crew's ATV when on site, coming up the hill. |
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 87 | 1248 | Closing Zone 1. |
| Type 2 | 582 | 20162 | Landfill lifts. |
| Type 3 | 195 | 1170 | Armour stone for slopes. |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| Relatively slow day. Poor conditions. |
| |

Photo log follows.

# Daily Operations Report

Date: 2-Sep-17 Saturday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 6 | Condition: | Overcast, light wind, scatter showers. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Jean-Christophe Lambert | Kudlik | Operator |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Today will be mainly slope shaping, geotextile placement and armour stone. |
| 0700 | Site activities begin. JC placing, compacting armour stone, clean up crew collecting debris. |
| 0727 | First deliver, Type 3 for slopes. |
| 0900 | Clean up crew moves some silt fence from AEC-1, where it is no longer needed, to AEC-2, where it will replace a section in need of repair. |
| 0905 | JC placing, compacting armour stone. GM setting targets. |
| 1015 | Conversation with RT regarding picking up debris from the stream. RJ relays that we cannot go in the stream, or pick up partially submerged debris, at this time. |
| 1130 | Kudlik off site. |
| 1230 | Site activities resume. Landfill embankment lifts, clean up crew picking debris. |
| 1400 | Significant rain, affecting the ability to haul and work. |
| 1600 | Clean up crew calls it quits. The conditions are making it too difficult to work. RJ does the water parameter measurements as per LTM plan. |
| 1755 | All off site. |

| Health and Safety |
|---|
| Kudlik briefing discusses the road speeds and regulations in town. Do not want incidents, we are going back and forth a lot. |
| Clean up crew stops work at 1600 due to adverse conditions, poor footing. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1248 | |
| Type 2 | 513 | 20675 | Landfill lifts. |
| Type 3 | 220 | 1390 | Armour stone for the slope. |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| Conditions are worsening, and the roads are in very poor condition. Tomorrow will likely be a weather day. |
| |

Photo log follows.

# Daily Operations Report

Date: 3-Sep-17 Sunday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 4 | Condition: | Heavy wind and rain. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| | | |
| | | |
| | | |
| | | |
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| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Today will be a weather day, the roads are impassable. |
| 0700 | RJ in office, working through financial paperwork, etc. |
| 0900 | Site inspection, walkaround. |
| 1230 | Site inspection, walkaround. |
| 1400 | Water parameter measurements as per LTM plan. |
| 1700 | Off site. |
| | |
| | |
| | |
| | |
| | |

| Health and Safety |
|---|
| No health and safety issues today. |
| |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1248 | |
| Type 2 | 0 | 20675 | |
| Type 3 | 0 | 1390 | |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| No hauling today due to poor road conditions. |
| |

No photo log (no activity).

# Daily Operations Report

Date: 4-Sep-17 Monday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 4 | Condition: | Moderate to heavy wind, raining intermittently. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| | | |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Longer Monday morning safety briefing. There will be no hauling today, hoping to repair the roads this afternoon. |
| 0700 | Site activities begin, only the debris picking crew on site. |
| 1010 | Kudlik mechanics service the site generator. |
| 1057 | Clean up crew enquires about removing debris from the streambed. Not yet. |
| 1130 | Kudlik off site for lunch. |
| 1230 | Site activities resume. |
| 1450 | RJ takes water parameter measurements as per the LTM plan. |
| 1500 | GM staking out the path of Road B, at the top of the landfill slope. |
| 1755 | All off site. |
| | |

| Health and Safety |
|---|
| Longer health and safety discussion today. Discusses engine emissions in closed spaces and knife safety. |
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1248 | |
| Type 2 | 0 | 20675 | |
| Type 3 | 0 | 1390 | |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| No hauling today. Road repair started in the afternoon, hopefully we can haul tomorrow. |
| |

Photo log follows.

# Daily Operations Report

Date: 5-Sep-17 Tuesday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 6 | Condition: | sun and cloud, light wind |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Jean-Christophe Lambert | Kudlik | Operator |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Road speed and tailgates. |
| 0700 | Site activities begin. |
| | Repairing the road this am |
| 9:30 | Discussed a change with Charles Gravell (Arcadis Engineer). We can end the initial lift at 12 m elevation instead of the initial 13 m design. There is no worries about lateral earth pressures with this design change. |
| 10:00 | Discussed change with GM on site. Kudlik will need an e-mail from Arcadis and PSPC with this change. |
| 11:30 | Lunch |
| 12:30 | Activity resumes. Hauling resumes to the site. |
| | Hauling Type II aggregate and placing/compacting in the 2:1 slope. Gaston implemented the discussed change in the field and ended the initial bench at 12 m. |
| 14:00 | RF on site. RJ off site, back to Ottawa. |
| | Continuing with hauling of Type II aggregate. |
| 18:05 | Off site |

| Health and Safety |
|---|
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1248 | |
| Type 2 | 1200 | 21875 | |
| Type 3 | 0 | 1390 | |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| resumed hauling today |
| |

Photo log follows.

# Daily Operations Report

Date: 6-Sep-17 Wednesday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 8 | Condition: | sun and cloud, light wind |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Jean-Christophe Lambert | Kudlik | Operator |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Ensure good eye contact between everyone at all times. Make sure you know each others intentions. Stop if it is not clear and use radios or get out of the machine and talk one on one. |
| | Hauling, placing, and compacting material in the initial lift of the 2:1 slope area of the main landfill (AEC 3) |
| 9:00 | Spoke with GM and JD about the elevation change for the bench (transition zone between 4:1 and 2:1). Kudlik would like this change in writing as soon as possible. RJ working on a draft e-mail to address this change. |
| 11:30 | Lunch |
| 12:30 | On site - activity resumes. |
| | Continuing hauling, placing and compacting Type II aggregate. |
| 18:00 | Off site |

| Health and Safety |
|---|
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1248 | |
| Type 2 | 1359 | 23234 | |
| Type 3 | 0 | 1390 | |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| Good progress, lots of material moved to site. |
| |

Photo log follows.

# Daily Operations Report

Date: 7-Sep-17 Thursday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 9 | Condition: | sunny, light wind |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Jean-Christophe Lambert | Kudlik | Operator |
| Michael Brownlee | PSPC | Project |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Respect all of the speed limits. The speed limit on the site is 30 km/hr. |
| 7:00 | On site - activities commence |
| | Hauling Type II aggregate, placing and compacting in the new lift. |
| 7:15 | Discussed geotextile placement with GM this am and confirmed the tie in points etc. |
| | JC conducted some re-grading of Road A to smooth things out for the trucks using the dozer. |
| 8:15 | Received the latest grain size distribution from Kudlik. The two test show the new batch of Type II aggregate are within specs. |
| 9:30 | Michael Brownlee arrives on site. RF and MB completed a site walk-through. Discussed trying to maintain some natural features of the site drainage located in AEC 2. |
| 11:30 | Lunch |
| 12:30 | On site - activities resume. Continue hauling, placing and compacting Type II aggregate. |
| 15:30 | Began constructing temporary access road from the top of the landfill to the current toe. |
| 18:00 | Off site |

| Health and Safety |
|---|
| Trucks were driving slightly fast and RF had to ask Kudlik to slow them down. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1248 | |
| Type 2 | 1329 | 24563 | Hauling Type II to AEC 3 |
| Type 3 | 0 | 1390 | |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| Good progress hauling today. New haul road is coming along well. |
| |

Photo log follows.

# Daily Operations Report

Date: 8-Sep-17 Friday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 7 | Condition: | Sun and cloud. Windy. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Jean-Christophe Lambert | Kudlik | Operator |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 6:45 | Kudlik briefing. Respect all of the speed limits. The speed limit on the site is 30 km/hr. |
| 7:00 | On-site. Hauling, placing, and compacting Type II material. Labourers laying geotextile on the lower bench. |
| 11:30 | Lunch |
| 12:30 | Resumed activity. Continued hauling, placing, and compacting Type II aggregate material. |
| | Began hauling Type III aggregate material (Rip-rap) and placing in lifts along the bench. |
| 15:00 | Completed the temporary haul road. Now using for hauling. |
| 18:00 | Off site |

| Health and Safety |
|---|
| No concerns today - truck speed was improved. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1248 | |
| Type 2 | 219 | 24782 | Hauling Type II to AEC 3 |
| Type 3 | 1065 | 2455 | Hauling Type III to AEC 3 |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| Good progress hauling today. |
| |

Photo log follows.

# Daily Operations Report

Date: 9-Sep-17 Saturday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 6 | Condition: | clounds, light rain off and on |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Jean-Christophe Lambert | Kudlik | Operator |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Respect all of the speed limits. The speed limit on the site is 30 km/hr. |
| 7:00 | On site - hauling Type III aggreagate material for bench and toe armour |
| 11:30 | Lunch |
| 12:30 | On site - hauling Type III aggreagate material for bench and toe armour |
| 15:45 | Began hauling Type II aggregate material |
| | Finished placing Type II aggregate material for now, only the southern toe remains |
| 16:00 | Off site |

| Health and Safety |
|---|
| Low visibility - everyone work a little bit slower to account for the weather. No issues or concerns. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1248 | |
| Type 2 | 522 | 25304 | Hauling Type II to AEC 3 |
| Type 3 | 723 | 3178 | Hauling Type III to AEC 3 |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| Good progress hauling today. |
| |

Photo log follows.

# Daily Operations Report

Date: 10-Sep-17 Sunday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 6 | Condition: | Cloudy, scattered showers, light wind |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Jean-Christophe Lambert | Kudlik | Operator |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Respect all of the speed limits. The speed limit on the site is 30 km/hr. |
| 7:00 | On site and activities begin. Hauling Type II aggregate material, placing, and compacting. |
| | May begin ditches at top of landfill and metal impacted soil removal from AEC 2 as well today. |
| 11:00 | RF on weekly construction meeting conference call |
| 11:30 | Kudlik off site |
| 12:00 | RF off site lunch |
| 12:30 | On site and activities resume. Continued hauling Type II aggregate material, placing and compacting. |
| 14:15 | Health and Safety inspection by Kudlik. All is okay. |
| 18:05 | Off site |
| | Note: ditching and metal impacted soil removal did not commence today. |
| | |

| Health and Safety |
|---|
| No concerns |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1248 | |
| Type 2 | 1434 | 26738 | Hauling Type II to AEC 3 |
| Type 3 | 0 | 3178 | |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| Good progress hauling today. |
| |

Photo log follows.

# Daily Operations Report

Date: 11-Sep-17 Monday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 5 | Condition: | Foggy with rain off and on |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Jean-Christophe Lambert | Kudlik | Operator |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Respect all of the speed limits. The speed limit on the site is 30 km/hr. |
| 7:00 | on site - activities commence. Hauling Type II aggregate material, placing, and compacting. |
| 11:30 | Off site - lunch |
| 12:30 | On site - activities resume. Hauling Type II aggregate material, placing, and compacting. |
| | Became very windy - 70 km/hr gusts. |
| 18:00 | Off site |

| Health and Safety |
|---|
| High winds today - ground crews needed to take extra care while walking around to maintain safe footing. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1248 | |
| Type 2 | 1107 | 27845 | Hauling Type II to AEC 3 |
| Type 3 | 0 | 3178 | |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| Good progress hauling today. |
| |

Photo log follows.

# Daily Operations Report

Date: 12-Sep-17 Tuesday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 5 | Condition: | Heavy rain all day, cloudy, light wind |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Jean-Christophe Lambert | Kudlik | Operator |
| Pierre Lajoie | Kudlik | Operator |
| Sylvian St-Onge | Kudlik | Operator |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. |
| 7:00 | On-site - activities commence. Hauling Type II today and conducting metal soils excavation in AEC 2. |
| 7:25 | First loads of aggregate arrive. |
| | Heavy rain today, trucks moving slowly. May be less productivity today, but will hopefully save the roads some wear and tear. |
| 11:30 | Off site - lunch |
| 12:30 | On-site - activities resume. Continue hauling Type II aggregate material, placing and compacting. |
| 15:00 | Completed removal of metals impacted soil from AEC 2. Was all placed into aggregate lifts up close to the landfill slope. The material was all sand and gravel and was nice and moist so will pack in very well. A total of 17 rock truck loads were moved for a total of 272 m3 of material. |
| | Excavated down to bedrock across the entire area - no sampling required. |
| | RF rough counted tires and batteries in TWA1 for an inventory |
| 16:50 | RF and GM conduct site walk through. Discuss ditches and swale construction. |
| | Kudlik begins work on swale on eastern side of upper landfill (AEC 3) |
| 18:00 | Off site |
| | |
| **Health and Safety** | |
| no concerns today | |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1248 | |
| Type 2 | 917 | 28762 | Hauling Type II to AEC 3 |
| Type 3 | 0 | 3178 | |
| Type 4 | 0 | 1321 | |

| Comments: |
|---|
| Good progress hauling and excavating today. |
| |

Photo log follows.

# Daily Operations Report

Date: 13-Sep-17 Wednesday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 5 | Condition: | Foggy, steady light rain all day, cloudy |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Jean-Christophe Lambert | Kudlik | Operator |
| Pierre Lajoie | Kudlik | Operator |
| Sylvian St-Onge | Kudlik | Operator |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Respect all of the speed limits. The speed limit on the site is 30 km/hr. |
| 7:00 | On site and activities commence for the day. |
| | Kudlik to begin removal of Access Road A. The municipal roads are in too poor a condition and we will work on-site only today. |
| 8:25 | RF talked with GM and JD about rip rap on southern portion of the landfill. Seems there may have been some minor miss-interpretation of the cross sections. RF approves the addition of some more rip-rap to maintain consistency with the remainder of the design and for aesthetic and functional purposes. |
| | Two rock trucks are hauling from the bottom of Access Road A and hauling to the upper lift of the main landfill slope. |
| 11:25 | Off site for lunch |
| 12:20 | On site, activities resume |
| 13:00 | RF sampling excavation walls of PHC-2 and Metals-1 in AEC 1 for confirmatory samples. Still raining heavily. |
| 16:30 | RF sampling stock piled soil in TWA-1 for classification to determine appropriate course of disposal. |
| 18"00 | Off site |
| | |

| Health and Safety |
|---|
| Rainy with poor visibility. Trucks on site drove very slow today and were very safe. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1248 | |
| Type 2 | 0 | 28762 | No hauling - bad road conditions |
| Type 3 | 0 | 3178 | |
| Type 4 | 0 | 1321 | |

| | | | |
|---|---|---|---|
| Road A to Landfill | 1408 | 1408 | Hauling Type Road A to AEC 3 |

| Comments: |
|---|
| Good progress - lots of aggregate moved from Access Road A today. |
| |

Photo log follows.

# Daily Operations Report

Date: 14-Sep-17 Thursday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 9 | Condition: | sunny, light wind |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Jean-Christophe Lambert | Kudlik | Operator |
| Pierre Lajoie | Kudlik | Operator |
| Sylvian St-Onge | Kudlik | Operator |
| Max Lagueux | Kudlik | Superintendent |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Respect all of the speed limits. The speed limit on the site is 30 km/hr. |
| 7:00 | On-site. Activities commence. |
| | Continuing to dismantle Access Road A. Manual clean up crew continuing debris pick up throughout the site. |
| 8:30 | RF ships samples south via First Air Cargo. |
| | Kudlik removing waste from north end of landfill toe (final remaining waste to deal with) |
| | Laying geotextile on north toe in preparation from rip-rap (Type III aggregate) |
| 10:59 | Visit on site by water resource enforcement officer (Justin Hack) from INAC with regards to the NWB license. Had a very brief discussion with RF about the project. Said he will come back this afternoon with PPE and talk more, as well as, conduct a site walk through. |
| | Discussed work in the water to achieve the sediment removal required. Also discussed the main access road and whether or not it will be left in place - RF indicated that it is to remain as is up to the crest of the landfill. |
| 11:30 | Off site for lunch |
| 12:30 | On site - activities resume. Continue road dismantling and Type III aggregate hauling. |
| 14:40 | INAC water resource officers return to site. Justin Hack, John Mesher, and Jeremy Fraser - all from INAC. Conducted a site walk-through with RF. Inspected the landfill operations and the stream in question. Justin mentioned that there may be another type of license we can apply for that does not have a 50 m3 limit, as was specified in our current application. They will look at the regulations and get back to RF. |
| 18:00 | off site |
| | |

| Health and Safety |
|---|
| no issues or concerns today |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1248 | |
| Type 2 | 0 | 28762 | |
| Type 3 | 360 | 3538 | Hauling Type III to AEC 3 |
| Type 4 | 0 | 1321 | |

| | | | |
|---|---|---|---|
| Road A to Landfill | 1248 | 2656 | Hauling Type Road A to AEC 3 |

| Comments: |
|---|
| |

# Daily Operations Report

Date: 15-Sep-17 Friday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 5 | Condition: | sun and cloud, wind 20k |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Superintendent |
| Colin Kanayuk (Inuk) | Kudlik | Labourer |
| Simon Akearok (Inuk) | Kudlik | Labourer |
| Ralph Totalik (Inuk) | Kudlik | Labourer |
| Andre Aubry | Kudlik | Operator |
| Pierre Lajoie | Kudlik | Operator |
| Sylvian St-Onge | Kudlik | Operator |
| Max Lagueux | Kudlik | Superintendent |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Respect all of the speed limits. The speed limit on the site is 30 km/hr. |
| 7:00 | On-site. Activities commence. |
| | Continuing to dismantle Access Road A. Manual clean up crew continuing debris pick up throughout the site. GM to leave Iqaluit today, Max Lageux to take over as superintendent. May haul some type II and type III today after road repairs are complete in town. |
| | Placing and compacting into AEC 3 main slope cap. |
| 8:30 | RF LTM round |
| 11:00 | GM and RF discuss quantities remaining. GM conducted a site survey this am that included the slope remaining, the top of the landfill, and the remaining aggregate in the road A. It was determined that approximately 10,000 m3 +/- will be required from the quarry still to complete all the work on site - this calculation took into consideration the remaining material available within the Access Road A. |
| 11:30 | Off site for lunch |
| 12:30 | On site - continuing activities. |
| | Hauling some type III and type II aggregate from the quarry now. Continuing work on upper portion of the Access Road A dismantling. |
| 15:30 | Completed Road A dismantling for now - do not want to remove anymore material, as we still need access to the bottom of the slope to construct drainage swales etc. |
| | Excavator working on the upper swale onto of the main landfill (AEC 3) |
| | Hauling only Type II aggregate now |
| 18:00 | Off site |

| Health and Safety |
|---|
| no issues or concerns today |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | | 1248 | |
| Type 2 | 828 | 29590 | Hauling Type II to AEC 3 |
| Type 3 | 162 | 3700 | Hauling Type III to AEC 3 |
| Type 4 | | 1321 | |

| | | | |
|---|---|---|---|
| Road A to Landfill | 656 | 3312 | Hauling Type Road A to AEC 3 |

| Comments: |
|---|
| GM off site today - shifted out. Max Legeux to replace GM |
| |

Photo log follows.

# Daily Operations Report

Date: 16-Sep-17 Saturday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 5 | Condition: | sun and cloud, light wind |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Andre Aubry | Kudlik | Operator |
| Pierre Lajoie | Kudlik | Operator |
| Sylvian St-Onge | Kudlik | Operator |
| Max Lagueux | Kudlik | Superintendent |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Respect all of the speed limits. The speed limit on the site is 30 km/hr. |
| 7:00 | On-site. Activities commence. |
| | Hauling type II, placing and compacting |
| | Spreading Type III cap on southern toe of the landfill |
| | Working on upper ditches and swales |
| 11:30 | Off-site for lunch |
| 12:30 | On site - activities resume |
| 15:00 | Talked with ML and JD about drainage swales. Swale at north bottom has been cancelled, we have natural drainage already as is. Re-route of the other lower drainage swales to field fit with topography and bedrock outcrops. RF directs Kudlik as to the best location for newly aligned swales in the field. |
| 18:00 | Off site |
| | |

| Health and Safety |
|---|
| no issues or concerns today |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | | 1248 | |
| Type 2 | 1341 | 30931 | Hauling Type II to AEC 3 |
| Type 3 | | 3700 | |
| Type 4 | | 1321 | |

| | | | |
|---|---|---|---|
| Road A to Landfill | | 3312 | |

| Comments: |
|---|
| |
| |

Photo log follows.

# Daily Operations Report

Date: 17-Sep-17 Sunday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 4 | Condition: | sun and cloud, wind 20k |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Andre Aubry | Kudlik | Operator |
| Pierre Lajoie | Kudlik | Operator |
| Sylvian St-Onge | Kudlik | Operator |
| Max Lagueux | Kudlik | Superintendent |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Respect all of the speed limits. The speed limit on the site is 30 km/hr. |
| 7:00 | On-site. Activities commence. |
| | Hauling Type II aggregate, placing and compacting into AEC 3 main slope and top of AEC 3 |
| | Start with drainage swale at the bottom of AEC 3 today |
| 11:30 | Off-site for lunch |
| 12:30 | On-site. Activities resume. |
| | Start working on the drainage swale at the bottom of AEC 3 now. Field fit as discussed yesterday. RF ensures alignment. |
| | Continuing hauling, placing and compacting Type II aggregate material. Hauling some Type III for drainage swales. |
| 18:00 | Off-site |

| Health and Safety |
|---|
| no issues or concerns today |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | | 1248 | |
| Type 2 | 987 | 31918 | Hauling Type II to AEC 3 |
| Type 3 | | 3700 | |
| Type 4 | | 1321 | |

| | | | |
|---|---|---|---|
| Road A to Landfill | | 3312 | |

| Comments: |
|---|
| Great progress |
| |

Photo log follows.

# Daily Operations Report

Date: 18-Sep-17 Monday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 5 | Condition: | sunny, light breeze |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Andre Aubry | Kudlik | Operator |
| Pierre Lajoie | Kudlik | Operator |
| Sylvian St-Onge | Kudlik | Operator |
| Max Lagueux | Kudlik | Superintendent |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Respect all of the speed limits. The speed limit on the site is 30 km/hr. |
| 7:00 | On-site. Activities commence. |
| | Hauling type II, placing and compacting in AEC 3 main slope and top of AEC 3 |
| | Continue working on drainage swales at bottom of AEC 3 |
| 7:20 | First truck. Piling aggregate at north end of AEC 3 and pushing over the edge with the dozer. |
| | Excavator working on drainage swales |
| 11:30 | Off site for lunch |
| 12:30 | On-site. Activities resume. |
| | Work continues as above |
| 14:40 | RF LTM performance monitoring round. |
| 18:00 | Off site |
| | |

| Health and Safety |
|---|
| no issues or concerns today |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | | 1248 | |
| Type 2 | 1113 | 33031 | Hauling Type II to AEC 3 |
| Type 3 | 93 | 3793 | Hauling Type III to AEC 3 |
| Type 4 | | 1321 | |
| Road A to Landfill | | 3312 | Hauling Type Road A to AEC 3 |

| Comments: |
|---|
| |
| |

Photo log follows.

# Daily Operations Report

Date: 19-Sep-17 Tuesday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 4 | Condition: | cloudy, light wind |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Andre Aubry | Kudlik | Operator |
| Pierre Lajoie | Kudlik | Operator |
| Sylvian St-Onge | Kudlik | Operator |
| Max Lagueux | Kudlik | Superintendent |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Respect all of the speed limits. The speed limit on the site is 30 km/hr. |
| 7:00 | On-site. Activities commence. |
| | Hauling type II, placing and compacting |
| | Two rock tucks mobilized to site |
| 10:20 | RF discussed upper landfill cap with ML. RF inspected cap thickness and figured out that, in some areas, we are only getting a 400 mm thickness in total (after Road B construction). RF instructed Kudlik to increase the elevation of the Type II material by +500 mm in order to obtain a total of 1000 mm coverage over debris. This is required in order to protect the landfill from precipitation and H20 loading. |
| 11:00 | RF completed correspondence with PSPC and Kudlik with regards to the proposed elevation changes. |
| 11:30 | Off-site for lunch |
| 12:30 | On-site. Activities resume. |
| 13:00 | RF picked up RJ from the airport. RJ in town for a couple of days to complete another job. RF and RJ completed a site walk through to discuss progress and steps moving forward. |
| | Kudlik cleaning tundra at the bottom of AEC 3 from rock debris left over from the removal of Road A. Looks good. |
| 16:00 | Finished up with AEC 3 swales at bottom of the toe. They look great. |
| | Continuing to remove Road A now. Hauling to the top of AEC 3. |
| 18:00 | Off-site. |

| Health and Safety |
|---|
| no issues or concerns today |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | | 1248 | |
| Type 2 | 840 | 33871 | Hauling Type II to AEC 3 |
| Type 3 | | 3793 | |
| Type 4 | | 1321 | |

| | | | |
|---|---|---|---|
| Road A to Landfill | 1184 | 4496 | Hauling Type Road A to AEC 3 |

| Comments: |
|---|
| |
| |

Photo log follows.

# Daily Operations Report

Date: 20-Sep-17 Wednesday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 5 | Condition: | sun and cloud, wind 20k |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Ryan Janzen | Arcadis | Departmental Representative |
| Andre Aubry | Kudlik | Operator |
| Pierre Lajoie | Kudlik | Operator |
| Sylvian St-Onge | Kudlik | Operator |
| Max Lagueux | Kudlik | Superintendent |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Respect all of the speed limits. The speed limit on the site is 30 km/hr. |
| 7:00 | On-site. Activities commence. |
| | Hauling type II, placing and compacting |
| | Work on Road A |
| | Drainage swale at toe of AEC 3 |
| 11:30 | Off site for lunch |
| 12:30 | On site - activities resume. |
| 13:00 | Pick up RJ at the airport. |
| 14:30 | RF and RJ complete site walk through to discuss progress and steps moving forward. |
| | Kudlik cleaning tundra at bottom of AEC 3 slope where former access road A was located. Looks great. |
| 16:00 | finishing up with drainage swales. |
| 18:00 | Off-site. |

| Health and Safety |
|---|
| no issues or concerns today |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | | 1248 | |
| Type 2 | 867 | 34738 | Hauling Type II to AEC 3 |
| Type 3 | | 3793 | |
| Type 4 | | 1321 | |

| | | | |
|---|---|---|---|
| Road A to Landfill | 624 | 5120 | Hauling Type Road A to AEC 3 |

| Comments: |
|---|
| |
| |

Photo log follows.

# Daily Operations Report

Date: 21-Sep-17 Thursday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 5 | Condition: | sun and cloud, wind 20k |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Andre Aubry | Kudlik | Operator |
| Pierre Lajoie | Kudlik | Operator |
| Sylvian St-Onge | Kudlik | Operator |
| Max Lagueux | Kudlik | Superintendent |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Respect all of the speed limits. The speed limit on the site is 30 km/hr. |
| 7:00 | On-site. Activities commence. |
| 7:00 | On-site. Activities commence. |
| | Removing Road A, hauling to the top of AEC 3, placing and compacting. |
| | Will conduct LTM chemical sampling today. |
| | RF preparing sample containers. |
| 9:00 | RF begins surface water sampling round of LTM1 through 7. |
| 11:30 | Off site for lunch |
| 12:30 | On-site. Activities resume. |
| | RF completes remaining LTM water sampling |
| 13:00 | Kudlik begins capping of AEC 1 and stockpiling material outside of work area. |
| 18:00 | Off site |
| | |

| Health and Safety |
|---|
| no issues or concerns today |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1248 | |
| Type 2 | 528 | 35266 | Hauling Type II to AEC 1 and stockpile area |
| Type 3 | 363 | 4156 | Hauling Type III to stockpile |
| Type 4 | 0 | 1321 | |

| | | | |
|---|---|---|---|
| Road A to Landfill | 576 | 5696 | Hauling Type Road A to AEC 3 |

| Comments: |
|---|
| |
| |

Photo log follows.

# Daily Operations Report

Date: 22-Sep-17 Friday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 2 | Condition: | sun and cloud, wind 20kph |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Ryan Janzen | Arcadis | Departmental Representative |
| Pierre-Luc Paradis | Kudlik | Equipment Operator |
| Pierre Lajoie | Kudlik | Equipment Operator |
| Bernard Sivret | Kudlik | Equipment Operator |
| Sylvian St-Onge | Kudlik | Equipment Operator |
| Max Lagueux | Kudlik | Supervisor |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Respect all of the speed limits. The speed limit on the site is 30 km/hr. |
| 7:00 | On-site. Activities commence. |
| | Hauling Type 2, placing and compacting. |
| | Placing and compacting into AEC-3 main slope cap. |
| | Dismantling Road A. |
| 0840 | Martin is on site for health and safety inspection. |
| 1130 | Kudlik off site for lunch. |
| 1215 | RJ takes RF to airport for flight to YOW. |
| 1230 | Site activities resume. |
| 1330 | Capping and grading of AEC-1 begins. |
| 1720 | RJ and ML go over areas to be capped in AEC-1. |
| | Discuss strategy for Road A dismantling, what is to be left behind. Discuss strategy for closing road access at end of project. More details to follow from TC. |
| 1755 | Kudlik off site. |
| 1830 | RJ off site. |

| Health and Safety |
|---|
| Martin visits site for fire extinguisher check up. |
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1248 | |
| Type 2 | 474 | 35740 | Capping in AEC-1. |
| Type 3 | 0 | 4156 | |
| Type 4 | 0 | 1321 | |
| | | | |
| Road A to Landfill | 928 | 6624 | Hauling Type 2 from Road A to other areas (landfill embankment, capping). |

| Comments: |
|---|
| Beginning to cap and cover debris areas in AEC-1/2, there isn't much left to do. |
| |

No photo log follows today.

# Daily Operations Report

Date: 23-Sep-17
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 0 | Condition: | Overcast, moderate winds. Light snow at times. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| Maxime Lageuex | Kudlik | Supervisor |
| Pierre-Luc Paradis | Kudlik | Operator |
| Sylvain St. Onge | Kudlik | Operator |
| Pierre Lajoie | Kudlik | Operator |
| Bernard Sivret | Kudlik | Operator |
| Danik Mazerolle | Kudlik | Surveyor |
| Jean-David Laberge | Kudlik | Project Manager |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Road A dismantling will continue, moving material to areas in need of cap. Road B and drainage swale work as well. Danik to provide targets. |
| 0700 | Site activities begin. |
| | Discussion with ML as to how much of Road A material will remain. RJ to verify with PSPC. |
| 0730 | Generator on site and internet connection are not working. RJ attempts to fix. |
| 0850 | RJ verifies and lays out areas in AEC-1 and -2 in need of cap. |
| 1130 | Kudlik off site for lunch. |
| 1230 | Site activities resume. |
| 1330 | Capping activities move from AEC-1 to -2. |
| 1515 | JL comes by for an inspection, progress check. He is anxious to get approval to access the streambed, there is not much left to do. |
| 1645 | LTM water parameter measurements. |
| 1730 | Kudlik off site. |
| 1810 | RJ off site. |

| Health and Safety |
|---|
| Morning briefing discusses site layout and appropriate parking spots for equipment. Be visible. |
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1248 | |
| Type 2 | 0 | 35740 | |
| Type 3 | 0 | 4156 | |
| Type 4 | 0 | 1321 | |

| | | | |
|---|---|---|---|
| Road A to Landfill | 1008 | 7632 | Hauling Type 2 from Road A to other areas (landfill embankment, capping). |

| Comments: |
|---|
| Running out of work activities, down to half crew midway through the day. |
| Need verdict on Road A material from PSPC/TC. |

# Daily Operations Report

Date: 24-Sep-17
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 0 | Condition: | Fog in the morning, light snow intermittently. Moderate wind from the N. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| Jean-David Laberge | Kudlik | Project Manager |
| Maxime Lageuex | Kudlik | Supervisor |
| Pierre-Luc Paradis | Kudlik | Operator |
| Bernard Sivret | Kudlik | Operator |
| Danik Mazerolle | Kudlik | Surveyor |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Road A dismantling and drainage swales. |
| 0700 | Site activities begin. Welder on site to perform maintenance on excavator bucket. Stone is hard, how about that. |
| | Slow morning, no other personnel on site. |
| 1230 | Kudlik on site. Material deliveries from stockpile for drainage swales, raising grade at the top of the landfill embankment. Type 4 material. |
| 1515 | Talk with ML and JL with regards to field fits for drainage swales. Minor modifications to accommodate rock outcrops, areas with steeper grades, etc. |
| 1645 | LTM water parameter measurements. |
| 1700 | DM providing targets for final elevations of Road B, drainage swales based on earlier decisions. |
| 1750 | Kudlik off site. |
| 1810 | RJ off site. |

| Health and Safety |
|---|
| Kudlik briefing discusses equipment operators and using spotters. There is snow on the ground, pay extra attention to footing and vehicle path. |
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1248 | |
| Type 2 | 0 | 35740 | |
| Type 3 | 0 | 4156 | |
| Type 4 | 0 | 1321 | |

| | | | |
|---|---|---|---|
| Road A to Landfill | 300 | 7932 | Hauling Type 2 from Road A to other areas (landfill embankment, capping). |

| Comments: |
|---|
| Weather is starting to worsen, but it is not yet affecting the ability to work. |
| |

Photo log follows.

# Daily Operations Report

Date: 25-Sep-17
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | -2 | Condition: | Overcast, several snow squalls. Moderate winds. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| Maxime Lageuex | Kudlik | Supervisor |
| Pierre-Luc Paradis | Kudlik | Operator |
| Bernard Sivret | Kudlik | Operator |
| Danik Mazerolle | Kudlik | Surveyor |
| Gaston Martin | Kudlik | Supervisor |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Continue work on drainage swales and Road B. |
| 0700 | Site activities begin. Working on Road B and drainage swale final grades. |
| 1020 | Email with our approved Water Licence! There is much rejoicing. |
| 1100 | Weekly construction call with PSPC/TC. |
| 1130 | Kudlik off site for lunch. |
| 1230 | Site activities resume. Shaping the top of the landfill embankment and drainage swales. |
| 1500 | GM is back on site. He and RJ go over additional areas needing capping. |
| 1630 | GM and RJ discuss the strategy for excavating the streambed. |
| 1810 | All off site. |
| | |
| | |

| Health and Safety |
|---|
| Kudlik safety briefing discusses road conditions. Call for the sand truck if needed. |
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1248 | |
| Type 2 | 0 | 35740 | |
| Type 3 | 0 | 4156 | |
| Type 4 | 189 | 1510 | Drainage swales and Road B. |

| | | | |
|---|---|---|---|
| Road A to Landfill | 0 | 7932 | Hauling Type 2 from Road A to other areas (landfill embankment, capping). |

| Comments: |
|---|
| Water Licence received, stream area excavation will start tomorrow. |
| Final grading of capped areas to begin as well. |

Photo log follows.

# Daily Operations Report

Date: 26-Sep-17
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | -3 | Condition: | Overcast, moderate winds. Some snow flurries. Clearing in the afternoon. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| Pierre-Luc Paradis | Kudlik | Operator |
| Bernard Sivret | Kudlik | Operator |
| Maxime Lageuex | Kudlik | Supervisor |
| Gaston Martin | Kudlik | Supervisor |
| Jean-David Laberge | Kudlik | Project Manager |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | Kudlik briefing. Stream excavation is the main item today. |
| 0700 | Site activities begin. Shaping and final grades on Road B sub base. |
| | RJ and GM go over areas in the stream bed to excavate. |
| | Discuss extra areas still in need of capping. |
| | Some site cleanup still required, individual pieces of debris. |
| 0730 | JL on site to discuss Road A strategy. We need this material in other locations, need a plan. |
| 0800 | Final grades on cap in AEC-1. |
| 1130 | Kudlik off site for lunch. |
| 1230 | RJ speaks with MB regarding Road A. We are to remove as much material as we can, do not leave any access route. |
| | Site activities resume. |
| 1300 | Begin excavation in streambed. Silt fence installed downstream. |
| 1400 | Labour crew on site to remove silt fence and collect debris. |
| 1750 | Kudlik off site. Sediment is stockpiled, transport to TWA-1 will happen tomorrow. |
| 1820 | RJ off site. |

| Health and Safety |
|---|
| Kudlik briefing discusses cold. Wear proper clothing. |
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 60 | 1308 | Road B top coat. |
| Type 2 | 153 | 35893 | AEC-1 cap, additional areas. |
| Type 3 | 0 | 4156 | |
| Type 4 | 117 | 1627 | Road B. |

| | | | |
|---|---|---|---|
| Road A to Landfill | 0 | 7932 | Hauling Type 2 from Road A to other areas (landfill embankment, capping). |

| Comments: |
|---|
| Work progresses across all remaining tasks. |

# Daily Operations Report

Date: 27-Sep-17
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RJ
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | -2 | Condition: | Overcast, steady wind. |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Supervisor |
| Danik Mazerolle | Kudlik | Surveyor |
| Pierre-Luc Paradis | Kudlik | Operator |
| Bernard Sivret | Kudlik | Operator |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | RJ on site early to measure water parameters after stream work began yesterday. |
| 0700 | Site activities begin. Stream excavation and backfill today. |
| 9:30 | Begin in stream area excavation below dump area |
| 11:30 | Off site for lunch |
| 12:30 | Site activities resume |
| 14:00 | Lower section of stream is backfilled with rip-rap. |
| 16:15 | stream has been backfilled fully with rip-rap armour stone. Placing a couple of boulders. Can not see the water through the armour stone. |
| 17:30 | Off-site |
| | |

| Health and Safety |
|---|
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1308 | |
| Type 2 | 0 | 35893 | |
| Type 3 | 0 | 4156 | material moved from previous stockpile to site, so no additional material |
| Type 4 | 0 | 1627 | |

| | | | |
|---|---|---|---|
| Road A Removal | 0 | 7932 | |

| Comments: |
|---|
| Stream bed excavation and backfill complete. |
| |

Photo log follows.

# Daily Operations Report

Date: 28-Sep-17
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | -4 | Condition: | Overcast, steady wind, some snow (flurries) |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Janzen | Arcadis | Departmental Representative |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Supervisor |
| Danik Mazerolle | Kudlik | Surveyor |
| Pierre-Luc Paradis | Kudlik | Operator |
| Bernard Sivret | Kudlik | Operator |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | H&S meeting at Kudlik Head Office. Road safety for full trucks. |
| 0700 | Site activities begin. Dismantling Road A. Drainage swales. Fine grading of landfill toe. |
| | Manual crew collecting some final debris in the ponds below the stream |
| 10:45 | Beginning work on Road A removal |
| | RF conducted detailed site inspection and marked all deficiencies and items remaining with paint and flags in the field. Completed a walk through with GM afterwards to discuss. |
| 11:30 | Off site for lunch |
| 12:30 | Activities resume. RJ to airport. Mobilizing back south. |
| | Continuing with Road A removal. Transporting to AEC 1 new capping areas and AEC 3 upper swale cap. |
| | RF collecting sediment samples from stockpiles in TWA-1 |
| 18:00 | Off site |

| Health and Safety |
|---|
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1308 | |
| Type 2 | 0 | 35893 | |
| Type 3 | 0 | 4156 | |
| Type 4 | 0 | 1627 | |

| | | | |
|---|---|---|---|
| Road A Removal | 464 | 8396 | |

| Comments: |
|---|
| Good progress today |
| |

Photo log follows.

# Daily Operations Report

Date: 29-Sep-17 Friday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 1 | Condition: | Overcast, light flurries at times, wind 15 k |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Supervisor |
| Danik Mazerolle | Kudlik | Surveyor |
| Pierre-Luc Paradis | Kudlik | Operator |
| Bernard Sivret | Kudlik | Operator |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | H&S meeting at Kudlik Head Office. Road safety for full trucks, slippery surfaces with fresh snow. |
| 0700 | Site activities begin. |
| | Dismantling Road A. Capping additional areas in AEC 1 and AEC 3. Adding some additional cap to AEC 2. |
| 8:00 | Hauling Road A material to new capping areas (AEC 1 and AEC 2, some to AEC 3) |
| 8:30 | RF prepared and shipped sediment characterization samples to Maxxam Ottawa for rush analysis. |
| 10:30 | Capping area to the east of upper AEC 3 drainage swale with material from Access Road A |
| 11:30 | Off site for lunch |
| 12:30 | On site - activities resume |
| 16:00 | Flattening out the two new capping areas using the loader. |
| 17:30 | Removed sea can from site that was used for geotextile shipment. |
| 18:00 | Off site |

| Health and Safety |
|---|
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1308 | |
| Type 2 | 0 | 35893 | |
| Type 3 | 0 | 4156 | |
| Type 4 | 0 | 1627 | |

| | | | |
|---|---|---|---|
| Road A Removal | 0 | 8396 | |

| Comments: |
|---|
| Good progress today. Capping is nearing completion. |
| |

Photo log follows.

# Daily Operations Report

ARCADIS Design & Consultancy for natural and built assets

Date: 30-Sep-17 Saturday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | -5 | Condition: | Snow, turning to snow storm, 10 cm, 70 km/hr winds |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Supervisor |
| Danik Mazerolle | Kudlik | Surveyor |
| Pierre-Luc Paradis | Kudlik | Operator |
| Bernard Sivret | Kudlik | Operator |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | H&S meeting at Kudlik Head Office. Road safety for full trucks, slippery surfaces with fresh snow. |
| 0700 | Site activities begin. |
| | Hauling Type II aggregate |
| | Shaping of AEC 2 |
| | Top (north end) of AEC 3 drainage swale continuation |
| | Shaping in AEC 1 |
| | Final Touches |
| 11:30 | Off site for lunch |
| 12:30 | Back on site - activities contunue as above |
| | Shaping AEC 1 - adding a little bit more Type II to top off a few thiner areas |
| | Snowstorm begins in the afternoon - activities suspended. |
| 14:30 | Off site |

| Health and Safety |
|---|
| No health and safety issues today. Activities suspended upon the arrival of a snowstorm. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1308 | |
| Type 2 | 333 | 36226 | |
| Type 3 | 0 | 4156 | |
| Type 4 | 0 | 1627 | |

| | | | |
|---|---|---|---|
| Road A Removal | 0 | 8396 | |

| Comments: |
|---|
| |
| |

Photo log follows.

# Daily Operations Report

Date: 1-Oct-17 Sunday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | -2 | Condition: | Overcast, light flurries at times, wind 20-30 k |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Supervisor |
| Danik Mazerolle | Kudlik | Surveyor |
| Pierre-Luc Paradis | Kudlik | Operator |
| Bernard Sivret | Kudlik | Operator |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | H&S meeting at Kudlik Head Office. Road safety for full trucks, slippery surfaces with fresh snow. |
| 0700 | Site activities begin. |
| | Finsihing drainage swales |
| | Final capping of new capping areas between AEC 1 and AEC 2 |
| 8:15 | Start working on drainage swale on top of AEC 3 at the north end |
| 11:30 | Off site for lunch |
| 12:30 | Activities resume |
| | Completed AEC swale at the north end |
| | Beginning work on the AEC 3 drainage swale south end to connect the swale to the access road A culvert. |
| 15:00 | Drainage swale completed |
| | working on some final shaping in AEC 1 and 2 and access road A |
| 18:00 | Off-site |

| Health and Safety |
|---|
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1308 | |
| Type 2 | 0 | 36226 | |
| Type 3 | 0 | 4156 | |
| Type 4 | 0 | 1627 | |

| | | | |
|---|---|---|---|
| Road A Removal | 0 | 8396 | |

| Comments: |
|---|
| |
| |

Photo log follows.

# Daily Operations Report

Date: 2-Oct-17 Monday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | -3 | Condition: | Overcast, light flurries at times |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Supervisor |
| Pierre-Luc Paradis | Kudlik | Operator |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | H&S meeting at Kudlik Head Office. Road safety for full trucks, slippery surfaces with fresh snow. |
| 0700 | Site activities begin. |
| | Final shaping in AEC 1. Excavator only on site today. |
| 11:30 | Off site for lunch |
| 12:30 | On site - resuming activities |
| | Continuing final shaping in AEC 1 using the excavator |
| 16:45 | Mobilized the dozer and tamper to the site for preparation to start road B construction in the am |
| 18:00 | Off site |

| Health and Safety |
|---|
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1308 | |
| Type 2 | 0 | 36226 | |
| Type 3 | 0 | 4156 | |
| Type 4 | 18 | 1645 | |

| | | | |
|---|---|---|---|
| Road A Removal | 0 | 8396 | |

| Comments: |
|---|
| |
| |

Photo log follows.

# Daily Operations Report

ARCADIS Design & Consultancy for natural and built assets

Date: 3-Oct-17 Tuesday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 4 | Condition: | Overcast, rain off and on all day, light wind |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Supervisor |
| Danik Mazerolle | Kudlik | Surveyor |
| Pierre-Luc Paradis | Kudlik | Operator |
| Bernard Sivret | Kudlik | Operator |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | H&S meeting at Kudlik Head Office. Road safety for full trucks, slippery surfaces with fresh snow. |
| 0700 | Site activities begin. |
| | Road B construction |
| 7:20 | First trucks arrive hauling aggregate for road B construction (Type 1) |
| | Placing and compacting Road B base |
| 11:20 | Off site for lunch |
| 12:30 | On site - activities resume |
| | Continuing Road B construction |
| | RF conducted LTM sampling (got all sample stations except LTM1, which was frozen/slush to the bottom) |
| 16:00 | Met with Q.E. to come up with a plan to deal with all the hazardous materials and wastes at TWA-1. Reviewed sampling results. Will begin work on TWA-1 tomorrow. |
| 18:00 | Off site |
| | |

| Health and Safety |
|---|
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1308 | |
| Type 2 | 0 | 36226 | |
| Type 3 | 0 | 4156 | |
| Type 4 | 540 | 2185 | |

| | | | |
|---|---|---|---|
| Road A Removal | 0 | 8396 | |

| Comments: |
|---|
| |
| |

Photo log follows.

# Daily Operations Report

Date: 4-Oct-17 Wednesday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | -3 | Condition: | Overcast, wind 15 k |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Supervisor |
| Danik Mazerolle | Kudlik | Surveyor |
| Pierre-Luc Paradis | Kudlik | Operator |
| Bernard Sivret | Kudlik | Operator |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | H&S meeting at Kudlik Head Office. Road safety for full trucks, slippery surfaces with fresh snow. |
| 0700 | Site activities begin. |
| | Q.E. on site working in TWA-1. Removing PHC impacted soil to landfarm. |
| | Transport Canada to visit the site later this afternoon. |
| 10:15 | Finsihed removing PHC impacted soil and liquid processing area from TWA-1 |
| | Mobilized from TWA-1 to AEC 3 to begin work on Road B |
| 11:30 | off site for lunch |
| 12:30 | On site |
| | RF sampling soils in TWA-1 beneath PHC stockpile areas and below liquid storage processing area |
| 15:00 | Transport Canada on site. Jackie Barker and Anita Godmundson, along with John Hawkins (Nunavut Airports). Conducted a brief site tour to inspect access road and discuss limiting site access. |
| | Kudlik continuing work on Access Road B |
| 17:00 | RF inspects TWA-1. Q.E. containerizing tires into a sea can. Plan to start containerizing metal debris in the am. |
| 18:00 | Off site |
| | |

| Health and Safety |
|---|
| No health and safety issues today. Slippery surfaces today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 162 | 1470 | |
| Type 2 | 0 | 36226 | |
| Type 3 | 0 | 4156 | |
| Type 4 | 0 | 1627 | |

| | | | |
|---|---|---|---|
| Road A Removal | 0 | 8396 | |

| Comments: |
|---|
| |
| |

Photo log follows.

# Daily Operations Report

Date: 5-Oct-17 Thursday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | -2 | Condition: | Overcast, light flurries at times, windy |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Supervisor |
| Martin Lemay | QE | Hydrovac Technician |
| Pierre-Luc Paradis | Kudlik | Operator |
| | | |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | H&S meeting at Kudlik Head Office. Road safety for full trucks, slippery surfaces with fresh snow. |
| 0700 | Kudlik finished with site earth work. Ready for the final inspection. |
| | Q.E. on-site to package up lead ammended painted material. Loading into sea cans. |
| 7:30 | RF packaging samples for shipment to Maxxam |
| 8:30 | RF ships LTM samples and soil samples from below the PHC/liquid process stockpiles/area. |
| 9:30 | PSPC (Michael Brownlee) and Transport Canada (Jackie Barker and Anita Godmundson) are on site. |
| | Condcuted a complete site walk-through and final inspection of the completed remediation. |
| | Discussed the placement of site access restrictions at the culvert. |
| 10:45 | PSPC and TC off site. |
| 11:30 | Off site for lunch |
| 12:30 | On-site |
| | Q.E. continuing with containerization of hazardous materials |
| 17:30 | Off-site |

| Health and Safety |
|---|
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1470 | |
| Type 2 | 0 | 36226 | |
| Type 3 | 0 | 4156 | |
| Type 4 | 0 | 1627 | |

| | | | |
|---|---|---|---|
| Road A Removal | 0 | 8396 | |

| Comments: |
|---|
| |
| |

Photo log follows.

# Daily Operations Report

Date: 6-Oct-17 Friday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | -2 | Condition: | Overcast, light flurries at times, wind 15-20 k |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Supervisor |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0700 | On-site |
| | Kudlik is finished with site activities. |
| | RF completing any outstanding paper work |
| 11:30 | Off site for lunch |
| 12:30 | On site |
| | RF packing and taking down the site office. Transporting everything off site. |
| 17:30 | Off-site |
| | |

| Health and Safety |
|---|
| No concerns today |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1470 | |
| Type 2 | 0 | 36226 | |
| Type 3 | 0 | 4156 | |
| Type 4 | 0 | 1627 | |

| | | | |
|---|---|---|---|
| Road A Removal | 0 | 8396 | |

| Comments: |
|---|
| Site office has been demobilized and set up in another location for final project closure. |
| |

Photo log follows.

# Daily Operations Report

Date: 7-Oct-17 Saturday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 1 | Condition: | Overcast, light flurries at times |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Martin Lemay | QE | Hydrovac Technician |
| Pierre-Luc Paradis | Kudlik | Operator |
| Gaston Martin | Kudlik | Supervisor |
| Olivier Simard | QE | Project Manager |
| | | |

| Summary of Work Activities | |
|---|---|
| 0700 | Site activities begin. |
| | Q.E. on site for some final work on packaging up the remaining hazardous materials. |
| 14:30 | RF meets with Kudlik and Q.E. to discuss the remaining packaging of hazardous waste. |
| | Some sediments are to be bagged and shipped south (based on exceeding metals concentrations), other parts of the piles can be treated at the Q.E. yard in Iqaluit. RF field marks the piles based on sampling results. |
| 17:30 | Off-site |
| | |

| Health and Safety |
|---|
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1470 | |
| Type 2 | 0 | 36226 | |
| Type 3 | 0 | 4156 | |
| Type 4 | 0 | 1627 | |

| | | | |
|---|---|---|---|
| Road A Removal | 0 | 8396 | |

| Comments: |
|---|
| |
| |

Photo log follows.

# Daily Operations Report

Date: 8-Oct-17 Sunday
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | -3 | Condition: | Sun and cloud, light flurries at times on and off |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Gaston Martin | Kudlik | Supervisor |
| Pierre-Luc Paradis | Kudlik | Operator |
| Martin Lemay | QE | Hydrovac Technician |
| Olivier Simard | QE | Project Manager |

| Summary of Work Activities | |
|---|---|
| 7:00 | On site. |
| | Q.E. bagging sediments as previously marked |
| | Q.E. removed PAH impacted sediments to treat at their facility in Iqaluit |
| 14:00 | RF met GM at the quarry to select boulders to utilize as site access restrictions |
| | Mobilized the boulders to the site and installed in the roadway |
| 17:00 | Kudlik begins scraping back the metal processing area to clean up any remaining debris. |
| 17:45 | Off site. |
| | |

| Health and Safety |
|---|
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1470 | |
| Type 2 | 0 | 36226 | |
| Type 3 | 0 | 4156 | |
| Type 4 | 0 | 1627 | |
| Road A Removal | 0 | 8396 | |

| Comments: |
|---|
| Site access restrictions are in place |
| |

Photo log follows.

# Daily Operations Report

Date: 9-Oct-17 Monday (Thanskgiving Day)
Arcadis Project Number: 102153-000
Location: Iqaluit, NU

Reporting Staff: RF
Project Name: Iqaluit Community Landfill and Metal Dump Remediation

| Weather | | | |
|---|---|---|---|
| Temp (C): | 1 | Condition: | Overcast, light flurries at times, wind 15 k |

| Personnel On Site | | |
|---|---|---|
| Name | Company | Position |
| Ryan Fletcher | Arcadis | Departmental Representative |
| Pierre-Luc Paradis | Kudlik | Operator |
| Bernard Sivret | Kudlik | Operator |
| | | |
| | | |

| Summary of Work Activities | |
|---|---|
| 0645 | H&S meeting at Kudlik Head Office. Road safety for full trucks, slippery surfaces with fresh snow. |
| 0700 | Site activities begin. |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

| Health and Safety |
|---|
| No health and safety issues today. |

| Aggregate Summary ($m^3$) | | | |
|---|---|---|---|
| Contents | Volume Today | Volume to Date | Comments |
| Type 1 | 0 | 1470 | |
| Type 2 | 0 | 36226 | |
| Type 3 | 0 | 4156 | |
| Type 4 | 0 | 1627 | |

| | | | |
|---|---|---|---|
| Road A Removal | 0 | 8396 | |

| Comments: |
|---|
| |
| |

Photo log follows.

# APPENDIX D

## Weekly Meeting Minutes

# MEMO

ARCADIS Design & Consultancy for natural and built assets

To:
Mr. Michael Brownlee – PSPC
Public Works and Government Services Canada

Copies:
Attendees

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Fax 905 882 8962
www.arcadis.com

ENVIRONMENT

From:
Ryan Janzen – Arcadis

Location:
Iqaluit
NU

Date:
2017.07.26

ARCADIS Project No.:
102153

Subject:
Iqaluit Landfill Kickoff Meeting

---

**Attendance and Distribution**

| Name | Initials | Company | Email | Att. | Dist. |
|---|---|---|---|---|---|
| Mr. Michael Browlee | MB | PSPC | Michael.Brownlee@pwgsc-tpsgc.gc.ca | √ | √ |
| Ms. Amanda Wiebe | AW | PSPC | Amanda.Wiebe@pwgsc-tpsgc.gc.ca | √ | √ |
| Ms. Jackie Barker | JB | TC | Jackie.Barker@tc.gc.ca | √ | √ |
| Mr. François Bourassa | FB | Kudlik | fbourassa@gely.biz | √ | √ |
| Mr. Jean-David Laberge | JL | Kudlik | jdlaberge@kudlik.biz | √ | √ |
| Mr. Maxime Gaudreau | MG | Kudlik | mgaudreau@kudlik.biz | √ | √ |
| Mr. Benoit Dion | BD | QE | | √ | |
| Mr. Stephen Livingstone | SL | Arcadis | Stephen.Livingstone@arcadis.com | √ | √ |
| Mr. Geoff Parker | GP | Arcadis | Geoffrey.Parker@arcadis.com | √ | √ |
| Mr. Ryan Janzen | RJ | Arcadis | ryan.janzen@arcadis.com | √ | √ |
| Mr. Ryan Fletcher | RF | Arcadis | ryan.fletcher@arcadis.com | √ | √ |

## *1.0 Introductions, Project Roles and Review of Agenda*

Project team members introduce themselves and their positions. MB briefly gives a brief project introduction to the kickoff meeting.

## *2.0 Health and Safety*

2.1 Existing Protocols (HASP)

Several submittals remain outstanding, including the amended Health and Safety Plan. JD states that a hard copy is present in the site office and an electronic version will be supplied shortly.

2.2 Site Operations

RJ, RF state that health and safety protocols are being followed on site. Tailgate meetings are held each morning at 0645 at Kudlik's office. The site office is equipped with eye wash station, first aid kit, emergency contact numbers, hard copy of the HASP, etc. DR is satisfied with protocols and site preparedness.

Site controls, including access fencing and signage, remains to be addressed. Kudlik has committed to addressing these concerns later today. Site sanitation facilities are not yet in place; this is less of a priority given that the town of Iqaluit and Kudlik's headquarters are less than 1km away.

DRs mention detailed health and safety topics such as PPE, incident reporting procedures, wildlife safety, working around equipment, etc. to confirm that they have been addressed/discussed with Kudlik on site and that operations are in accordance with specified procedures.

MB asks Kudlik representatives if there are any new employees present on site, and if so, wants to confirm that they are properly trained. JD et al. confirm that Kudlik employees on this project are experienced, and properly trained.

2.3 Quarry Operations

The quarry and aggregate crushing operations are discussed. These activities occur at another site, and are considered a separate industrial operation, outside of the jurisdiction of this project. Health and safety is solely the responsibility of Kudlik, and they have separate documentation and protocols governing this site and these operations.

## *3.0 Partial Scope of Work due to Water Licence Delay*

3.1 Currently Allowable Work Items

SL wants to confirm the activities that may be performed prior to the Nunavut Water Board's pending approval of site operations, and those that may not. Work items that can currently be performed without interference include:

- Building the temporary access road;
- Preparing AEC-3 (main landfill zone) to receive debris; and
- Relocation of debris and impacted soils outside of water bodies / water body areas of influence.

Work items that cannot currently be performed include:

- Excavation and relocation of sediments;
- Any activities that will disrupt / disturb surface water flow / drainage; and
- Final capping and surface grading.

3.2 Current Status of Water Licence

The Water Licence is currently outstanding. JB has no new status updates, but is in contact with the Nunavut Water Board and asking for regular updates. Approval is expected shortly.

3.3 Work Schedule

JB asks for an approximate work schedule, how long JD thinks we can work without slowing to wait for the Water Licence. JD estimates 15-20 days of work remain before waiting for the Water Licence will begin to impact the schedule. There is currently no issue; work that can be currently be performed includes much of the project.

SL suggests laying out tasks that we can complete, and those that we can't. Arcadis is to send Kudlik the highlighted list of activities that can be currently performed, so they have official confirmation and can plan accordingly.

## *3.0 Contracting*

3.1 Contract Award Details

AW gives contract details:

- 12 July 2017 is the official award date;
- PSPC has received security in the form of a bond from Kudlik, therefore project holdback will be 10%; and
- PSPC has received Kudlik's insurance, and notes that it expires 15 August 2017 and will have to be renewed prior to that date.

3.2 AOC Targets

Kudlik's AOC targets are noted to be 20% for labour and 80% for subcontracting. Certification must be completed and verified prior to final payment. A penalty/reward of up to 1% final contract value is achievable depending on final values of aboriginal work as compared to the specified targets. Kudlik is asked to please call Amanda with any questions.

PSPC will be asking for report from contractor, to be verified by DR, in support of the claimed AOC values. JC advises that Kudlik is familiar with this process, and has a system in place to track and verify AOC targets.

AW notes that change orders are included in the total contract value and subject to AOC considerations.

3.3 Invoicing and Change Orders

AW notes that a standard statutory declaration is required with each invoice for progress payment. MB asks if Kudlik is familiar with govt invoicing. JD says they are.

AW details CO system. The contract includes a list of allowable costs, predetermined markups, etc. Any submitted change order is asked to include an indication of any change to project schedule. Work performed prior to receiving an approved change order is considered 'at risk' work; if PSPC determines it was not necessary, payment may be withheld. AW and MB highly recommend the relevant change order is approved before doing any work.

AW discusses pre-approval process for urgent work. Arcadis would notify PSPC to indicate urgent work, MB contacts procurement for a verbal/email approval, then notifies Arcadis, work then proceeds. The

official change order paperwork then follows afterwards. PSPC managers are available during off hours if required.

### *4.0 Site Operations*

4.1 Current Status

RF details the current status of the site:

- Equipment currently on site
- Location/contents of site office
- Status of staging areas

4.2 Media Attention

DR questions what information can be volunteered to interested parties. MB says confirmation of remediation project approved by the Government of Canada is allowed. JB says any information given in the recent CBC article can be confirmed. DR will post copies of this article in the site office.

4.3 Contractual Status of TWA-1

Kudlik has official dispensation to use TWA-1 from a previous contract. Staging areas, etc. are approved until 31 October 2017. MB asks for written confirmation, please forward to Arcadis.

4.4 Tracking Systems

Brief discussion of the DR tracking tools to be used throughout the project. Will show aggregates, etc. in our daily reports.

### *5.0 Permits and Reporting*

5.1 Daily Reports

DR will produce daily reports and send to PSPC in weekly installments via WeTransfer. Confirmation of milestones, irregular incidents, apparent schedule changes, etc. will be made via email in the evenings if applicable.

5.2 Weekly Construction Meetings

DR is to set up a recurring 1100 Monday morning meeting.

### *6.0 Work Plan and Schedule Update*

5.1 Current Status

We are currently on schedule. Eagerly awaiting award of Water Licence (NWB approval).

5.2 Aggregate

JD stated that 80% of aggregate volume is prepared. Next blasting event scheduled in August, will complete the necessary aggregate preparation.

### *7.0 Miscellaneous/Action Items*

7.1 Good Neighbour Policy

MB states a desire to have the project not inconvenience local residents. Expresses an interest in making sure traffic control, signage, dust control, etc. protocols are in place and being followed. The

project site is close to the Syliva Grinnell Territorial Park, and close to the city. Instructs project staff to be friendly and courteous.

JB received NRB approval earlier, with 24 conditions. DR to make sure terms and conditions are posted in site trailer. SL states that meeting these conditions ties into contract performance monitoring.

7.2 Outstanding Submittals

MB reiterates that HASP needs to be provided. Also expresses a desire to have project staff keep H&S in the forefront. MB asks Kudlik if their procedures have an easy pathway for employees to express H&S concerns. JD confirms that there is, and that Kudlik has a H&S meeting before beginning work every morning.

7.3 Allowable Work

JD looks forward to receiving the list of what we can/cannot do at this time. He has not seen the highlighted list. JB states the list is provided by TC, not necessarily by the NWB.

Some question over the official designation of 'water'. JB says look at NU Waters and NU Surface Tribunal Acts (sections 11 and 12) for a definition of water. NWB concerns specifically addressed diversion of stream, impacts to stream. SL volunteers to have Arcadis team further define 'water' and thus work areas affected by unresolved Water Licence. DR to provide a lay out for Kudlik to erect silt fencing around currently inaccessible areas.

7.4 Official Site Visit

MB et alc. will arrange a site visit midway through work.

Everyone was wished a pleasant evening and the meeting was ended at approximately 1340 EST.

END OF MINUTES

Please advise the writer – in writing – by Tuesday, 1 August 2017 if these minutes contain any errors or omissions; they will otherwise become part of the project documentation as presented.

Minutes prepared by Mr. Ryan Janzen – Arcadis Canada Inc.
26 July 2017

# MEMO

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ENVIRONMENT

To:
Mr. Michael Brownlee – PSPC
Public Works and Government Services Canada

Copies:
Attendees

From:
Ryan Fletcher – Arcadis

Location:
Iqaluit
NU

Date:
2017.07.31

ARCADIS Project No.:
102153

Subject:
Iqaluit Landfill Kickoff Meeting

---

**Attendance and Distribution**

| Name | Initials | Company | Email | Att. | Dist. |
|---|---|---|---|---|---|
| Mr. Michael Browlee | MB | PSPC | Michael.Brownlee@pwgsc-tpsgc.gc.ca | √ | √ |
| Ms. Holly Poklitar | HP | TC | Holly.Poklitar@tc.gc.ca | √ | √ |
| Ms. Jackie Barker | JB | TC | Jackie.Barker@tc.gc.ca | X | √ |
| Mr. François Bourassa | FB | Kudlik | fbourassa@gely.biz | √ | √ |
| Mr. Jean-David Laberge | JL | Kudlik | jdlaberge@kudlik.biz | √ | √ |
| Mr. Jonathan Bouchard | JB | Kudlik | jbouchard@kudlik.biz | √ | √ |
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| Mr. Ryan Janzen | RJ | Arcadis | ryan.janzen@arcadis.com | √ | √ |
| Mr. Ryan Fletcher | RF | Arcadis | ryan.fletcher@arcadis.com | √ | √ |

SL outlines the purpose of this weekly update call. The idea is to have notes and keep minutes. These calls could last an hour or minutes depending on what we need to discuss. The intent is to have a brief update as to the project schedule and progress. If there are any break-away conversations that come up in these meetings, we could set up another call on the side for those. All agreed.

Handed the floor to RJ.

RJ – Everyone got the weekly update that was sent out at the end of last week. We all talked on Wednesday. Not many updates since then. A lot of material has been brought on site. Status is that the road is over the crest of the hill and the very first lift is at the bottom of the hill at this point in time. Suggests using the agenda outlined in the specs, unless anyone has an urgent item to discuss.

MB – Discussed a call from the city from the City of Iqaluit with regards to roadway maintenance. The City was not terribly happy with the condition of the road. Kudlik stepped in and did some grading events and it was greatly appreciated.

JD – They had a lot of rain, which did not help the situation. These were un-characteristic rains. Kudlik did grade the road, but does not plan to grade on a daily basis. Stated that they (Kudlik) are not the only users of the road.

MB – understands that Kudlik is not the only user but will leave this to Kudlik's discretion and professional judgement as to how often to grade the roadways moving forward. MB did mention that it was outlined in the specifications that the access roads are to be maintained by the contractor for the duration of the project.

RJ – Proposed using the outlined agenda in the specifications for the weekly meetings. Referred everyone to section 01 31 19, Section 1.4.6. All agreed.

**1.0 Review, approval of minutes of previous meeting**

RJ - all should have reviewed the previous meeting minutes from the kick off meeting and if there are not further comments, they will become part of the project records

**2.0 Review of Work progress since previous meeting**

RJ - Not much has changed since the last meeting – Kudlik is still working on hauling aggregate to the site and constructing Road A.

Roadway up to the crest at AEC-2 and working down the hill now.

**3.0 Field observations, problems, conflicts**

RJ stated that the dozer and excavator are working full time at the site. The Kudlik surveyor (Danik) is on site daily (at least once a day) to check progress and road alignment. No delays at this time with the exception of the heavy rain last week, and none expected in the immediate future.

**4.0 Problems which impede construction schedule**

None identified at this time.

**5.0 Corrective measures and procedures to regain projected schedule**

None currently needed.

**6.0 Revision to construction schedule**

None currently needed.

**7.0 Progress schedule, during succeeding work period**

No changes to the provided schedule. Building Road A is expected to take all of the coming week.

**8.0 Review submittal schedules: expedite as required**

A list of outstanding submittals was communicated to Kudlik at the end of last week. Some submittals are still coming in and are being reviewed. Kudlik has been good at getting these in so far and is addressing any deficiencies.

**9.0 Health, Safety and Security Issues**

RJ states that this is a semi-public site and there are members of the public on the site on a daily basis. This is a popular access point to the river. There is a fence in place now at the entrance of the work site. Construction signage is in place at this time. Kudlik personnel are very good with regards to H&S and have always been observed to be following best practices and wearing PPE at all times. RJ stated that fencing the entire site is impractical.

MB – are daily tailgate meetings taking place? Are there minutes and attendance? RJ – Kudlik has records of these meetings at their main site office and are doing a good job. Arcadis does not take minutes except to highlight the main points of the daily tailgates, e.g. this morning had a 15 minute briefing on truck safety with accompanying video. Mondays are a more detailed weekly safety briefing, with shorter (10-15 minute) meetings taking place each morning at 6:45 at the Kudlik office.

MB – regarding visitors to site, is there a sign that says all visitors must report to the site office for example? Concerned about people entering the site around the sides etc. Please ask Martin (Kudlik) as to the best approach and report back PSPC.

**10.0 Maintenance of quality standards**

Quality of work is good. Nothing to add at this time.

**11.0 Review proposed changes for effect on construction schedule and on completion date**

No proposed changes at this time.

**12.0 Wildlife incidents**

Nothing on site to date other than ravens, no incidents to date.

**13.0 Other Discussions**

RJ - Things have gone smoothly so far and Arcadis is very happy with the progress.

MB – Mentioned the one instance of PHC soil removal. RJ – the area has been excavated and sorted out to the side. The excavated soil was mostly debris and some sorting is required. The PHC soil area was excavated to bedrock across the entire area and Kudlik was given the okay to proceed with roadway construction.

JD – When can we start moving material from different zones to the temporary work area? This should be happening at the same time as the road construction. RJ – we can start that now, there is silt fencing in place and RJ was not sure of the exact status of the NWB license. We can start sorting whenever Kudlik would like to move forward with that. RJ stated that Arcadis marked out the exclusion zones in the field and this has also been communicated to field personnel.

JD – Mentioned that some activities have moved around because of the NWB license delay and will send a slightly altered version of the project schedule.

SL – We had an internal (Arcadis) call last week. There is some debris straddling the surface water body in AEC 2 along the stream. We have decided to leave that in place for the time being and focus on other areas in the meantime.

HP – Once the signage is up that visitors are to report to the site office, can a photo please be taken and forwarded to TC? RJ – Yes, this will be done.

END OF MINUTES

Please advise the writer – in writing – by Thursday, 3 August 2017 if these minutes contain any errors or omissions; they will otherwise become part of the project documentation as presented.

Minutes prepared by Mr. Ryan Fletcher – Arcadis Canada Inc.
31 July 2017

# MEMO

ARCADIS Design & Consultancy for natural and built assets

To:
Mr. Michael Brownlee – PSPC
Public Works and Government Services Canada

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ENVIRONMENT

From:
Ryan Janzen – Arcadis

Location:
Iqaluit
NU

Date:
2017.08.07

ARCADIS Project No.:
102153

Subject:
Iqaluit Landfill Weekly Construction Meeting

---

**Attendance and Distribution**

| Name | Initials | Company | Email | Att. | Dist. |
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| Ms. Holly Poklitar | HP | TC | Holly.Poklitar@tc.gc.ca | X | √ |
| Ms. Jackie Barker | JB | TC | Jackie.Barker@tc.gc.ca | X | √ |
| Mr. François Bourassa | FB | Kudlik | fbourassa@gely.biz | √ | √ |
| Mr. Jean-David Laberge | JL | Kudlik | jdlaberge@kudlik.biz | √ | √ |
| Mr. Jonathan Bouchard | JB | Kudlik | jbouchard@kudlik.biz | X | √ |
| Mr. Maxime Gaudreau | MG | Kudlik | mgaudreau@kudlik.biz | X | √ |
| Mr. Gaston Martin | GM | Kudlik | gmartin@kudlik.biz | X | √ |
| Mr. Stephen Livingstone | SL | Arcadis | stephen.livingstone@arcadis.com | √ | √ |
| Mr. Geoffrey Parker | GP | Arcadis | geoffrey.parker@arcadis.com | X | √ |
| Mr. Ryan Janzen | RJ | Arcadis | ryan.janzen@arcadis.com | √ | √ |
| Mr. Ryan Fletcher | RF | Arcadis | ryan.fletcher@arcadis.com | √ | √ |

SL gives a brief intro, we decide to start without MB and JB. RJ to lead discussion. Agenda is taken from Progress Meetings Section 01 31 19 1.4.6.

## 1.0 Review, approval of minutes of previous meeting

Previous minutes accepted.

## 2.0 Review of Work progress since previous meeting

Road A construction continues steadily. Road A has progressed to the base of the slope in AEC-3. Consistently moving around 1000$m^3$ of Type 2 aggregate per day. Project finishing the road by the end of this week.
A test pit in the area of PHC contaminated soils in AEC-1 was conducted last week. Appears to be roughly 1/3 soil and 2/3 debris in the area. A number of drums containing various amounts of various hydrocarbon fluids were encountered.
Manual clean up in AEC-1 also began last week. Minor clean up of debris that can be moved by hand using an ATV and trailer.

**3.0 Field observations, problems, conflicts**
None to note at this time. We did get some light rain last week, but it did not slow work progress or affect the roads as the heavy rain two weeks ago did.

**4.0 Problems which impede construction schedule**
None at this time.

**5.0 Corrective measures and procedures to regain projected schedule**
None at this time.

**6.0 Revision to construction schedule**
JL to send around revised construction schedule. Minor changes, nothing specifically noted.

**7.0 Progress schedule, during succeeding work period**
RF states it is likely Road A will be finished by the end of the week. Debris sorting will possibly start this week depending on the availability of equipment. He has also spoken to QE, and they intend to start lining TWA-1 later this week and constructing a soil containment unit there. They will also set up the sifting/debris extraction process.

FB asks if Arcadis will be conducting baseline sampling for the sorting area? SL agrees it is a good idea. We are reminded that the area was a temporary landfill until last week – metals, old appliances, refuse deposit zone, etc., and it is likely the area is already contaminated. Arcadis to sample beneath TWA-1 to provide baseline measurements, 4-6 samples from the sorting area. The goal is to prove that the site is not becoming further contaminated by this year's activities.

**8.0 Review submittal schedules: expedite as required**
Nothing outstanding at this time. Arcadis is currently reviewing the Environmental Protection Plan, will get back to Kudlik with comments.

**9.0 Health, Safety and Security Issues**
No issues to report. Martin (Kudlik H&S inspector) is on site every other day to conduct inspections. Arcadis is happy with site controls, Kudlik health and safety systems in place.

**10.0 Maintenance of quality standards**
Quality of work is good. Nothing to add at this time.

**11.0 Review proposed changes for effect on construction schedule and on completion date**

No proposed changes at this time.

**12.0 Wildlife incidents**

Nothing to report. RJ saw a stoat last week.

**13.0 Other Discussions**

Received Kudlik's July progress draw. Kudlik believes they have the required PSPC progress draw form. Kudlik to submit to RJ, he will discuss any issues with JL and forward with Arcadis tracking sheet to PSPC.

Decision is made to set up an Arcadis Sharepoint site for project files. RJ to set up and email log in information to project team.

We have received the Water Licence. RF to send a copy to Kudlik. We still need to submit the Performance Monitoring Plan as a condition of the licence; PSPC still needs to send in the final submittals. The Water Licence approves of the proposed work plan with no major changes. Final receipt is pending, until such time, site work still needs to stay away from watercourses. DFO, INAC etc. can now show up on site to conduct official inspections now that we are on the record. We will need to set up an inspection protocol including: logging in inspectors, giving them a brief health and safety introduction before having the site tour, maintaining a record of inspections, etc. The major touch points for any inspection will be dust control, sediment control and the disturbance of watercourses. Site personnel are encouraged to refer inspectors to PSPC and/or TC.

Everyone is wished a pleasant day and signs off.

END OF MINUTES

Please advise the writer – in writing – by Wednesday, 9 August 2017 if these minutes contain any errors or omissions; they will otherwise become part of the project documentation as presented.

Minutes prepared by Mr. Ryan Janzen – Arcadis Canada Inc.
7 August 2017

# MEMO

ARCADIS Design & Consultancy for natural and built assets

To:
Mr. Michael Brownlee – PSPC
Public Works and Government Services Canada

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Attendees

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www.arcadis.com

ENVIRONMENT

From:
Ryan Janzen – Arcadis

Location:
Iqaluit
NU

Date:
2017.08.14

ARCADIS Project No.:
102153

Subject:
Iqaluit Landfill Weekly Construction Meeting

---

**Attendance and Distribution**

| Name | Initials | Company | Email | Att. | Dist. |
|---|---|---|---|---|---|
| Mr. Michael Browlee | MB | PSPC | Michael.Brownlee@pwgsc-tpsgc.gc.ca | √ | √ |
| Ms. Jackie Barker | JB | TC | Jackie.Barker@tc.gc.ca | √ | √ |
| Mr. François Bourassa | FB | Kudlik | fbourassa@gely.biz | √ | √ |
| Mr. Jean-David Laberge | JL | Kudlik | jdlaberge@kudlik.biz | √ | √ |
| Mr. Jonathan Bouchard | JB | Kudlik | jbouchard@kudlik.biz | X | √ |
| Mr. Maxime Gaudreau | MG | Kudlik | mgaudreau@kudlik.biz | X | √ |
| Mr. Gaston Martin | GM | Kudlik | gmartin@kudlik.biz | X | √ |
| Mr. Stephen Livingstone | SL | Arcadis | stephen.livingstone@arcadis.com | X | √ |
| Mr. Geoffrey Parker | GP | Arcadis | geoffrey.parker@arcadis.com | X | √ |
| Mr. Ryan Janzen | RJ | Arcadis | ryan.janzen@arcadis.com | √ | √ |
| Mr. Ryan Fletcher | RF | Arcadis | ryan.fletcher@arcadis.com | √ | √ |

RF gives a brief intro, we decide to start without SL as he has another meeting. RF was the DR on site during the previous work period; he will lead the discussion. Agenda is taken from Progress Meetings Section 01 31 19 1.4.6.

## 1.0 Review, approval of minutes of previous meeting

Previous minutes accepted.

## 2.0 Review of Work progress since previous meeting

RF details the work completed since the last meeting:

- Road A has been completed and fully graded to the base of the landfill.
- Silt fencing installed throughout the site; AEC-1, -2, and -3.
- SL was on site last week for a visit.
- 'No Trespassing', 'Only Authorized Persons Allowed on Site' and 'Restricted Area' signage was installed. This will be replaced with trilingual signage once ready. JL to follow up and get expected delivery date of the trilingual signage.
- Temporary access roads have been constructed in order to access debris with equipment.– one loop road in AEC-1 and two roads in AEC-2.
- Work activities are staying clear of waterways at this time. There is a segregated area in AEC-2 that hasn't yet been touched.
- The Long Term Monitoring plan was reviewed and revised, and has been submitted to PSPC.
- LTM stations have been established in the field and pre-emptive monitoring has begun in order to establish baseline parameters.
- The first lift of the landfill toe has been completed (Type 2 aggregate).
- Baseline sampling underneath TWA-1 has been completed and samples submitted for analytical testing.
- Soil stock pile area at TWA-1 has been completed with liner and berms for secondary containment.
- The liquid waste storage area has been completed (lined and bermed).
- Sorting of hazardous and non-hazardous waste has begun in both AEC-2 and -3.
- Initial levelling of Zone 1 has been completed.
- Sorting of the drum piles has been completed; liquids have been segregated and transported to the liquid waste staging and sorting area in TWA-1. All liquids were transported in tubs for proper containment.
- Hazardous material (lead-amended painted material) has been moved from AEC-2 to TWA-1. Some additional hazardous material has also been moved from AEC-3 to TWA-1.
- Tires have been sorted out and stockpiled up at TWA-1. They will be coming south.
- Type 1 material is being stockpiled on site in preparation for starting lifts in Zone 1 of the main landfill.
- Manual clean up of debris and sorting hazardous and non-hazardous is ongoing in AEC-1, -2, and -3 using local help.
- Q.E. is transferring liquids from old drums to new containers – all water so far.

**3.0 Field observations, problems, conflicts**

The bulldozer and excavator are working full time on site.
The surveyor is on site at least daily to check grades, provide targets, etc.
No problems or conflicts to note at this time.

**4.0 Problems which impede construction schedule**

We need to have the Water Licence approved. JB to submit the revised plan later today and request an ETA for approved licence.

**5.0 Corrective measures and procedures to regain projected schedule**

JB states the revised LTM and Water Licence request to be submitted immediately following this meeting.

**6.0 Revision to construction schedule**

None at this time. FB asks if we are required to sample the water from Pond 3 before discharge – as long as the volume remains below 50$m^3$ we are not, according to the terms of our Water Licence.

**7.0 Progress schedule, during succeeding work period**

RF states the upcoming activities on site are expected to include:

- Sorting debris from AEC-3.
- Cutting and crushing of non-hazardous material in AEC-3.
- Trucking of material to TWA-1.
- Beginning to construct lifts of metal debris and Type 1 material in Zone 1.

**8.0 Review submittal schedules: expedite as required**

Nothing outstanding at this time.

**9.0 Health, Safety and Security Issues**

RF details an incident where several intoxicated individuals attempted to access the site on the way to the river. They were agreeable to using an alternate route to access the river outside the site boundaries.
The site is semi-public, but there is a fence and construction signage currently in place.
A firearm was found on site this morning, in the debris. The RCMP was notified, and will come later today to collect it.
Kudlik is commended for their commitment to H&S and for their safe work practices.

**10.0 Maintenance of quality standards**

Quality of work is good. Nothing to add at this time.

**11.0 Review proposed changes for effect on construction schedule and on completion date**

No proposed changes at this time.

**12.0 Wildlife incidents**

Nothing to report.

**13.0 Other Discussions**

Work has progressed smoothly, there have not been any major obstacles, and Arcadis is satisfied with project progress.
JL will have the revised July Progress Draw and Invoice for submittal later today. It will be sent to Arcadis and then forwarded to PSPC.
RJ to touch base with SL regarding Arcadis invoice; it will follow shortly as well.
MB would like to be notified when the firearm has been removed from site.

Everyone is wished a pleasant day and signs off.

END OF MINUTES

Please advise the writer – in writing – by Wednesday, 16 August 2017 if these minutes contain any errors or omissions; they will otherwise become part of the project documentation as presented.

Minutes prepared by Mr. Ryan Janzen – Arcadis Canada Inc.
14 August 2017

# MEMO

ARCADIS Design & Consultancy for natural and built assets

To:
Mr. Michael Brownlee – PSPC
Public Works and Government Services Canada

Copies:
Attendees

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www.arcadis.com

ENVIRONMENT

From:
Arcadis

Location:
Iqaluit
NU

Date:
2017.08.21

ARCADIS Project No.:
102153-000

Subject:
Iqaluit Landfill Weekly Construction Meeting

---

**Attendance and Distribution**

| Name | Initials | Company | Email | Att. | Dist. |
|---|---|---|---|---|---|
| Mr. Michael Brownlee | MB | PSPC | Michael.Brownlee@pwgsc-tpsgc.gc.ca | √ | √ |
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| Mr. François Bourassa | FB | Kudlik | fbourassa@gely.biz | x | √ |
| Mr. Jean-David Leberge | JL | Kudlik | jblaberge@kudlik.biz | x | √ |
| Mr. Jonathan Bouchard | JB | Kudlik | jbouchard@kudlik.biz | √ | √ |
| Mr. Gaston Martin | GM | Kudlik | gmartin@kudlik.biz | x | √ |
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| Mr. Geoff Parker | GP | Arcadis | Geoffrey.Parker@arcadis.com | x | √ |
| Mr. Ryan Janzen | RJ | Arcadis | ryan.janzen@arcadis.com | x | √ |
| Mr. Ryan Fletcher | RF | Arcadis | ryan.fletcher@arcadis.com | √ | √ |

MB gives a brief intro and hands the floor to RF. RF was the DR on site during the previous work period and he will lead the discussion for today. The agenda used was taken from the specification section on Progress Meetings, Specification 01 31 19, Section 1.4.6.

**1. Review, approval of minutes of previous meeting.**

Previous meeting minutes were accepted.
The meeting minutes from last week will become part of the contract records.

**2. Review of Work progress since previous meeting.**

RF details the work completed since the last construction meeting as follows:

- Two additional drums of fuel were discovered since the last conversation. In addition, Q.E.

vacuumed off approximately 3000 L of impacted water fuel mixture from a small excavation where a suspected oil drum was punctured during excavation. This is now above the contract value of 2000 L.

- Labourers continued to sort debris in all three AECs during the last period. AEC-1 is finished with manual sorting, only a small area between AEC-1 and AEC-2 remains.
- Performance monitoring of the LTM stations continued on a daily basis at this time.
- It was decided to process all of the waste within the footprint of Zone 1 instead of building the proposed TWA-2 in order to save material, time and avoid the potential impacts associated with material handling and size reduction.
- The last of the drums were sorted and crushed.
- All of the debris from the toe of AEC-3 was sorted into waste streams and reduced in size in preparation for material lifts.
- The shear was down for most of the day on August 17 due to a cutting edge re-build.
- Material lifts began on August 17.
- A small 305 excavator was used in AEC-1 to collect and excavate surface material, placed in a dumpster and transferred to AEC-3 toe for processing.
- Finished collecting, sorting and transporting the remaining accessible debris from AEC-2 and incorporated into material lifts in AEC-3.
- Collected accessible material from the top of AEC-3 and incorporated into material lifts within AEC-3 toe. Some soil went with the debris at the same time. This soil was just from the top of AEC-3 where the landfill was peeled back to make room for Road A.
- Material lifts are now complete with the debris available currently. We still have to get the debris from within the AEC-2 stream area and process.
- Kudlik is in the process now of hauling Type II material to begin building up the landfill toe to meet the elevation of the current material lifts.

3. **Field observations, problems, conflicts.**

Shear and excavator are operating full time. Surveyor on site daily to check progress daily or multiple times daily as needed. No delays or problems to report at this time.

**4. Problems which impede construction schedule.**

Final approval of the NWB with regards to the LTM is still in need of final approval.

RF stated that he understands that the plan was submitted, and is currently in a 15 day comment period ending September 1st, 2017. The plan will then be submitted for approval after that point in time.

MB confirms there is a15 day comment period. Then we address the comments. Then it goes for approval to the board. He states that we need to start thinking about work we can do in the meantime.

SL adds there are two components to the monitoring. The performance monitoring which is what we are doing right now and the Long Term monitoring. SL does not have a concern that the performance monitoring will slow us down at all. Now that we know the process, it would be good to get an interim monitoring program. We need to get into AEC-2 to get the material. Can MB and JB look into getting some sort of idea of progress on the performance monitoring?

MB asks if it ispossible to contact the board, JB confirms that it is. She will do so, and ask about progress.

MB brings up the idea of reducing hours worked on site per day. RF responds that Kudlik is already managing the resources based on the tasks required on site.

JB asks if the work holdup is an access issue. RF responds that it is; the material is within the stream bed and cannot be accessed without disturbing the stream – which would be in direct violation of the Water Licence.

JB asks if INAC enforcement been to the site yet. RF responds that they have not JB asks for photos and a sketch of the area.

SL asks about waste streams and what currently in Zone 1. Are we just waiting on the waste left in AEC 2? RF responds thatWe are complete processing all of the waste outside of the restricted access area and it is into Zone 1.

**5. Corrective measures and procedures to regain projected schedule.**

As discussed above.

**6. Revision to construction schedule.**

Not at this time; however, without the LTM approval soon the construction schedule will possibly need revision.

**7. Progress schedule, during succeeding work period.**

RF states that the anticipated activities on site for the up-coming work period may include:

- Re-instate hauling of Type II and Type III aggregate and work on bringing up the toe of the landfill to the current height of the material lifts in Zone 1.
- Screen PHC soils.
- Haul debris to AEC-3.
- Metal soil from AEC-2.
- Stockpile PHC soils at TWA-1, sample and classify.
- Excavate metal impacted soil from AEC-2 and haul to AEC-3 to place in material lifts.

**8. Review submittal schedules.**

None outstanding.

**9. Health, Safety and Security Issues.**

- We discussed the issue of a rifle found on site in the last meeting; however, it was actually part of this past week's weekly update. The RCMP arrived and removed the firearm.
- A small spill occurred on August 19th at the end of the day. The shear ended up with a leak during mobilization from one spot to another it leaked a small trail of fluid. Kudlik quickly cleaned it up by shoveling impacted soil into buckets and disposing off-site at Q.E.

**10. Maintenance of quality standards.**

Quality of work is excellent.

**11. Review proposed changes for effect on construction schedule and on completion date.**

No changes at this time.

**12. Wildlife incidents.**

Nothing to report at this time.

**13. Other business.**

SL states that300 rock dust seems to be a decent material that doesn't generate any dust. This may be an issue.

MB asks if there have there been any more issues with the cit. RF responds there are none to report

JL states that the shear operation will stop on Wednesday of this week without further debris to process.SL suggestslooking in the field at the stream to see if there are any more debris we can remove without disturbing the sediment.

No further comments at this time.

END OF MINUTES

# MEMO

To:
Mr. Michael Brownlee – PSPC
Public Works and Government Services Canada

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ENVIRONMENT

From:
Arcadis

Location:
Iqaluit
NU

Date:
2017.08.28

ARCADIS Project No.:
102153-000

Subject:
Iqaluit Landfill Weekly Construction Meeting

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**Attendance and Distribution**

| Name | Initials | Company | Email | Att. | Dist. |
|---|---|---|---|---|---|
| Mr. Michael Brownlee | MB | PSPC | Michael.Brownlee@pwgsc-tpsgc.gc.ca | ✓ | ✓ |
| Ms. Jackie Barker | JB | TC | Jackie.Barker@tc.gc.ca | ✓ | ✓ |
| Mr. François Bourassa | FB | Kudlik | fbourassa@gely.biz | ✓ | ✓ |
| Mr. Jean-David Leberge | JL | Kudlik | jblaberge@kudlik.biz | x | ✓ |
| Mr. Jonathan Bouchard | JB | Kudlik | jbouchard@kudlik.biz | ✓ | ✓ |
| Mr. Gaston Martin | GM | Kudlik | gmartin@kudlik.biz | x | ✓ |
| Mr. Stephen Livingstone | SL | Arcadis | Stephen.Livingstone@arcadis.com | ✓ | ✓ |
| Mr. Geoff Parker | GP | Arcadis | Geoffrey.Parker@arcadis.com | x | ✓ |
| Mr. Ryan Janzen | RJ | Arcadis | ryan.janzen@arcadis.com | ✓ | ✓ |
| Mr. Ryan Fletcher | RF | Arcadis | ryan.fletcher@arcadis.com | ✓ | ✓ |

MB welcomes all and hands the floor to RJ. The agenda used was taken from the specification section on Progress Meetings, Specification 01 31 19, Section 1.4.6.

**1. Review, approval of minutes of previous meeting.**

Approved. These minutes will become part of the project records.

**2. Review of Work progress since previous meeting.**

RJ details the work completed since the last construction meeting as follows:

- Delivery of Type 2 material to landfill, placing, spreading, compacting;
- Shaping of slope and placement of geotextile;
- Delivery of Type 3 material, placement and shaping of final slope at the toe of the landfill;

- Delivery of sheared, non-hazardous metal debris to Zone 1, placed, compacted and covered;
- Delivery of hazardous debris and tires to TWA-1;
- Vacuuming of more PHC product and water from the PHC excavation in AEC-1. Continuing this excavation to the frost layer, ending there;
- Excavation of metals-impacted soil zone in AEC-1. This soil taken to landfill base and used to fill voids in metal debris lifts;
- Picking of debris in AEC-1 using rubber-track mini-ex. AEC-1 debris collection complete; and
- Using the long boom excavator with a chain to pluck debris from AEC-2 area.

3. **Field observations, problems, conflicts.**

Surveyor on site daily to check elevations and extents multiple times daily as needed. No delays or problems to report at this time.

**4. Problems which impede construction schedule.**

Final approval of the NWB with regards to the LTM is still in need of final approval. We are currently able to keep working on the landfill embankment, but will run out of metal debris (and thus, the ability to keep working on said embankment) shortly.

RJ asks for an update on the status of the Water Licence. MB responds that we will likely not see anything before the end of the long weekend, and that this would be the end of the comment period on the proposed LTM plan. He does not expect that there will be any comments. JB agrees that it is unlikely that there would be any comments; however, this is an unknown.

SL asks if there would potentially be more iterations of the LTM needed. As far as he is aware, the only thing that could be required is an incorporation of any NWB comments into the existing LTM plan. JB thinks this is the case, but is not certain. MB thinks the only thing that the NWB may take issue with is the length of time TC is required to monitor for after project completion, but we could be surprised. JB thinks it likely that there will not be much that needs to be addressed, and that hopefully comments/concerns with the LTM could be resolved after the licence is issued for the project (after all, it won't be applicable until after project completion).

MB asks if there is work that can be performed in the interim. RJ suggests that we could begin the capping and grading of AEC-1, although the final grading etc. requires the approved Water Licence.

SL asks to go over the project tasks and estimated quantities, to gauge how far along the project has progressed and how much remains to be done. RJ details the quantities excavated and/or delivered to site to date. These quantities will not be included here; for a full accounting of each of the project tasks and percentage complete to date, please refer to the Basis of Payment Table included in Kudlik's Progress Draw #2, issued 28 August 2017. RJ states in summary that the quantity of Type 2 material may be somewhat greater than anticipated due to a) an overhang area in the cliff face that needed to be filled in and b) Zone 1 being smaller than anticipated, but that the other estimates appear to be accurate or if anything conservative.

A last issue of note is the fact that Kudlik is now processing the quarry reserves to make more material. Drillers are due to arrive tomorrow and blasting to provide new material for the needed aggregate manufacture is expected next week. This is according to initial plans.

**5. Corrective measures and procedures to regain projected schedule.**

As discussed above. We should be able to meet schedule provided there are no significant delays obtaining the Water Licence.

**6. Revisions to construction schedule.**

None at this time.

**7. Progress schedule, during succeeding work period.**

RJ states that the anticipated activities on site for the up-coming work period may include:

- Hauling of Type 2 and Type 3 aggregate and work on bringing up the landfill to the current height of the material lifts in Zone 1;
- Shaping of slopes and placement of geotextile;
- Screen and dispose of PHC-impacted soils;
- Extract debris from AEC-1 and -2;
- Haul debris to AEC-3, place and compact; and
- Containerize hazardous metal debris.

**8. Review submittal schedules.**

None outstanding.

MB speaks to payment of Progress Claim #1. It takes 30 days from receipt for payment.

JL and RJ have reviewed Kudlik's second progress claim; it will be issued shortly.

**9. Health, Safety and Security Issues**

RJ notes there has been a stray dog seen on site periodically, last seen the day before yesterday. One of the sled dogs got loose. It has not approached any site personnel.

**10. Maintenance of quality standards.**

Quality of work is excellent.

**11. Review proposed changes for effect on construction schedule and on completion date.**

No changes at this time.

**12. Wildlife incidents.**

Nothing to report at this time.

**13. Other business.**

RJ brings up the fact that daylight is starting to decrease significantly. FB and Kudlik management agree that this should not affect the project timeline.

FB mentions the contaminated sediments may lengthen the project timeline. We need to excavate them, then submit samples for analysis before disposal. If they meet regulatory requirements, they are permitted for use in the landfill Zone 1. Therefore, we cannot close Zone 1 prior to excavating and testing these sediments.

To that end SL, asks what the current rate of flow of the stream is. RJ to estimate in the coming week. (Note: it has been raining recently and the stream flow has increased. RJ will wait to measure stream flow until the storm surge subsides, likely several days).

END OF MINUTES

Please advise the writer – in writing – by Friday, 1 September 2017 if these minutes contain any errors or omissions; they will otherwise become part of the project documentation as presented.

Minutes prepared by Mr. Ryan Janzen – Arcadis Canada Inc.
28 August 2017

# MEMO


To:
Mr. Michael Brownlee – PSPC
Public Works and Government Services Canada

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ENVIRONMENT

From:
Arcadis

Location:
Iqaluit
NU


Date:
2017.09.04

ARCADIS Project No.:
102153-000

Subject:
Iqaluit Landfill Weekly Construction Meeting

---

**Attendance and Distribution**

| Name | Initials | Company | Email | Att. | Dist. |
|---|---|---|---|---|---|
| Mr. Michael Brownlee | MB | PSPC | Michael.Brownlee@pwgsc-tpsgc.gc.ca | x | ✓ |
| Ms. Jackie Barker | JB | TC | Jackie.Barker@tc.gc.ca | x | ✓ |
| Mr. François Bourassa | FB | Kudlik | fbourassa@gely.biz | x | ✓ |
| Mr. Jean-David Leberge | JL | Kudlik | jblaberge@kudlik.biz | x | ✓ |
| Mr. Jonathan Bouchard | JB | Kudlik | jbouchard@kudlik.biz | x | ✓ |
| Mr. Gaston Martin | GM | Kudlik | gmartin@kudlik.biz | x | ✓ |
| Mr. Maxime Gaudreau | MG | Kudlik | mgaudreau@kudlik.biz | ✓ | ✓ |
| Mr. Stephen Livingstone | SL | Arcadis | Stephen.Livingstone@arcadis.com | ✓ | ✓ |
| Mr. Geoff Parker | GP | Arcadis | Geoffrey.Parker@arcadis.com | x | ✓ |
| Mr. Ryan Janzen | RJ | Arcadis | ryan.janzen@arcadis.com | ✓ | ✓ |
| Mr. Ryan Fletcher | RF | Arcadis | ryan.fletcher@arcadis.com | x | ✓ |

RJ leads discussion. The agenda used was taken from the specification section on Progress Meetings, Specification 01 31 19, Section 1.4.6.

**1. Review, approval of minutes of previous meeting.**

Approved. These minutes will become part of the project records.

**2. Review of Work progress since previous meeting.**

RJ details the work completed since the last construction meeting as follows:

- Delivery of Type 2 material to landfill, placing, spreading, compacting;
- Shaping of slope and placement of geotextile;

- Delivery of Type 3 material, placement and shaping of final slope at the toe of the landfill;
- Delivery of sheared, non-hazardous metal debris to Zone 1, placed, compacted and covered;
- Delivery of hazardous debris and tires to TWA-1;
- Closure of Zone 1, progressing with Type 2 material lifts across the entire embankment;
- Excavation of PHC-impacted soil zone in AEC-1 (PHC-2). This soil taken to TWA-1 and awaiting sampling (hoping to dry it out a bit);
- Picking of debris in AEC-1, -2 using rubber-track mini-ex. Both areas are metal debris free; and
- Manual clean up in all site areas.
- SL asks about PCB sediments and if we can continue. RJ states that we can, we will incorporate that material into the face as we go up.

3. **Field observations, problems, conflicts.**

Surveyor on site daily to check elevations and extents multiple times daily as needed.

RJ states that the roads have been impassable yesterday and today due to excessive rain. There has been no hauling, but we are hoping to resume as early as this afternoon. This is not seen as a problem with regards to schedule at this time.

**4. Problems which impede construction schedule.**

Currently under a rain delay.

Water Licence is not considered a primary concern at this time, work can continue without it for now.

**5. Corrective measures and procedures to regain projected schedule.**

When we resume hauling it will be with a larger number of trucks.

**6. Revisions to construction schedule.**

None at this time.

**7. Progress schedule, during succeeding work period.**

RJ states that the anticipated activities on site for the up-coming work period may include:

- Hauling of Type 2 and Type 3 aggregate and work on bringing up the level of the landfill embankment;
- Screen and dispose of PHC-impacted soils;
- Clearing and grubbing under the path of Road B;
- Potentially excavate PCB-contaminated sediments; and
- Containerize hazardous metal debris.

**8. Review submittal schedules.**

None outstanding.

Kudlik's second progress claim was submitted last week.

**9. Health, Safety and Security Issues**

None to report.

**10. Maintenance of quality standards.**

Quality of work is excellent.

**11. Review proposed changes for effect on construction schedule and on completion date.**

No changes at this time.

**12. Wildlife incidents.**

Nothing to report at this time.

**13. Other business.**

We don't really need the Water Licence at the current time. No massive metal debris clean up needed going forward, only the stream sediments.

Project estimates are relatively accurate. Preliminary modelling estimates from Kudlik are that we are close. SL to relay the results to MB. We will continue with the modelling estimate and have a more exact aggregate amount for contingency coming later.

Hazardous waste stream collection is going well. We have not found anything surprising or outlandish quantities to date. For all intents and purposes, the extra waste streams can be considered complete – quantity wise – with the exception of lead-amended metal debris, where there is an isolated area to be sorted still.

SL would like to give some thought to the PCB impacted sediment portion of the program. What is the strategy for removal? What is the threshold value for sending it south? How are we reinstating the stream bed? There are sections where excavator access in impossible without significant regrading, etc. Would using the vac truck be an acceptable strategy? Field staff and Kudlik to discuss.

END OF MINUTES

Please advise the writer – in writing – by Wednesday, 6 September 2017 if these minutes contain any errors or omissions; they will otherwise become part of the project documentation as presented.

Minutes prepared by Mr. Ryan Janzen – Arcadis Canada Inc.
4 September 2017

# MEMO

ARCADIS Design & Consultancy for natural and built assets

To:
Mr. Michael Brownlee – PSPC
Public Works and Government Services Canada

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ENVIRONMENT

From:
Arcadis

Location:
Iqaluit
NU

Date:
2017.09.11

ARCADIS Project No.:
102153-000

Subject:
Iqaluit Landfill Weekly Construction Meeting

---

**Attendance and Distribution**

| Name | Initials | Company | Email | Att. | Dist. |
|---|---|---|---|---|---|
| Mr. Michael Brownlee | MB | PSPC | Michael.Brownlee@pwgsc-tpsgc.gc.ca | ✓ | ✓ |
| Ms. Jackie Barker | JB | TC | Jackie.Barker@tc.gc.ca | ✓ | ✓ |
| Mr. François Bourassa | FB | Kudlik | fbourassa@gely.biz | ✓ | ✓ |
| Mr. Jean-David Laberge | JL | Kudlik | jblaberge@kudlik.biz | | ✓ |
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| Mr. Gaston Martin | GM | Kudlik | gmartin@kudlik.biz | | ✓ |
| Mr. Maxime Gaudreau | MG | Kudlik | mgaudreau@kudlik.biz | | ✓ |
| Mr. Stephen Livingstone | SL | Arcadis | Stephen.Livingstone@arcadis.com | ✓ | ✓ |
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| Mr. Ryan Janzen | RJ | Arcadis | ryan.janzen@arcadis.com | ✓ | ✓ |
| Mr. Ryan Fletcher | RF | Arcadis | ryan.fletcher@arcadis.com | ✓ | ✓ |

RF leads discussion. The agenda used was taken from the specification section on Progress Meetings, Specification 01 31 19, Section 1.4.6.

**1. Review, approval of minutes of previous meeting.**

Minutes from previous meeting approved. These minutes will become part of the project records.

**2. Review of Work progress since previous meeting.**

RF details work on site since last meeting.

- Hauling of Type II and Type III aggregate material.

- Two days of no hauling and limited site activity on September 3 and 4 due to heavy rains and bad road conditions.
- Road repair was completed after rains on September 5th and hauling commenced once again that afternoon.
- Michael Brownlee visited the site on September 7, 2017 for a walk through.
- Constructed a temporary haul road from the top of AEC 3 to the current working platform. Photos to be included as part of the next weeks progress report.
- Kudlik continues to haul Type II and some Type III aggregate to the site.
- MB is happy with the work completed. Project is looking good, professional.

3. **Field observations, problems, conflicts.**
   - Bulldozer and excavator going full time
   - Now using six trucks, will likely up to eight trucks later today or this week at some point
   - Surveying daily or more often
   - Field change to the buttress elevation, one metre lower than designed. Approx. 1000m3 reduction in aggregate. This change was implemented due to the fact that we closed zone 1 early due to a lesser volume of metal debris than expected.

**4. Problems which impede construction schedule.**

- Water Licence is not considered a primary concern at this time, work can continue without it for now. We will need approval to collect the contaminated sediments from the stream area.
- MB states there is very little waste remaining in the stream, the scrap material is a non-issue. RF states that sediment volumes are expected to significantly less than estimated. Their removal will happen at the end of the program.
- JB asks when we absolutely need the WL. RF responds that progress is quick, we will need it in the next couple weeks. MB confirms we want a decision within the next two weeks. Weather is currently good, we would like to do this soon.
- JB will initiate some discussion with NWB, to communicate the deadline and get an estimated issue date.
- SL references Arcadis' memo response to the NWB comments. He would like to initiate the chemical testing program as requested by the ECCC comments to provided to the NWB. Some ECCC questions regarding the timing of sampling events were answered in the original LTM submission in Chapter 7.
- JB will be in touch with NWB to see if they actually need more response, or if they are happy with the document as it stands. TC wanted to have a response from Arcadis just in case it was needed by the NWB to get ahead of the ball on it.
- MB agrees that proceeding with chemical testing is a good idea. SL details the rationale behind proceeding with the sampling; we then have data to accommodate NWB request when it comes through. JB agrees and gives approval to proceed with surface water chemical testing.
- MB asks if we need a change order to accommodate this testing. Arcadis will check and get back to MB/TC.
- MB discusses the contingency amounts and whether we can reduce them. RF and GM had done some modelling, and the numbers suggest retaining 15% contingency of Type 2 aggregate volume. Other aggregate types are coming in on budget. There are two reasons for the increase in aggregate: a) less Type 1 waste and b) overhang area in the cliff face.

**5. Corrective measures and procedures to regain projected schedule.**

We are slightly ahead of schedule, but do not have an accurate new completion date at this point in time. It could be mid-October.

**6. Revisions to construction schedule.**

None at this time.

**7. Progress schedule, during succeeding work period.**

RJ states that the anticipated activities on site for the up-coming work period may include:

- Hauling of Type 2 and Type 3 aggregate and work on bringing up the level of the 2:1 landfill embankment;
- Screen and dispose of PHC-impacted soils;
- Clearing and grubbing under the path of Road B;
- Potentially excavate PCB-contaminated sediments; and
- Containerize hazardous metal debris.
- Take metal contaminated soils out of AEC-2 and place into lifts.
- Slight amount of hazardous metal debris left in the ravine to the north, we are almost at an elevation where we can access this area.
- MB discusses containerizing the metal debris in TWA-1 and RF states that this will likely take place very shortly to beat the poor weather.

**8. Review submittal schedules.**

None outstanding.

**9. Health, Safety and Security Issues**

Truck speed was high at certain times. Was brought to the attention of Kudlik staff and speeds have been lowered.

**10. Maintenance of quality standards.**

Quality of work is excellent, as it has been throughout the project.

**11. Review proposed changes for effect on construction schedule and on completion date.**

No changes at this time, schedule progress is favourable.

**12. Wildlife incidents.**

Nothing to report at this time.

**13. Other business.**

- SL asks if we have seen inspectors on site. RF says we have not, somewhat surprising. People in town, the City employees etc. have seen the progress of the project and there is a sense of familiarity in town. People in the community seem happy with the project, it is highly visible. Not worried about the lack of inspectors.
- MB discusses the stream feature. It is aesthetically pleasing, and we may consider design

changes to keep the stream aesthetic – i.e. replacing streambed with native rock, as opposed to armour stone. Is this something TC would entertain? Is this something that is feasible?

- JB says TC needs to consider the case. Need to be careful not to be seen to be making 'enhancements' to the property. Would like a cost breakdown to consider the request.
- RF to take some photos of the streambed and ask Kudlik for an idea on cost.
- FB to consider a source for 'native' material. Will work with RF to come up with a plan. MB will then discuss with TC.
- MB discusses access to site post-remediation. Existing roads are in good shape, worried about allowing large vehicle access to site, the potential of illegal dumping. Proposes a design to excavate the opening section of the road and keep large vehicle traffic off site. This design also allows for the road to be re-instated should the City or another entity wish to allow more access. TC would like to see some decommissioning measure to restrict vehicle traffic, approves this idea. Excavation would go beyond the culvert, to not impede existing water flow on site. RF confirms this will be implemented.
- JB asks if there is signage that can be left for long term posting. RF responds there is nothing of that nature currently. JB will consider some long term signage explaining the nature of the project, historical site use, the long term monitoring, etc. Wording will need to be decided.
- Discussion comes back to limiting site access. Consider a design that uses large boulders to block the road as opposed to road excavation. TC to discuss design options with the landowner (GNT). TC asks for a figure to aid the discussion. RF to send something to MB.

END OF MINUTES

Please advise the writer – in writing – by Wednesday, 13 September 2017 if these minutes contain any errors or omissions; they will otherwise become part of the project documentation as presented.

Minutes prepared by Mr. Ryan Janzen & Mr. Ryan Fletcher – Arcadis Canada Inc.
11 September 2017

# MEMO

ARCADIS Design & Consultancy for natural and built assets

To:
Mr. Michael Brownlee – PSPC
Public Works and Government Services Canada

Copies:
Attendees

ARCADIS Canada Inc.
329 Churchill Ave. N
Ottawa, ON
K1Z 5B8

613-721-0555

www.arcadis.com

ENVIRONMENT

From:
Arcadis

Location:
Iqaluit
NU

Date:
2017.09.18

ARCADIS Project No.:
102153-000

Subject:
Iqaluit Landfill Weekly Construction Meeting

---

**Attendance and Distribution**

| Name | Initials | Company | Email | Att. | Dist. |
|---|---|---|---|---|---|
| Mr. Michael Brownlee | MB | PSPC | Michael.Brownlee@pwgsc-tpsgc.gc.ca | ✓ | ✓ |
| Ms. Jackie Barker | JB | TC | Jackie.Barker@tc.gc.ca | ✓ | ✓ |
| Mr. François Bourassa | FB | Kudlik | fbourassa@gely.biz | | ✓ |
| Mr. Jean-David Laberge | JL | Kudlik | jblaberge@kudlik.biz | ✓ | ✓ |
| Mr. Jonathan Bouchard | JB | Kudlik | jbouchard@kudlik.biz | ✓ | ✓ |
| Mr. Gaston Martin | GM | Kudlik | gmartin@kudlik.biz | | ✓ |
| Mr. Maxime Gaudreau | MG | Kudlik | mgaudreau@kudlik.biz | | ✓ |
| Mr. Stephen Livingstone | SL | Arcadis | Stephen.Livingstone@arcadis.com | | ✓ |
| Mr. Geoff Parker | GP | Arcadis | Geoffrey.Parker@arcadis.com | | ✓ |
| Mr. Ryan Janzen | RJ | Arcadis | ryan.janzen@arcadis.com | ✓ | ✓ |
| Mr. Ryan Fletcher | RF | Arcadis | ryan.fletcher@arcadis.com | ✓ | ✓ |

RF leads discussion. The agenda used was taken from the specification section on Progress Meetings, Specification 01 31 19, Section 1.4.6.

**1. Review, approval of minutes of previous meeting.**
Approved. These minutes will become part of the project records.

**2. Review of Work progress since previous meeting.**
RF details work on site since last meeting:

- Completed base of landfill embankment
- Completed temporary haul road

- Hauling of Type II and Type III aggregate material.
- Drainage swale construction in AEC-3. Some slight changes to routes.
- Confirmatory samples from stockpiles and excavations.
- Removed metals soil from AEC-2, relocated to AEC-3
- Road A removal has begun. Aggregate being relocated to landfill embankment.
- Some weather delays to due to rain.
- INAC inspectors for site inspection. No concerns expressed, discussed the potential work-arounds with regards to WL from NWB. They may be willing to give us an exception, talks have been constructive.
- Removed debris from the north side of the landfill embankment. More hazardous and non-hazardous debris, no surprises.

3. **Field observations, problems, conflicts.**

RF notes the following:

- May need some additional capping to the NE of the main embankment, due to more debris/greater grubbing thickness than intended.
- Bulldozer and excavator full time, two off-road dump trucks and compactor.

MB notes the quantification refinements done last week. Most quantities are below estimates, there will likely be no overall effect on budget. The overages will require change orders from Kudlik, JL and RF to discuss and work together.

**4. Problems which impede construction schedule.**

No problems noted at this point in time.

**5. Corrective measures and procedures to regain projected schedule.**

We are slightly ahead of schedule.

**6. Revisions to construction schedule.**

- No revisions noted at this time. Slightly ahead of schedule. Middle of October completion date, may be affected by Water License timeline.
- MB and JB bring up the timeline for WL. JB has just spoke with INAC regarding Water License, and there have been several follow up questions. Their recommendation is to wait another couple days for the NWB input. RF has spoken to John Mesher on site, and a resolution is expected; INAC seems to approve of the proposed strategy. Re-iterate that the decision is to wait a couple days, and that Resident Engineer is to make a decision on whether/when a temporary permit is required.

**7. Progress schedule, during succeeding work period.**

RF states that the anticipated activities on site for the up-coming work period may include:

- Hauling of Type 2 aggregate and work on bringing up the level of the landfill embankment;
- Road A dismantling;
- MB brings up invoice #2, awaiting the second stat dec? JL and RJ say they should both have come

at once.

**8. Review submittal schedules.**

None outstanding.

**9. Health, Safety and Security Issues**

Heavy rain and high winds, work conditions were changed to account for that.

Lots of health and safety inspections/inventories, etc. DR approves of this.

**10. Maintenance of quality standards.**

Quality of work is excellent, as it has been throughout the project.

**11. Review proposed changes for effect on construction schedule and on completion date.**

No changes at this time, schedule progress is favorable.

**12. Wildlife incidents.**

Nothing to report at this time.

**13. Other business.**

No other business at this time.

END OF MINUTES

Please advise the writer – in writing – by Wednesday, 20 September 2017 if these minutes contain any errors or omissions; they will otherwise become part of the project documentation as presented.

Minutes prepared by Mr. Ryan Fletcher – Arcadis Canada Inc.
18 September 2017

# MEMO

ARCADIS Design & Consultancy for natural and built assets

To:
Mr. Michael Brownlee – PSPC
Public Works and Government Services Canada

Copies:
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329 Churchill Ave. N
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613-721-0555

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ENVIRONMENT

From:
Arcadis

Location:
Iqaluit
NU

Date:
2017.09.25

ARCADIS Project No.:
102153-002

Subject:
Iqaluit Landfill Weekly Construction Meeting

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**Attendance and Distribution**

| Name | Initials | Company | Email | Att. | Dist. |
|---|---|---|---|---|---|
| Mr. Michael Brownlee | MB | PSPC | Michael.Brownlee@pwgsc-tpsgc.gc.ca | ✓ | ✓ |
| Ms. Jackie Barker | JB | TC | Jackie.Barker@tc.gc.ca | ✓ | ✓ |
| Mr. François Bourassa | FB | Kudlik | fbourassa@gely.biz | x | ✓ |
| Mr. Jean-David Laberge | JL | Kudlik | jblaberge@kudlik.biz | ✓ | ✓ |
| Mr. Jonathan Bouchard | JB | Kudlik | jbouchard@kudlik.biz | x | ✓ |
| Mr. Gaston Martin | GM | Kudlik | gmartin@kudlik.biz | x | ✓ |
| Mr. Maxime Gaudreau | MG | Kudlik | mgaudreau@kudlik.biz | x | ✓ |
| Mr. Stephen Livingstone | SL | Arcadis | Stephen.Livingstone@arcadis.com | x | ✓ |
| Mr. Geoff Parker | GP | Arcadis | Geoffrey.Parker@arcadis.com | x | ✓ |
| Mr. Ryan Janzen | RJ | Arcadis | ryan.janzen@arcadis.com | ✓ | ✓ |
| Mr. Ryan Fletcher | RF | Arcadis | ryan.fletcher@arcadis.com | ✓ | ✓ |

RF leads discussion. There is a brief initial discussion with regards to site conditions; it has been snowing in Iqaluit and temperatures have dropped. The ponds and stream have a skim of ice on standing portions. Conditions are not expected to pose significant difficulties in the near future.
Moving on the meeting agenda. The agenda used was taken from the specification section on Progress Meetings, Specification 01 31 19, Section 1.4.6.

**1. Review, approval of minutes of previous meeting.**
Approved. These minutes will become part of the project records.

**2. Review of Work progress since previous meeting.**

RF details work on site since last meeting:

- Hauling material to stockpiles from the quarry.
- Completed swales at bottom of AEC-3.
- Drainage swale construction in AEC-3. Some slight changes to routes, elevations. Some swales not needed.
- Road A removal continues. Aggregate relocated to landfill embankment, AEC-1 and AEC-2.
- Capping in AEC-1 and AEC-2.
- Final grades at top of landfill embankment, slight elevation increase.
- Construction of Road B (also affected by elevation increase).
- First round of surface water chemical monitoring as per LTM.
- Some weather delays to due to rain.

3. **Field observations, problems, conflicts.**

We are anticipating the Type 2 aggregate volume used to be in excess of the original estimate. RJ wants to wait to issue change order regarding volumes until the final survey is in. MB has prepared a contemplated change notice.

**4. Problems which impede construction schedule.**

We now have the water licence, and thus no problems noted at this point in time.

**5. Corrective measures and procedures to regain projected schedule.**

We are slightly ahead of schedule. None required.

**6. Revisions to construction schedule.**

No revisions noted at this time. Finish date is anticipated to be the middle of October.

**7. Progress schedule, during succeeding work period.**

RF/RJ state that the anticipated activities on site for the up-coming work period may include:

- Final grading of the landfill embankment;
- Road A dismantling;
- Construction of Road B;
- Construction of drainage swales;
- Capping and final grading of areas across the site;
- Excavation of sediments from the stream area;
- Containerization, shipping of hazardous wastes.

MB asks if weather is an impediment. JL says it is not.

MB asks about rip rap in the stream bed. RF states that we found some boulders in AEC-2, we will use those during stream re-instating.

MB brings up the access road final closure design. JB has not been able to connect with John Hawkins at the Iqaluit Airport re. using boulders to restrict access. JL states that this will need to happen shortly. MB

and JB will try to have an approved strategy by the end of the week.

**8. Review submittal schedules.**

None outstanding.

**9. Health, Safety and Security Issues**

There is now snow on site, making roads/footing slippery. Extra caution is being taken, and Kudlik has a sand truck that can be mobilized if site personnel feel it is needed.

**10. Maintenance of quality standards.**

Quality of work is excellent, as it has been throughout the project.

**11. Review proposed changes for effect on construction schedule and on completion date.**

No changes at this time, schedule progress is favourable.

**12. Wildlife incidents.**

Nothing to report at this time.

**13. Other business.**

MB will come up for another site visit during the first week of October. He will communicate his plans once finalized.

END OF MINUTES

Please advise the writer – in writing – by Wednesday, 28 October 2017 if these minutes contain any errors or omissions; they will otherwise become part of the project documentation as presented.

Minutes prepared by Mr. Ryan Janzen – Arcadis Canada Inc.
25 September 2017

# MEMO


To:
Mr. Michael Brownlee – PSPC
Public Works and Government Services Canada

Copies:
Attendees

ARCADIS Canada Inc.
329 Churchill Ave. N
Ottawa, ON
K1Z 5B8

613-721-0555

www.arcadis.com

ENVIRONMENT

From:
Arcadis

Location:
Iqaluit
NU


Date:
2017.10.02

ARCADIS Project No.:
102153-002

Subject:
Iqaluit Landfill Weekly Construction Meeting

---

**Attendance and Distribution**

| Name | Initials | Company | Email | Att. | Dist. |
|---|---|---|---|---|---|
| Mr. Michael Brownlee | MB | PSPC | Michael.Brownlee@pwgsc-tpsgc.gc.ca | ✓ | ✓ |
| Ms. Jackie Barker | JB | TC | Jackie.Barker@tc.gc.ca | ✓ | ✓ |
| Mr. François Bourassa | FB | Kudlik | fbourassa@gely.biz | x | ✓ |
| Mr. Jean-David Laberge | JL | Kudlik | jblaberge@kudlik.biz | x | ✓ |
| Mr. Jonathan Bouchard | JB | Kudlik | jbouchard@kudlik.biz | x | ✓ |
| Mr. Gaston Martin | GM | Kudlik | gmartin@kudlik.biz | x | ✓ |
| Mr. Maxime Gaudreau | MG | Kudlik | mgaudreau@kudlik.biz | ✓ | ✓ |
| Mr. Stephen Livingstone | SL | Arcadis | Stephen.Livingstone@arcadis.com | ✓ | ✓ |
| Mr. Geoff Parker | GP | Arcadis | Geoffrey.Parker@arcadis.com | x | ✓ |
| Mr. Ryan Janzen | RJ | Arcadis | ryan.janzen@arcadis.com | ✓ | ✓ |
| Mr. Ryan Fletcher | RF | Arcadis | ryan.fletcher@arcadis.com | ✓ | ✓ |

RJ leads discussion. The agenda used was taken from the specification section on Progress Meetings, Specification 01 31 19, Section 1.4.6.

**1. Review, approval of minutes of previous meeting.**

Approved. These minutes will become part of the project records.

**2. Review of Work progress since previous meeting.**

RJ details work on site since last meeting:

- Hauling material to stockpiles/Road B from the quarry.
- Drainage swale construction in AEC-3.

- Road A removal continues. Aggregate relocated to landfill embankment, AEC-1 and AEC-2.
- Capping in AEC-1 and AEC-2.
- Construction of Road B begins.
- Streambed excavation and backfill.
- Sediment\ stockpiles sampled and shipped to Maxxam.

3. **Field observations, problems, conflicts.**

Streambed excavation completed, total amount of sediments removed was less than the 100$m^3$ original estimate. Using truck loads, it has been estimated at 65$m^3$. This will be confirmed on disposal depending on the chemical results.

**4. Problems which impede construction schedule.**

None of note. Down day (afternoon) due to weather during snowstorm on Saturday.

**5. Corrective measures and procedures to regain projected schedule.**

Ahead of schedule. Should be completed by the end of the week with only minor things to take care of early next week.

**6. Revisions to construction schedule.**

No revisions noted at this time.

**7. Progress schedule, during succeeding work period.**

RF states that the anticipated activities on site for the up-coming work period may include:

- Final grading of the landfill embankments, roadways, and capping;
- Final construction of Road B;
- Final completion of drainage swales;
- Capping and final grading of areas across the site;
- Containerization, shipping of hazardous wastes;
- Demobilization of site office.

**8. Review submittal schedules.**

None outstanding.

RJ has the latest progress draw #3 and will forward to PSPC as soon as possible.

**9. Health, Safety and Security Issues**

There is now snow on site, making roads/footing slippery. Cold is not yet a concern.

**10. Maintenance of quality standards.**

Quality of work is excellent, as it has been throughout the project.

**11. Review proposed changes for effect on construction schedule and on completion date.**

No changes at this time, schedule progress is favourable.

**12. Wildlife incidents.**

Nothing to report at this time.

**13. Other business.**

MB, JB and Anita will be up this coming Wednesday for a site progress inspection to take place Thursday.

MB would like to discuss placement of boulders in stream. Some have been placed along the sides of the streambed area.

RJ asks if a decision has been made on the road closure design? There has not been any input from J. Hawkins at the airport as yet, he will be returning to Iqaluit later today.

SL asks about LTM monitoring, when the next round is? RF will attempt shortly, but the stream is frozen and he will likely be unsuccessful.

The timing of the hazardous waste shipping has not been determined. Awaiting the results of the sediment sampling.

Sealift is scheduled to return to Iqaluit on 7 October 2017. Hazardous waste will need to be moved then.

END OF MINUTES

Please advise the writer – in writing – by Wednesday, 4 October 2017 if these minutes contain any errors or omissions; they will otherwise become part of the project documentation as presented.

Minutes prepared by Mr. Ryan Janzen – Arcadis Canada Inc.
2 October 2017

# MEMO

ARCADIS Design & Consultancy for natural and built assets

To:
Mr. Michael Brownlee – PSPC
Public Works and Government Services Canada

Copies:
Attendees

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329 Churchill Ave. N
Ottawa, ON
K1Z 5B8

613-721-0555

www.arcadis.com

ENVIRONMENT

From:
Arcadis

Location:
Iqaluit
NU

Date:
2017.10.10

ARCADIS Project No.:
102153-002

Subject:
Iqaluit Landfill Weekly Construction Meeting

---

**Attendance and Distribution**

| Name | Initials | Company | Email | Att. | Dist. |
|---|---|---|---|---|---|
| Mr. Michael Brownlee | MB | PSPC | Michael.Brownlee@pwgsc-tpsgc.gc.ca | ✓ | ✓ |
| Ms. Jackie Barker | JB | TC | Jackie.Barker@tc.gc.ca | ✓ | ✓ |
| Mr. François Bourassa | FB | Kudlik | fbourassa@gely.biz | | ✓ |
| Mr. Jean-David Laberge | JL | Kudlik | jblaberge@kudlik.biz | | ✓ |
| Mr. Jonathan Bouchard | JB | Kudlik | jbouchard@kudlik.biz | | ✓ |
| Mr. Gaston Martin | GM | Kudlik | gmartin@kudlik.biz | | ✓ |
| Mr. Maxime Gaudreau | MG | Kudlik | mgaudreau@kudlik.biz | | ✓ |
| Mr. Stephen Livingstone | SL | Arcadis | Stephen.Livingstone@arcadis.com | ✓ | ✓ |
| Mr. Geoff Parker | GP | Arcadis | Geoffrey.Parker@arcadis.com | | ✓ |
| Mr. Ryan Janzen | RJ | Arcadis | ryan.janzen@arcadis.com | ✓ | ✓ |
| Mr. Ryan Fletcher | RF | Arcadis | ryan.fletcher@arcadis.com | ✓ | ✓ |

RF leads discussion. The agenda used was taken from the specification section on Progress Meetings, Specification 01 31 19, Section 1.4.6.

**1. Review, approval of minutes of previous meeting.**

Approved. These minutes will become part of the project records.

**2. Review of Work progress since previous meeting.**

RF details work on site since last meeting:

- Completed dismantling of access road A
- Sampled sediments

- Capped area east of drainage swale on top of AEC 3
- Removed sea can used for geotextile – took to beach
- Final touches and final capping of AEC 2
- Final touches and final capping of AEC 1
- Completed AEC 3 drainage swale north and south extents and joined to the culvert
- Collected final LTM surface water sampling round. Got all but one station (due to frozen conditions)
- Completed Road B construction
- Removed PHC stock piles and took to landfarm in Iqaluit
- Removed liquid and liquid processing area
- Sampled below each PHC stockpile area and liquid processing area
- Had a site visit by transport Canada and PSPC on Wednesday and Thursday morning of last week. John Hawkins also participated in part of the site tour.
- Packaged hazardous lead amended painted material into sea cans for shipment and disposal south
- Packaged tires
- Removed some sediments for treatment in Iqaluit (PAH impacted) and bagged some sediments (11 bags of 2.5 m3 each) for a total of 27.5 m3 of metals impacted soil for disposal south.
- Cleaned up TWA-1
- Sampled below sediment stock piles and metal storage and sorting area
- Placed boulders in roadway to restrict site access
- Compaction testing of Road B

**3. Field observations, problems, conflicts.**

None noted at this time. Site work has wrapped up except for the very last items.

**4. Problems which impede construction schedule.**

None of note.

**5. Corrective measures and procedures to regain projected schedule.**

Earthwork is complete.

**6. Revisions to construction schedule.**

No revisions noted at this time. Again, site work has essentially been completed.

**7. Progress schedule, during succeeding work period.**

RF states that the anticipated activities on site for the up-coming work period may include:

- Remove site office and gate.
- Awaiting sample results.
- Move impacted soil bags and hazardous waste cans down to beach for sealift.

MB asks for updated quantities for waste streams. RF to provide.

JB and MB have spoken to JHawkins about the sign to be left on site. They will finalize the exact text and have the sign placed. RF proposes similar text as on DEW Line sites.

**8. Review submittal schedules.**

None outstanding.

**9. Health, Safety and Security Issues**

Had a snow storm last Saturday that slowed/haulted activities for the afternoon.

**10. Maintenance of quality standards.**

Quality of work has been excellent.

**11. Review proposed changes for effect on construction schedule and on completion date.**

No changes at this time.

**12. Wildlife incidents.**

Nothing to report at this time.

**13. Other business.**

Barge will be loading today or tomorrow. Arrived in Iqaluit yesterday.

SL talks briefly about the final Arcadis reporting requirements. MB suggests before/after photos to illustrate the work done

END OF MINUTES

Please advise the writer – in writing – by Thursday, 12 October 2017 if these minutes contain any errors or omissions; they will otherwise become part of the project documentation as presented.

Minutes prepared by Mr. Ryan Fletcher and Mr. Ryan Janzen – Arcadis Canada Inc.
10 October 2017

# APPENDIX E

## Water Licence

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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI
OFFICE DES EAUX DU NUNAVUT

**Licence No.: 1BR-MDR1721**

July 31, 2017

Jackie Barker, Environmental Officer
Transport Canada
344 Edmonton Street,
Winnipeg, Manitoba, R3B 2L4
Email: Jackie.Barker@tc.gc.ca

**RE: NWB Licence No. 1BR-MDR1721**

Dear Ms. Barker:

Please find attached Licence No. **1BR-MDR1721** issued to Transport Canada (TC) by the Nunavut Water Board (NWB or Board) pursuant to its authority under Article 13 of the *Agreement between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in Right of Canada* (*Nunavut Agreement*). The terms and conditions of the attached Licence related to the use of Waters and the deposit of Waste are an integral part of this approval.

If the Licensee contemplates the renewal of this Licence, it is the responsibility of the Licensee to apply to the NWB for its renewal. The past performance of the Licensee, new documentation and information, and issues raised during a public hearing, if the NWB is required to hold one, will be used to determine the terms and conditions of the Licence renewal. Note that if the Licence expires before the NWB issues a new one, then Water use and Waste deposit must cease, or the Licensee may be in contravention of the *Nunavut Agreement* and the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*. However, the expiry or cancellation of a licence does not relieve the holder from any obligations imposed by the Licence. The NWB recommends that an application for the renewal of this Licence be filed at least **three (3) months** prior to the Licence expiry date. It should be noted that in accordance with s. 75 (1) (a) of the *Nunavut Planning and Project Assessment Act* (NuPPAA), the Board is not allowed to issue a permit or authorization for a project proposal that has not been submitted to the Nunavut Planning Commission (NPC) for the NPC's relevant determination.

If the Licensee contemplates or requires an amendment to this Licence, the NWB may decide, in the public's interest, to hold a public hearing. The Licensee should submit any application for amendment as soon as possible to give the NWB sufficient time to go through the amendment process. The process and timing may vary depending on the scope of the amendment; however, a minimum of **sixty (60) days** is required from time of acceptance by the NWB. It is the responsibility of the Licensee to ensure that all application materials have been received and are

acknowledged by the Manager of Licensing.

The NWB strongly recommends that the Licensee consult the comments received from interested persons on issues identified. This information is attached for your consideration.[1]

Sincerely,

Thomas Kabloona
Nunavut Water Board
Chair

TK/ce/rd

Enclosure: Licence No. **1BR-MDR1721**
Comments – **INAC – Water Resources Division, ECCC, and DFO**

Cc: Qikiqtani Distribution List

[1] Indigenous and Northern Affairs Canada (INAC) – Water Resources Division, June 7, 2017; Environment and Climate Change Canada (ECCC), June 5, 2017; Department of Fisheries and Oceans Canada, June 12, 2017.

## TABLE OF CONTENTS

**A. INTRODUCTION**....1
**B. PROCEDURAL HISTORY**....2
**C. GENERAL CONSIDERATIONS**....3
**D. DECISION**....6
WATER LICENCE....1
PART A. SCOPE, DEFINITIONS AND ENFORCEMENT....2
1. **Scope**....2
2. **Definitions**....2
3. **Enforcement**....4
PART B. GENERAL CONDITIONS....5
PART C. CONDITIONS APPLYING TO WATER USE....7
PART D. CONDITIONS APPLYING TO WASTE DISPOSAL....7
PART E. CONDITIONS APPLYING TO THE UNDERTAKING....9
PART F. CONDITIONS FOR CAMPS, ACCESS INFRASTRUCTURES AND OPERATIONS....9
PART G. CONDITIONS APPLYING TO DRILLING OPERATIONS....10
PART H. CONDITIONS APPLYING TO CONSTRUCTION AND MODIFICATIONS....10
PART I. CONDITIONS APPLYING TO SPILL CONTINGENCY PLANNING....10
PART J. CONDITIONS APPLYING TO CLOSURE AND RECLAMATION OR TEMPORARY CLOSING....11
PART K. CONDITIONS APPLYING TO THE MONITORING PROGRAM....12

# A. INTRODUCTION

On March 3, 2017, Transport Canada (TC) applied for a new Type 'B' Water Licence to support the water use and waste deposit activities associated with the remediation of the Iqaluit Former Vehicle Dump and Community Landfill (the site). The site is situated approximately 1.7 km southwest of the City of Iqaluit, very close to the Sylvia Grinnell River (Iqaluit). This Transport Canada initiative is entitled the "Former Iqaluit Metal Dump Remediation Project", and it is expected to start during the summer of 2017 and continue through to December 2020 for the decommission of the site, including: removal of debris and metal materials, removal of contaminated soil and sediments, temporary diversion of a drainage feature in order to remove contaminated sediments, drainage feature improvement, swale design to divert precipitation and meltwater away from decommissioned landfill slopes and the collection of surface water samples around the site to monitor the remediation efforts.

The former dump and landfill site occupies a total area of approximately 7.25 ha (72,500 $m^2$), which includes the up-gradient debris area and the lower area bordering the Sylvia Grinnell River. The site is within the Frobisher Bay Watershed (No. 53), adjacent to the Sylvia Grinnell Territorial Park protected area and is within the administrative boundaries of the City of Iqaluit.

Transport Canada has proposed the use less than 50 $m^3$ of water per day with the projected total use for surface water sampling activities not to exceed 0.1 $m^3$. The submitted application also mentions that there will be no diversion of existing water courses; however, new water runoff from precipitation / snow melt will be diverted away from impacted materials. Moreover, it is expected that the diverted water will be treated and returned to all sources. Finally, all waste remediated from the site will be disposed of at licensed/approved off-site facilities.

The undertaking will not involve any camp activities as all work and all sampling events will be carried out by workers that are accommodated at existing facilities located within the City of Iqaluit.

## B. PROCEDURAL HISTORY

On March 3, 2017, the NWB received an Application for a new Licence from Transport Canada (TC), to support the remediation of the Iqaluit Former Vehicle Dump and Community Landfill (the site). The Application comprised of the following documents, some of which were provided under separate submissions following receipt of the initial Application:

- Application for Water Licence, submitted March 3, 2017;
- General Water Licence Application, submitted March 3, 2017;
- Cover Letter for NWB Application, submitted March 3, 2017;
- Spill Contingency Plan, Iqaluit Metal Dump, dated March 3, 2017;
- Summary of Potential Environmental and Resource Impacts, submitted March 3, 2017;
- Executive Summary, in English and Inuktitut, dated submitted 3, 2017;
- Figures 1-Main Components Remediation Program, submitted March 3, 2017;
- Figures 2-Main Components Remediation Program, submitted March 3, 2017;
- Remedial Action Plan, Former Metal Dump and Community Landfill, dated 27 January 2017 by Arcadis Canada Ltd., submitted on March 3, 2017;
- Letter by TC to City of Iqaluit, dated November 1, 2016;
- Letter by TC to GN EDandT, dated November 1, 2016;
- Letter by TC to GN Environment, dated November 1, 2016;
- Letter by TC to NTI, dated November 1, 2016;
- Letter by TC to QIA, dated November 1, 2016;
- Email response by City of Iqaluit to TC, dated November 21, 2016;
- Letter by GN EDandT to TC, dated November 28, 2016;
- Letter from NIRB to TC requesting Additional Information, dated February 27, 2017;
- Letter by TC to NIRB responding to the request for Additional Information, dated April 25, 2017;
- Letter by TC to NWB responding to questions submitted by INAC, dated June 26, 2017.

Prior to the NWB's receipt of the Application, the NPC and the NIRB had both issued their respective determinations for the project. On February 20, 2017, the NPC determined that the project proposal (for NPC File No. 148456) was outside the area of an applicable regional land use plan and that the project required screening by the Nunavut Impact Review Board (NIRB). On May 16, 2017, the NIRB issued a screening decision report for the project (NIRB File No. 17UN025). On May 17, 2017, following a preliminary internal technical review, the NWB distributed a notice of the Application to interested parties. All parties were invited to make representations to the NWB by June 7, 2017. Environment and Climate Change Canada (ECCC), provided a submission on June 5, 2017 in which it indicated that it had no comments at the time. Submissions were received on June 7, 2017 from INAC's –Water Resources Division and the Kitikmeot Inuit Association (KIA). INAC-Water Resources Division stated that it supported the Licence term of 3.5 years requested by the Licensee. INAC-WRD also provided the following recommendations:

1) The Applicant use best practices for erosion control when constructing the temporary access road, particularly if the road ends up having to cross any drainage features;
2) The Applicant must ensure that the appropriate approvals are obtained from any receiving facilities for waste associated with this project;

3) The Applicant must ensure that they are using proper containment when drying sediments and ensure that they use secondary containment when storing contaminated soil and sediments prior to disposal;
4) Lastly, INAC-WRD recommended that the NWB confirm if any water use will be required for dust suppression on the temporary access road to be constructed by the Licensee. On June 26, 2017, Transport Canada submitted a letter to the NWB to confirm that dust suppression measures will be implemented on an "as required basis", however the water used will be trucked in to the site from municipal sources in Iqaluit.

The Department of Fisheries and Oceans Canada (DFO), submitted comments on June 12, 2017. In its submission, the DFO stated that the proposal has been identified as a project where a Fisheries Act authorization is not required given that serious harm to fish can be avoided by following standard measures. The DFO also highlighted in its submission the website where the Licensee could obtain the DFO's recommended standard measures.

Based upon the results of the detailed assessment of the Application, including consideration of any potential impacts to freshwater that the overall project might have on the area, the Board has approved the Application and has therefore approved the issuance of Water Licence No. 1BR-MDR1721.

## C. GENERAL CONSIDERATIONS

### Term of Licence

In accordance with the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* s. 45, the NWB may issue a Licence for a term not exceeding twenty-five years. The Licensee requested a three and a half (3.5) year Licence (for a Licence expiry by December 2020), for the remediation of the Iqaluit Former Vehicle Dump and Community Landfill (the site). In its review of the Application, on June 7, 2017, INAC-WRD supported the request for a three and a half (3.5) year Licence term. In determining an appropriate term of a Water Licence, the Board considers a number of factors including the comments received from other parties, and the risk to Water resources posed by the undertaking. The Board has decided to issue the Licence for a four-year term. This will not only allow the Licensee the time to decommission the site and submit all the required close-out reports for the undertaking, but will also allow INAC-WRD the opportunity to inspect the site and provide a site close-out inspection report.

### Annual Report

As a requirement of section 14(1) of the *Nunavut Waters Regulations* and similar to the terms and conditions generally included in all licences issued by the Board, the NWB has included under Part B, Item 1 of this Licence, requirements for the Licensee to submit to the Board for review, prior to the 31st of March, annually, a report detailing Water use and/or Waste deposit activities for the undertaking for the preceding year. The submission of Annual Reports ensure that the NWB has on file accurate updates of all Water use and/or Waste deposit activities related to an undertaking for any particular year preceding and including the date on which the report is filed.

The Board provides public access to the information submitted in licensees' annual reports through its ftp site as well as upon request from interested parties.

The NWB has included on its website a standardized form for annual reporting that licensees can use to submit annual reporting information, supplemented by other project-specific, relevant details. A copy of the NWB's generic Annual Report Form can be obtained from the NWB upon request or electronically from the NWB's FTP site using the following link: ftp://ftp.nwb-oen.ca/other%20documents/

**Water Use**

As requested by the Applicant, the Board has authorized the maximum water usage of fifty (50) cubic metre per day to allow for water diversion, remediation activities, water sampling and related activities. The Licensee indicated in the Application that all Water necessary for dust suppression, of the temporary access road to be constructed, will be sourced from the city of Iqaluit's municipal supply.

**Deposit of Waste**

The Licensee intends to remediate the site and will remove off-site an estimated 1040 $m^3$ of hazardous waste and consolidate in the on-site landfill an estimate 3629 $m^3$ of bulk items/scrap metal. The Licensee has indicated that contaminated soil and sediments will be removed from the site and will be either deposited at an on-site landfill, or the Iqaluit land treatment unit, or packaged for shipment to an appropriate facility. The Licensee has also indicated that sediments may need to be dried prior to disposal. In its June 7, 2017 comments, INAC-WRD recommended that the Licensee ensure that the appropriate approvals are obtained from all receiving facilities prior to waste disposal at those facilities. Moreover, INAC-WRD recommended that the Licensee not only ensure that proper containment is used when drying sediments, but that a secondary containment be used when storing contaminated soil and sediments prior to disposal. On June 26, 2017 the Licensee acknowledged INAC-WRD's recommendations and agreed to abide by them.

**The Undertaking**

The Licensee (Transport Canada) plans to implement the following remediation activities:

1. Removal of on-site debris;
2. Targeted removal of contaminant impacted soils and sediments;
3. Engineered decommissioning of on-site landfill to achieve a proper slope;
4. Build road access;
5. Implement mitigation measures for fugitive air emissions, sediment release control, and surface water control;
6. Perform final capping, contouring, and revegetation of the site; and
7. Monitor the performance of the remedial works in terms of physical stability, erosion, revegetation and attenuation of contaminants in soils, sediments, and surface water.

**Spill Contingency Planning**

With issuance of this Licence, the Board has now approved the submitted plan entitled "*Spill Contingency Plan Former Iqaluit Vehicle Dump and Community Landfill Remediation Project, Iqaluit Airport, Iqaluit, Nunavut*" Prepared by Transport Canada on March 2011, Revised in April 2017 by Arcadis Canada Inc.

**Abandonment and Reclamation**

The United States Air Force (USAF) used the Iqaluit Former Vehicle Dump and Community Landfill (the site) from between 1955 to 1963 as a metal dump for vehicles, truck bodies, barrels and scrap metal. In the 1960's, the town of Iqaluit briefly used the site as a municipal waste dump site. The site was abandoned in the 1970's and a toping consisting of granular material was placed on top and on the face of the landfill site to cover much of the debris.

With issuance of this Licence, the Board has now approved the submitted plan entitled *"Remedial Action Plan, Former Metal Dump and Community Landfill",* dated 27th January 2017, submitted to the NWB on March 31, 2017, drafted by Arcadis Canada Ltd. In this plan, the Licensee has detailed all remediation activities in sections 8.2. The Licensee shall conduct its remediation activities in accordance with this plan.

Under the terms and conditions in the Licence applying to abandonment and restoration, the Licensee is required to remove any remaining equipment associated with the project upon completion. Additional conditions for restoration have been included under Part J of this Water Licence.

**Monitoring**

A Monitoring Plan and Program is required during the remediation activities, Part K, Item 1. Once the landfill is decommissioned, a passive surface water system will be constructed, and the debris/impacted soil/sediments will be removed, it is expected that through natural attenuation, the areas will recover. Post-remediation monitoring will be required to verify this natural attenuation process, so as to ensure that the onsite conditions are improving as planned. A monitoring of at least three (3) years has been proposed following the remediation work. Should the on-site monitoring activities require water use (for water diversion, remediation activities, water sampling and related activities) or further waste deposit, past the expiry date of this License, the Licensee has been reminded to apply for a renewal License from the NWB.

Conditions related to monitoring can be found under Part K of the Licence.

# D. DECISION

**LICENCE NUMBER: 1BR-MDR1721**

This is the decision of the Nunavut Water Board (NWB or Board) with respect to an application dated March 3, 2017, for the Water Licence made by:

**TRANSPORT CANADA**

to allow for the use of Water and deposit of Waste during remediation of the Iqaluit Former Vehicle Dump and Community Landfill (the site). The site is situated approximately 1.7 km southwest of the City of Iqaluit, close to the Sylvia Grinnell River, in the Qikiqtani Region of Nunavut, generally at the following geographical coordinates:

| | | |
|---|---|---|
| Project Extent: | Max Latitude: 63° 44' 18.6" N | Max Longitude: 68° 33' 8.6" W |
| | Min Latitude: 63° 44' 1.7" N | Min Longitude: 68° 32' 58.5" W |

**DECISION**

After receiving confirmation that the Application was for a location that falls outside of an area with an approved Land Use Plan[1] as determined by the NPC (NPC file No. 148456) and that a review is not required in accordance with paragraph 92(10)(a) of the *Nunavut Planning and Project Assessment Act* (NuPPAA)[2] as determined by the Nunavut Impact Review Board (NIRB), the NWB has decided that the Application could proceed through the regulatory process. In accordance with s. 55.1 of the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* (*Act*) and Article 13 of the *Nunavut Agreement*, public notice of the Application was given and interested persons were invited to make representations to the NWB.

After reviewing the submission of the Licensee and considering the representations made by an intervening party, the NWB, having given due regard to the facts and circumstances, the merits of the submissions made to it and to the purpose, scope and intent of the *Nunavut Agreement* and of the *Act*, waived the requirement to hold a public hearing, and determined that:

**Issuing Licence No. 1BR-MDR1721 subject to the terms and conditions contained therein. (Motion #: 2017-B1-019)**

Signed this 31st day of July 2017 at Gjoa Haven, NU.

Thomas Kabloona
Nunavut Water Board
Chair

TK/ce/rd

[1] Nunavut Planning Commission (NPC) Determination, February 20, 2017.
[2] Nunavut Impact Review Board (NIRB), May 16, 2017.

**NUNAVUT WATER BOARD**
WATER LICENCE

Pursuant to the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Agreement Between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in right of Canada*, the Nunavut Water Board, hereinafter referred to as the Board, hereby grants to

**TRANSPORT CANADA**
(Licensee)

**344 EDMONTON STREET, WINNIPEG, MANITOBA R3B 2L4**
(Mailing Address)

hereinafter called the Licensee, the right to alter, divert or otherwise use water or dispose of waste for a period subject to restrictions and conditions contained within this Licence:

| | |
|---|---|
| Licence Number/Type: | **1BR-MDR1721 / TYPE "B"** |
| Water Management Area: | **FROBISHER BAY WATERSHED (# 53)** |
| Project / Location: | **FORMER IQALUIT METAL DUMP REMEDIATION PROJECT / QIKIQTANI REGION, NUNAVUT** |
| Classification: | **INDUSTRIAL UNDERTAKING** |
| Purpose: | **DIRECT USE OF WATER AND DEPOSIT OF WASTE** |
| Quantity of Water use not to Exceed: | **FIFTY (50) CUBIC METRE PER DAY** |
| Date of Licence Issuance: | **JULY 31, 2017** |
| Expiry of Licence: | **JULY 30, 2021** |

This Licence issued and recorded at Gjoa Haven, Nunavut, includes and is subject to the annexed conditions.

**Thomas Kabloona,**
**Nunavut Water Board**
**Chair**

## PART A. SCOPE, DEFINITIONS AND ENFORCEMENT

### 1. Scope

This Licence allows for the use of Water and the deposit of Waste associated with the remediation of a former landfill and dump site, for an Industrial undertaking as per Schedule 1 of the *Regulations*, at the Former Iqaluit Metal Dump Remediation Project. The site is situated approximately 1.7 km southwest of the City of Iqaluit, close to the Sylvia Grinnell River (Iqaluit), in the Qikiqtani Region of Nunavut.

a. This Licence is issued subject to the conditions contained herein with respect to the taking of water and the depositing of waste of any type in any waters or in any place under any conditions where such waste or any other waste that results from the deposits of such waste may enter any waters. Whenever new Regulations are made or existing *Regulations* are amended by the Governor in Council under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*, or other statutes imposing more stringent conditions relating to the quantity or type of waste that may be so deposited or under which any such waste may be so deposited, this Licence shall be deemed, upon promulgation of such Regulations, to be subject to such requirements; and

b. Compliance with the terms and conditions of this Licence does not absolve the Licensee from responsibility for compliance with the requirements of all applicable Federal, Territorial and Municipal legislation.

### 2. Definitions

In this Licence: 1BR-MDR1721

"**Act**" means the *Nunavut Waters and Nunavut Surface Rights Tribunal Act;*

"**Addendum**" means the supplemental text that is added to a full plan or report usually included at the end of the document and is not intended to require a full resubmission of the revised report;

"**Amendment**" means a change to original terms and conditions of this Licence requiring correction, addition or deletion of specific terms and conditions of the Licence; modifications inconsistent with the terms of the set terms and conditions of the Licence;

"**Analyst**" means an Analyst designated by the Minister under section 85 (1) of the *Act*;

"**Application**" means the application package for Licence No. 1BR-MDR1721, received by the Board March 3, 2017;

"**Appurtenant Undertaking**" Means an undertaking in relation to which a use of Water or a deposit of Waste is permitted by a licence issued by the Board;

"**Board"** means the Nunavut Water Board established under the *Nunavut Agreement* and

the *Nunavut Waters and Nunavut Surface Rights Tribunal Act;*

"**Effluent**" means treated or untreated liquid waste material that is discharged into the environment from a structure such as a settling pond, landfarm or a treatment plant;

"**Engineer**" means a professional engineer registered to practice in Nunavut in accordance with the *Consolidation of Engineers and Geoscientists Act S. Nu 2008, c.2* and the *Engineering and Geoscience Professions Act S.N.W.T. 2006, c.16 Amended by S.N.W.T. 2009, c.12*;

"**Final Discharge Point**" means the point at which the Licensee no longer exerts care and/or control over the quality and/or quantity of the effluent from a treatment process;

**"Grab Sample"** means a single water or wastewater sample taken at a time and place representative of the total discharge;

"**Greywater**" means all liquid wastes from showers, baths, sinks, kitchens and domestic washing facilities, but does not include toilet wastes;

"**Hazardous Waste**" means waste classified as "hazardous" by Nunavut Territorial or Federal Legislation, or as "dangerous goods" under the *Transportation of Dangerous Goods Act* at the time of clean-up;

"**High Water Mark**" means the usual or average level to which a body of Water rises at its highest point and remains for sufficient time so as to change the characteristics of the land;

"**Inspector**" means an Inspector designated by the Minister under Section 85 (1) of the *Act*;

"**Landfarm Facility**" means an engineered facility and associated appurtenance designed and constructed for the treatment and storage of hydrocarbon impacted soil and/or Water, as described in the Remedial Action Plan, Former Metal Dump and Community Landfill, dated 27 January 2017 by Arcadis Canada Ltd., submitted on March 3, 2017;

"**Licensee**" means the individual or organization to which 1BR-MDR1721 Type "B" is issued or assigned;

"**Modification**" means an alteration to a physical work that introduces a new structure or eliminates an existing structure and does not alter the purpose or function of the work, but does not include an expansion;

"**Monitoring Program**" means the monitoring program established to collect data on surface Water and groundwater quality to assess impacts to the environment of the appurtenant undertaking;

"**Non-Hazardous Waste Landfill**" comprises the landfill constructed for the disposal of non-hazardous Waste derived from the site cleanup, as described in plan entitled

"Remedial Action Plan, Former Metal Dump and Community Landfill", dated 27th January 2017.

"**Nunavut Agreement**" means the *"Agreement Between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in right of Canada*", including its preamble and schedules, and any amendments to that agreement made pursuant to it;

"**Regulations**" means the *Nunavut Waters Regulations SOR/2013-69 18th April, 2013*;

"**Sewage**" means all toilet Wastes and greywater;

"**Solid Waste**" means non-hazardous waste and Type-A soil;

"**Spill Contingency Plan**" means a Plan developed to deal with unforeseen petroleum and hazardous materials events that may occur during the operations conducted under the Licence;

"**Sump**" A structure or depression that collects, controls, and filters liquid Waste before it is released to the environment. This structure should be designed to prevent erosion while allowing percolation of liquid Waste;

"**Toilet Wastes**" means all human excreta and associated products, but does not include greywater;

"**Waste**" means, as defined in s.4 of the *Act*, any substance that, by itself or in combination with other substances found in water, would have the effect of altering the quality of any water to which the substance is added to an extent that is detrimental to its use by people or by any animal, fish or plant, or any water that would have that effect because of the quantity or concentration of the substances contained in it or because it has been treated or changed, by heat or other means;

"**Water**" **or** "**Waters**" means waters as defined in section 4 of the Act;

3. **Enforcement**

a. Failure to comply with this Licence will be a violation of the *Act*, subjecting the Licensee to the enforcement measures and the penalties provided for in the *Act*;

b. All inspection and enforcement services regarding this Licence will be provided by Inspectors appointed under the *Act*; and

c. For the purpose of enforcing this Licence and with respect to the use of Water and deposit or discharge of Waste by the Licensee, Inspectors appointed under the *Act*, hold all powers, privileges and protections that are conferred upon them by the *Act* or by other applicable law.

## PART B. GENERAL CONDITIONS

1. The Licensee shall file an Annual Report on the Appurtenant Undertaking with the Board no later than the 31st of March of the year following the calendar year being reported, containing the following information:

   a. A summary report of Water use activities;

   b. A summary of any construction work, modification and major maintenance work (including as-built diagrams) carried out;

   c. Tabular summaries for all data and information generated under the Monitoring Program;

   d. A review and analysis of data collected during the Monitoring Program and a brief description of any future studies planned by the Licensee;

   e. The results of any review conducted and any recommendations regarding any changes to the Monitoring Program and/or remediation requirements;

   f. A summary of any remediation work undertaken during the year and an outline of any work anticipated for the next year;

   g. A list of unauthorized discharges and summary of follow-up actions taken;

   h. Any updates or revisions for manuals and plans as required by changes in operation and/or technology;

   i. If applicable, a description of any trenches and sumps excavated, including the following: GPS coordinates, dimensions, depth below active layer, and secondary containment features;

   j. A brief summary of work done to address any concerns of deficiencies listed in the inspection reports and/or compliance reports prepared by an Inspector;

   k. An executive summary in English and Inuktitut of all plans, reports, or studies conducted under this Licence; and

   l. Any other details on Water use or deposit of Waste requested by the Board by 1st of November of the year being reported.

2. The Licensee shall notify the NWB of any changes in operating plans or conditions associated with this project at least thirty (30) days prior to any such change.

3. The Licensee shall comply with the Monitoring Program described in this Licence, and any amendments to the Monitoring Program as may be made from time to time, pursuant to the conditions of this Licence.

4. The Monitoring Program and compliance dates specified in the Licence may be modified at the discretion of the Board.

5. The Licensee shall, for all Plans submitted under this Licence, include a proposed timetable for implementation. Plans submitted, cannot be undertaken without subsequent written Board approval and direction. The Board may alter or modify a Plan if necessary

to achieve the legislative objectives and will notify the Licensee in writing of acceptance, rejection or alteration of the Plan.

6. The Licensee shall, for all Plans submitted under this Licence, implement the Plan as approved by the Board in writing.

7. The Licensee shall review the Plans referred to in this Licence, as required by changes in operation and/or technology, and modify the Plan accordingly. Revisions to the Plans shall be submitted in the form of an Addendum to be included with the Annual Report.

8. Every Plan to be carried out pursuant to the terms and conditions of this Licence shall become a part of this Licence, and any additional terms and conditions imposed upon approval of a Plan by the Board become part of this Licence. All terms and conditions of the Licence should be contemplated in the development of a Plan where appropriate.

9. The Licensee shall post signs in the appropriate areas to identify the stations of the Monitoring Program associated with the undertaking. All signage postings shall be in the Official Languages of Nunavut

10. The Licensee shall ensure a copy of this Licence is maintained at the site of operations at all times. Any communication with respect to this Licence shall be made in writing to the attention of:

**(a) Manager of Licensing:**
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0
Telephone: (867) 360-6338
Fax: (867) 360-6369
Email: licensing@nwb-oen.ca

**(b) Inspector Contact:**
Manager of Field Operations, INAC
Nunavut District, Nunavut Region
P.O. Box 100
Iqaluit, NU X0A 0H0
Telephone: (867) 975-4295
Fax: (867) 979-6445

11. The Licensee shall submit one paper copy and one electronic copy of all reports, studies, and plans to the Board. Reports or studies submitted to the Board by the Licensee shall include a detailed executive summary in Inuktitut.

12. The Licensee shall ensure that any document(s) or correspondence submitted by the Licensee to the NWB is received and acknowledged by the Manager of Licensing.

13. This Licence is assignable as provided for in section 44 of the *Act*.

## PART C. CONDITIONS APPLYING TO WATER USE

1. The Licensee is authorized to use up to fifty (50) cubic metre of Water per day for water diversion, remediation activities, water sampling and related activities.

2. The Licensee shall not remove any material from below the ordinary High Water Mark of any Water body.

3. The Licensee is required to determine and record the GPS co-ordinates (in degrees, minutes and seconds of latitude and longitude) of all locations where water is used and include this information in the submitted Annual Reports.

4. The Licensee is recommended to install flow meters or other such devices, or implement suitable methods for measuring volumes of water. These measures may include providing water volume calculations based on water level.

5. The Licensee is required to measure and record in cubic metres, the daily quantities of Water used.

6. The Licensee should equip all water intake hoses with a screen of an appropriate mesh size to ensure that there is no entrainment of fish and to withdraw water at a rate such that fish do not become impinged on the screen.

7. The Licensee should not remove any material from below the ordinary high water mark of any water body unless authorized.

8. Sediment and erosion control measures should be implemented prior to and maintained during the undertaking to prevent entry of sediment into water.

9. The Licensee shall implement measures to prevent the deposition of dust and/or sediment into Water arising from contractor activities or any on-site vehicular traffic.

10. Equipment used should be well cleaned and free of oil and grease and maintained free of fluid leaks. The Licensee shall ensure that pollutants from machinery used during construction do not enter Water.

## PART D. CONDITIONS APPLYING TO WASTE DISPOSAL

1. The Licensee shall locate areas designated for Waste disposal including all pump-out Water at a minimum distance of thirty-one (31) metres from the ordinary High Water Mark of any Water body, such that the quality, quantity or flow of Water is not impaired, unless otherwise approved by the Board in writing.

2. The Licensee shall not practice on-site landfilling of domestic waste, unless otherwise approved by the Board in writing.

3. The Licensee shall backhaul and dispose of all Waste not covered in Part D, Item 1, at a licenced waste disposal facility.

4. The Licensee shall provide to the Board, for review, documented authorization from all communities in Nunavut receiving wastes from the Site prior to any backhauling and disposal of Wastes to those communities.

5. The Licensee shall maintain records of all Waste backhauled and records of confirmation of proper disposal of backhauled Waste and include this information within the Annual Report in Part B, Item 1.

6. The Licensee may consolidate and treat Petroleum Hydrocarbon Contaminated Soil in a bermed area or as otherwise approved by the Board in writing.

7. The Licensee shall dispose of contaminated or hydrocarbon impacted soil at the proposed Landfarm Facility if constructed or backhaul such waste to an approved facility for disposal or manage it in a manner that is otherwise approved by the Board in writing.

8. The Licensee shall provide notice to an Inspector at least ten (10) days prior to initiating any decant or discharge of any waste waters. The notice shall include the estimated discharge volume, effluent quality, and the proposed location for the discharge.

9. Effluent discharged from any leachate/runoff should not exceed the following discharge limits:

| **Parameter** | **Maximum Concentration of any Grab Sample (µg/L)** |
|---|---|
| pH | 6 to 9 (pH units) |
| Oil and Grease | 5000 |
| Arsenic (total) | 100 |
| Cadmium (total) | 10 |
| Chromium (total) | 100 |
| Cobalt (total) | 50 |
| Copper (total) | 200 |
| Lead (total) | 50 |
| Mercury (total) | 0.6 |
| Nickel (total) | 200 |
| Zinc (total) | 500 |
| Benzene | 370 |
| Toluene | 2 |
| Ethylbenzene | 90 |

10. If the Effluent referred to in Part D, Items 9 exceeds the respective discharge limits, it will be considered Hazardous Waste requiring further treatment or disposal off-site at an approved facility or as otherwise approved by the Board in writing.

11. The Licensee shall provide for the proper storage, treatment, and/or disposal at an approved facility, of any Hazardous Waste generated by the Project, unless otherwise approved by the Board in writing.

12. The Licensee shall dispose of any material coated with Polychlorinated Biphenyl (PCB) amended paints, hazardous materials and soils containing contaminants in excess of *Canadian Environmental Protection Act* (CEPA) Guidelines, with the exception of asbestos, which must be disposed off site at an approved treatment facility.

## PART E. CONDITIONS APPLYING TO THE UNDERTAKING

1. The Licensee shall conduct all activities in such a way as to minimize impacts on surface drainage and the Licensee shall immediately undertake any corrective measures in the event of any impacts on surface drainage.

2. The Licensee shall not cause erosion to the banks of any body of Water and shall provide necessary controls to prevent such erosion.

3. The Licensee shall minimize disturbance to terrain, permafrost and drainage during movement of contractor's equipment and personnel around the site during post closure monitoring activities.

4. All sites affected by water diversion, remediation activities, water sampling and related activities shall be stabilized, landscaped as necessary, and suitable erosion control measures implemented to minimize sediment deposition into watercourses located on or adjacent to the site.

5. The Licensee shall implement proper handling, storage and transportation procedures for hazardous materials to prevent entry to any Water body.

## PART F. CONDITIONS FOR CAMPS, ACCESS INFRASTRUCTURES AND OPERATIONS

1. Establishment and use of a camp is not authorized under this Licence

2. All activities shall be conducted in such a way as to minimize impacts on surface drainage and the Licensee shall immediately undertake any corrective measures in the event of any impacts on surface drainage.

3. Winter lake and stream crossings, including ice bridges, shall be constructed entirely of water, ice or snow, and shall be removed prior to spring break-up.

4. With respect to access road, pad construction or other earthworks, the deposition of debris or sediment into any water body is prohibited. These materials shall be disposed of above the ordinary high water mark in such a fashion that they do not enter the water.

## PART G. CONDITIONS APPLYING TO DRILLING OPERATIONS

1. The Licensee is authorized to conduct drilling for the purposes of installing monitoring wells and other instrumentation.

2. The Licensee shall restore all drill holes and disturbed areas to natural conditions immediately upon completion of the projects. The restoration of drill holes must include the removal of any drill casing materials and the capping of holes with a permanent seal.

## PART H. CONDITIONS APPLYING TO CONSTRUCTION AND MODIFICATIONS

1. The Licensee shall submit to the Board for acceptance for-construction drawings for all water and/or waste management facilities authorized under the Licence at least thirty (30) prior to commencing construction.

2. The Licensee may, without written consent from the Board, carry out Modifications to the Water and Waste management structures or Facilities provided that such Modifications are consistent with the terms of this Licence and the following requirements are met:

   a. the Licensee has notified the Board in writing of such proposed Modifications at least sixty (60) days prior to beginning the Modifications;
   b. such Modifications do not place the Licensee in contravention of the Licence or the *Act*;
   c. such Modifications are consistent with the NIRB Screening Decision;
   d. the Board has not, during the sixty (60) days following notification of the proposed Modifications, informed the Licensee that review of the proposal will require more than sixty (60) days; and
   e. the Board has not rejected the proposed Modifications.

3. Modifications for which all of the conditions referred to in Part H, Item 1 have not been met can be carried out only with written approval from the Board.

4. The Licensee shall provide as-built plans and drawings of structures or facilities constructed under Part H, Item 1 or of the Modifications referred to in this Licence within ninety (90) days of completion. These plans and drawings shall be stamped by an Engineer.

## PART I. CONDITIONS APPLYING TO SPILL CONTINGENCY PLANNING

1. The Board has approved with issuance of this Licence the plan entitled “Spill Contingency Plan Former Iqaluit Vehicle Dump and Community Landfill Remediation Project, Iqaluit Airport, Iqaluit, Nunavut” Revised April 26 2017 and submitted as additional information for the Application.

2. The Licensee shall prevent any chemicals, petroleum products or wastes associated with the project from entering water. All sumps and fuel caches shall be located at a distance of at least thirty one (31) metres from the ordinary High Water Mark of any adjacent water body and inspected on a regular basis.

3. The Licensee shall conduct any equipment maintenance and servicing in designated areas and shall implement special procedures (such as the use of drip pans) to manage motor fluids and other waste and contain potential spills.

4. If during the term of this Licence, an unauthorized discharge of waste occurs, or if such a discharge is foreseeable, the Licensee shall:

   a. Employ the approved Spill Contingency Plan;

   b. Report the spill immediately to the 24-Hour Spill Line at (867) 920-8130 and to the Inspector at (867) 975-4295; and

   c. For each spill occurrence, submit to the Inspector, no later than thirty (30) days after initially reporting the event, a detailed report that will include the amount and type of spilled product, the GPS location of the spill, and the measures taken to contain and clean up the spill site.

## PART J. CONDITIONS APPLYING TO CLOSURE AND RECLAMATION OR TEMPORARY CLOSING

1. The Board has approved with issuance of this Licence the plan entitled "Remedial Action Plan, Former Metal Dump and Community Landfill", dated 27 January 2017 and submitted as additional information for the Application.

2. All roads shall be re-graded to match natural contours to reduce erosion.

3. In order to promote growth of vegetation and the needed microclimate for seed deposition, all disturbed surfaces shall be prepared by ripping, grading, or scarifying the surface to conform to the natural topography.

4. The Licensee shall remove from the site, all infrastructure and site materials, including all fuel caches, drums, barrels, material and equipment prior to the expiry of this Licence.

5. Areas that have been contaminated by hydrocarbons from normal fuel transfer procedures shall be reclaimed to meet objectives as outlined in the Government of Nunavut's *Environmental Guideline for Contaminated Site Remediation*, 2009. The use of reclaimed soils for the purpose of back fill or general site grading may be carried out only upon consultation and approval by the Government of Nunavut, Department of Environment and an Inspector.

6. All disturbed areas shall be contoured and stabilized upon completion of work and restored to a pre-disturbed state.

## PART K. CONDITIONS APPLYING TO THE MONITORING PROGRAM

1. Prior to commencing any onsite remediation work, the Licensee shall submit and obtain Board approval for a *detailed monitoring plan*. The *detailed monitoring plan* should:

    a. detail the on-going site Monitoring Program;
    b. identify Monitoring Program Stations, including the GPS co-ordinates (in degrees, minutes and seconds of latitude and longitude);
    c. address if there will be any effluent discharge, what the discharge criteria will be, and what effluent monitoring measures may be implemented;
    d. summarize data collected thus far during onsite remediation activities and;
    e. must include an assessment of how the facilities are expected to perform in the long-term as well as appropriate recommendations.

2. All sampling, sample preservation and analyses shall be conducted in accordance with methods prescribed in the current edition of *Standard Methods for the Examination of Water and Wastewater*, or by such other methods approved by the Board in writing.

3. All analyses shall be performed in a laboratory accredited according to ISO/IEC Standard 17025. The accreditation shall be current and in good standing.

4. The Licensee shall ensure that tabular summaries for all data and information generated under the Monitoring Program, as well as an analysis of data collected during the Monitoring Program, are provided to the Board in the Annual Report, in accordance with Part B, Item 1.

5. The Licensee shall determine the GPS co-ordinates (in degrees, minutes, and seconds of latitude and longitude) of all locations where sources of Water are utilized for all purposes.

6. The Licensee shall submit a Quality Assurance/Quality Control Plan (QA/QC) for the Long Term Monitoring of the site. The QA/QC plan should reflect the operation and/or technology being utilized. Any revisions to the QA/QC Plan shall be acceptable to an accredited laboratory and include, when being submitted to the Board, a cover letter from an accredited laboratory confirming acceptance of the Plan for analyses to be performed under the Licence.

7. Any revisions to the QA/QC Plan and the *detailed monitoring Plan* are to be submitted in the form of an addenda to be included with the Annual Report, unless directed otherwise by the Board.

8. The Licensee must conduct any additional monitoring requested by the Inspector.

**Licence No.: 1BR-MDR1721/**
**Part K, Item 1**

September 25, 2017

Jackie Barker, Environmental Officer
Transport Canada
344 Edmonton Street,
Winnipeg, Manitoba, R3B 2L4
Email: Jackie.Barker@tc.gc.ca

**Subject: Licence No. 1BR-MDR1721; Submission under Part K, Item 1, of a Performance & Long Term Monitoring Plan (LTM), Former Metal Dump and Community Landfill**

Dear Jackie Barker,

The Nunavut Water Board (NWB or Board) received from Transport Canada (TC) on August 14, 2017, the Performance & Long Term Monitoring Plan (LTM), Former Metal Dump and Community Landfill, dated August 3, 2017, as a requirement of Part K, Item 1 of the NWB Licence No. 1BR-MDR1721.

The Plan was distributed for a public review and comments with a deadline for submission set at September 1, 2017. The Board received communication from Environment and Climate Change Canada (ECCC) on August 31, 2017, and Indigenous and Northern Affairs Canada (INAC) on September 1, 2017. Indigenous and Northern Affairs Canada (INAC) wrote to confirm that the submitted Plan was reviewed, found to be adequate, and that they had no further concerns with the Plan. Environment and Climate Change Canada (ECCC) submitted three (3) main recommendations all of which were addressed by Transport Canada (the Licensee) in their September 12, 2017 follow-up submission.

By copy of this letter the Board acknowledges that the Plan addresses the requirements of Part K, Item 1 of Licence 1BR-MDR1721, and has approved the Plan through the Board Motion No. **2017-B1-031**, dated September 21, 2017. The Licensee is also advised that the Board's "approval" of this document is a verification that the proposed activities are consistent with the existing terms and conditions of the Licence and more specifically with the Part K, Item 1, and may proceed in accordance with the Plan.

Copies of the Plan and stakeholder submissions, can be accessed through the NWB's Public Registry and FTP site using the following link:

ftp://ftp.nwb-oen.ca/registry/1%20INDUSTRIAL/1B/1BR%20-%20Remediation/1BR-MDR1721%20TC/3%20TECH/9%20MONITORING/

If you have any questions related to this correspondence, please contact the NWB's Licensing Department at (867) 360-6338 or by email to licensing@nwb-oen.ca .

Regards,

Cynthia Ene, Technical Advisor
cc. Qikiqtani Distribution List

# APPENDIX F

## Aggregate Gradation Curves

4500, rue Louis-B.-Mayer
Laval (QC) H7P 6E4
Phone: 450-682-8013
www.exp.com

Cetified: ISO 9001:2008

# SOILS AND AGGREGATES

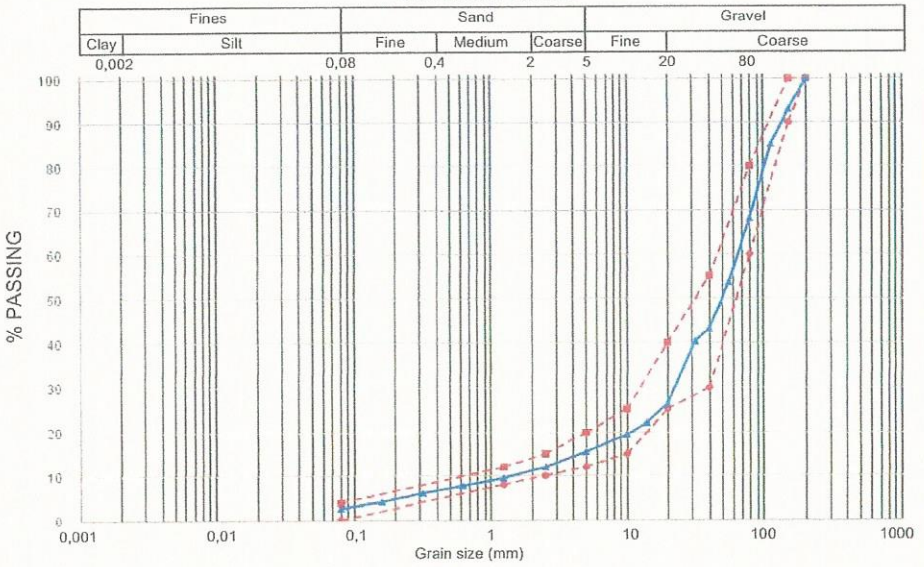
| | | | |
|---|---|---|---|
| Client : | KUDLIK CONSTRUCTION LTD | Project n° : | KUCE-218525-005400 |
| | | Sample n° : | IQ-0961 |
| Project : | Iqaluit 2014 à 2017 | **Client Ref.:** | |

| | | | |
|---|---|---|---|
| Material : | 0-200mm (Iqaluit) , Crushed stone (Type 3) | Sampling date : | 2017-07-04 by EXP |
| Source : | Quarry north of the airport, Iqaluit | Location : | Stockpile |
| Utilisation : | Backfilling | Receiving date : | 2017-07-04 |

**Grain size analysis**
**LC 21-040**

| Sieve (mm) | Grading (%passing) | | |
|---|---|---|---|
| | Value | Specifications | |
| 200 | 100 | 100 | 100 |
| 150 | 93 | 90 | 100 |
| 112 | 85 | | |
| 80 | 68 | 60 | 80 |
| 56 | 54 | | |
| 40 | 43 | 30 | 55 |
| 31,5 | 40 | | |
| 20 | 26 | 25 | 40 |
| 14 | 22 | | |
| 10 | 19 | 15 | 25 |
| 5 | 15 | 12 | 20 |
| 2,5 | 12 | 10 | 15 |
| 1,25 | 10 | 8 | 12 |
| 0,630 | 8 | | |
| 0,315 | 6 | | |
| 0,160 | 4 | | |
| 0,080 | 2,7 | 0,0 | 4,0 |

**Gradation Curve**




| Proctor | Other tests | Results | Specifications |
|---|---|---|---|
| Method : | | | |
| Masse vol. max. : | | | |
| Optimum water | | | |

Remarks :

Verified by : CHUONG SONG LU

Approved by : André Arbour Date : 2017-07-05
André Arbour

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**SOILS AND AGGREGATES**

Client : KUDLIK CONSTRUCTION LTD
Project n° : KUCE-218525-005400
Sample n° : IQ-0963
Project : Iqaluit 2014 à 2017
**Client Ref.:**

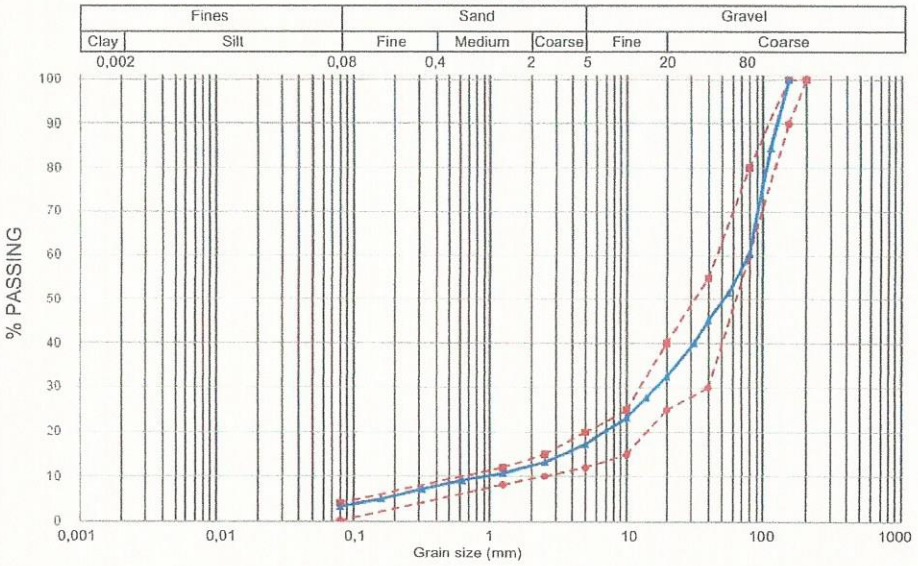
Material : 0-200mm (Iqaluit) , Crushed stone (Type 3)
Sampling date : 2017-07-07 by EXP
Source : Quarry north of the airport, Iqaluit
Location : Stockpile

Utilisation : Backfilling
Receiving date : 2017-07-07

**Grain size analysis**
**LC 21-040**

| Sieve (mm) | Grading (%passing) Value | Specifications | |
|---|---|---|---|
| 200 | | 100 | 100 |
| 150 | 100 | 90 | 100 |
| 112 | 85 | | |
| 80 | 60 | 60 | 80 |
| 56 | 51 | | |
| 40 | 45 | 30 | 55 |
| 31,5 | 40 | | |
| 20 | 32 | 25 | 40 |
| 14 | 28 | | |
| 10 | 23 | 15 | 25 |
| 5 | 17 | 12 | 20 |
| 2,5 | 13 | 10 | 15 |
| 1,25 | 11 | 8 | 12 |
| 0,630 | 9 | | |
| 0,315 | 7 | | |
| 0,160 | 5 | | |
| 0,080 | 3,2 | 0,0 | 4,0 |

**Gradation Curve**




| Proctor | Other tests | Results | Specifications |
|---|---|---|---|
| Method : | | | |
| Masse vol. max. : | | | |
| Optimum water | | | |

Remarks :

Verified by : CHUONG SONG LU
Approved by : André Arbour
Date : 2017-07-08

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Cetified: ISO 9001:2008

**SOILS AND AGGREGATES**

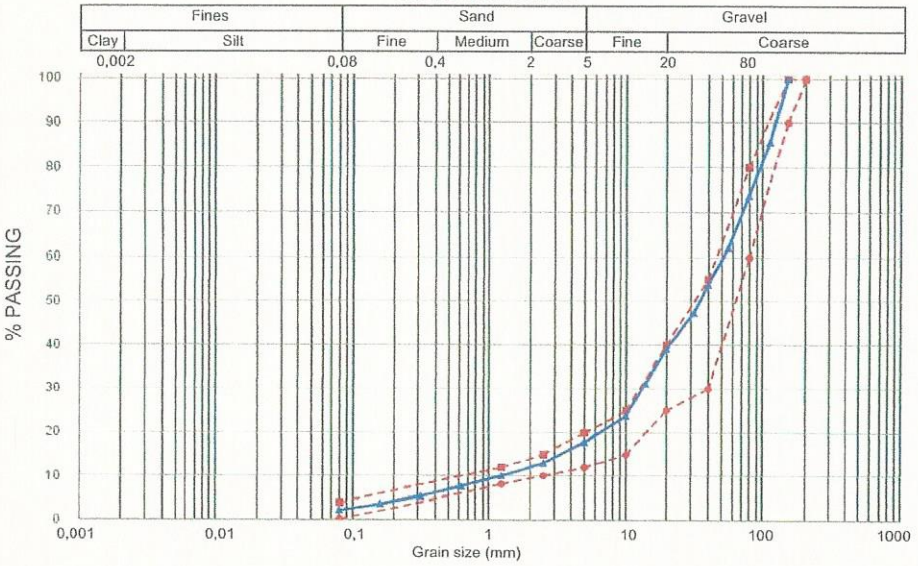
| | | | |
|---|---|---|---|
| Client : | KUDLIK CONSTRUCTION LTD | Project n° : | KUCE-218525-005400 |
| | | Sample n° : | IQ-0964 |
| Project : | Iqaluit 2014 à 2017 | **Client Ref.:** | |

| | | | |
|---|---|---|---|
| Material : | 0-200mm (Iqaluit) , Crushed stone (Type 3) | Sampling date : | 2017-07-08 by EXP |
| Source : | Quarry north of the airport, Iqaluit | Location : | Stockpile |
| Utilisation : | Backfilling | Receiving date : | 2017-07-08 |

**Grain size analysis**
**LC 21-040**

| Sieve (mm) | Grading (%passing) | | |
|---|---|---|---|
| | Value | Specifications | |
| 200 | | 100 | 100 |
| 150 | 100 | 90 | 100 |
| 112 | 86 | | |
| 80 | 74 | 60 | 80 |
| 56 | 62 | | |
| 40 | 54 | 30 | 55 |
| 31,5 | 47 | | |
| 20 | 39 | 25 | 40 |
| 14 | 31 | | |
| 10 | 24 | 15 | 25 |
| 5 | 18 | 12 | 20 |
| 2,5 | 13 | 10 | 15 |
| 1,25 | 10 | 8 | 12 |
| 0,630 | 8 | | |
| 0,315 | 5 | | |
| 0,160 | 4 | | |
| 0,080 | 2,3 | 0,0 | 4,0 |

**Gradation Curve**




| Proctor | Other tests | Results | Specifications |
|---|---|---|---|
| Method :<br>Masse vol. max. :<br>Optimum water | | | |

Remarks :

Verified by : CHUONG SONG LU

Approved by : André Arbour

Date : 2017-07-08

4500, rue Louis-B.-Mayer
Laval, QC H7P 6E4
Tél. : 450-682-8013

## RESULTS OF SIEVE ANALYSIS

OUR/REF. : **LAV-218525** PROJECT : MATERIAL : **Crushed stone 0-5mm**

CLIENT : **Kudlik Construction ltd** PERIOD : SOURCE : **Quarry north of the airport, Iqaluit, Nunavut**

SAMPLED BY : **Song Lu Chuong** **KUDLIK Stockpile** PROPOSED USAGE : **Asphalt**

SOURCE : **Quarry north of the airport, Iqaluit, Nunavut**

| # LAB. | SAMPLING | | SIEVES IN MILLIMETER | | | | | | | | | | SIEVES IN MICRON | | | | Cumulative at the End of the day |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE | DATE | 80 | 56 | 40 | 31,5 | 20 | 14 | 10 | 5 | 2,5 | 1,25 | 630 | 315 | 160 | 80 | |
| IQ-0930 | 1 | 2017-06-04 N | | | | | | 100 | 100 | 88 | 58 | 41 | 31 | 23 | 16 | 10,4 | |
| IQ-0932 | 2 | 2017-06-05 D | | | | | | 100 | 100 | 88 | 58 | 41 | 31 | 23 | 15 | 9,5 | |
| IQ-0934 | 3 | 2017-06-05 N | | | | | | 100 | 100 | 88 | 59 | 42 | 32 | 24 | 16 | 10,1 | |
| IQ-0936 | 4 | 2017-06-06 D | | | | | | 100 | 100 | 88 | 56 | 37 | 27 | 20 | 14 | 9,5 | |
| IQ-0938 | 5 | 2017-06-06 N | | | | | | 100 | 100 | 91 | 62 | 43 | 32 | 23 | 15 | 9,1 | |
| IQ-0940 | 6 | 2017-06-07 D | | | | | | 100 | 100 | 92 | 62 | 43 | 31 | 22 | 15 | 9,0 | |
| IQ-0942 | 7 | 2017-06-07 N | | | | | | 100 | 100 | 90 | 58 | 39 | 29 | 21 | 14 | 8,6 | |
| IQ-0944 | 8 | 2017-06-08 D | | | | | | 100 | 100 | 92 | 65 | 46 | 34 | 24 | 16 | 9,7 | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| ***AVERAGE*** | | | | | | | | **100** | **100** | **90** | **60** | **42** | **31** | **23** | **15** | **9,5** | |

* Out of specifications

| REQUIREMENT | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MIN. | | | | | | | | 100 | 85 | | | | | | 8 |
| | MAX. | | | | | | | | 100 | 100 | | | | | | 11 |

Prepared by : Song Lu Chuong Date : June 08, 2017 Approved by : Date : JUNE 11 2017

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**SOILS AND AGGREGATES**

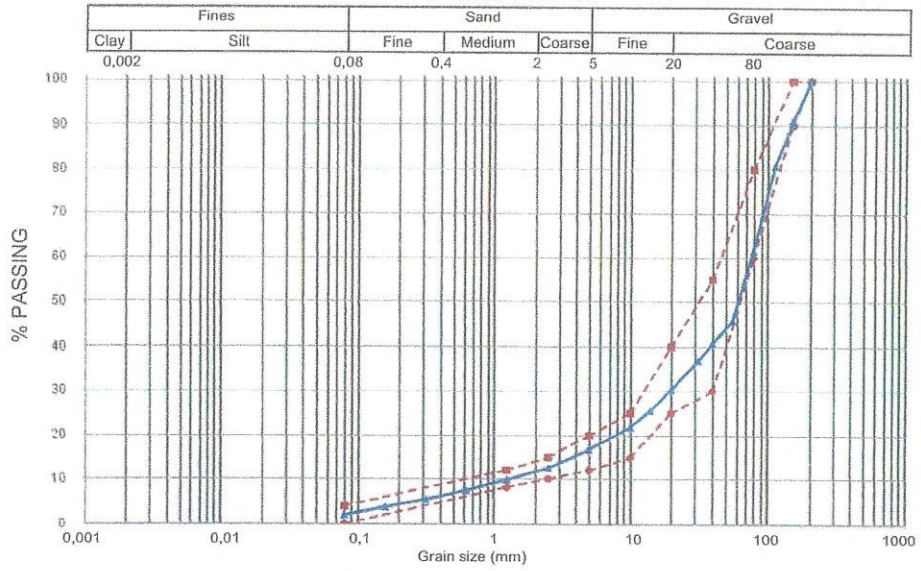
| | | | |
|---|---|---|---|
| Client : | KUDLIK CONSTRUCTION LTD | Project n° : | KUCE-218525-005400 |
| Project : | Iqaluit 2014 à 2017 | Sample n° : | IQ-1069 |
| | | **Client Ref.:** | |

| | | | |
|---|---|---|---|
| Material : | 0-200mm (Iqaluit) , Crushed stone (Type 2) | Sampling date : | 2017-09-04 by EXP |
| Source : | Quarry north of the airport, Iqaluit | Location : | Stockpile |
| Utilisation : | Backfilling | Receiving date : | 2017-09-04 |

**Grain size analysis**
**LC 21-040**

| Sieve (mm) | Grading (%passing) Value | Specifications | |
|---|---|---|---|
| 200 | 100 | 100 | 100 |
| 150 | 91 | 90 | 100 |
| 112 | 81 | | |
| 80 | 62 | 60 | 80 |
| 56 | 46 | | |
| 40 | 41 | 30 | 55 |
| 31,5 | 37 | | |
| 20 | 30 | 25 | 40 |
| 14 | 25 | | |
| 10 | 22 | 15 | 25 |
| 5 | 17 | 12 | 20 |
| 2,5 | 13 | 10 | 15 |
| 1,25 | 10 | 8 | 12 |
| 0,630 | 7 | | |
| 0,315 | 5 | | |
| 0,160 | 4 | | |
| 0,080 | 2,1 | 0,0 | 4,0 |

**Gradation Curve**




| Proctor | Other tests | Results | Specifications |
|---|---|---|---|
| Method :<br>Masse vol. max. :<br>Optimum water | | | |

Remarks :

Verified by : CHUONG SONG LU

Approved by : André Arbour

Date : 2017-09-05

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Cetified: ISO 9001:2008

# SOILS AND AGGREGATES

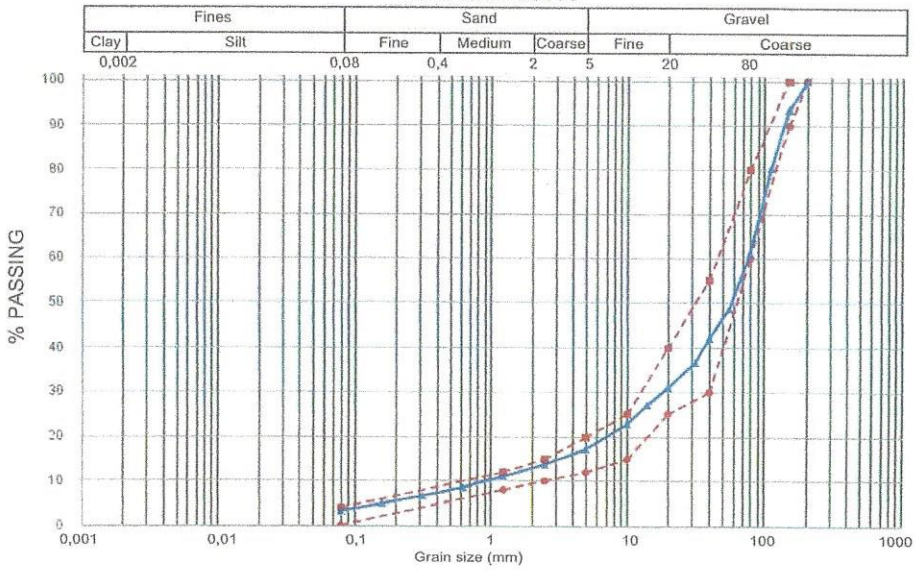
| | | | |
|---|---|---|---|
| Client : | KUDLIK CONSTRUCTION LTD | Project n° : | KUCE-218525-005400 |
| Project : | Iqaluit 2014 à 2017 | Sample n° : | IQ-1070 |
| | | **Client Ref.:** | |

| | | | |
|---|---|---|---|
| Material : | 0-200mm (Iqaluit) , Crushed stone (Type 2) | Sampling date : | 2017-09-05 by EXP |
| Source : | Quarry north of the airport, Iqaluit | Location : | Stockpile |
| Utilisation : | Backfilling | Receiving date : | 2017-09-05 |

**Grain size analysis**
**LC 21-040**

| Sieve (mm) | Grading (%passing) | | |
|---|---|---|---|
| | Value | Specifications | |
| 200 | 100 | 100 | 100 |
| 150 | 94 | 90 | 100 |
| 112 | 80 | | |
| 80 | 61 | 60 | 80 |
| 56 | 49 | | |
| 40 | 42 | 30 | 55 |
| 31,5 | 37 | | |
| 20 | 31 | 25 | 40 |
| 14 | 27 | | |
| 10 | 23 | 15 | 25 |
| 5 | 17 | 12 | 20 |
| 2,5 | 14 | 10 | 15 |
| 1,25 | 11 | 8 | 12 |
| 0,630 | 9 | | |
| 0,315 | 7 | | |
| 0,160 | 5 | | |
| 0,080 | 3,3 | 0,0 | 4,0 |

**Gradation Curve**




| Proctor | Other tests | Results | Specifications |
|---|---|---|---|
| Method : | | | |
| Masse vol. max. : | | | |
| Optimum water | | | |

Remarks :

Verified by : CHUONG SONG LU

Approved by : André Arbour

Date : 2017-09-05

4500, rue Louis-B.-Mayer
Laval (QC) H7P 6E4
Phone: 450-682-8013
www.exp.com

Cetified: ISO 9001:2008

# SOILS AND AGGREGATES

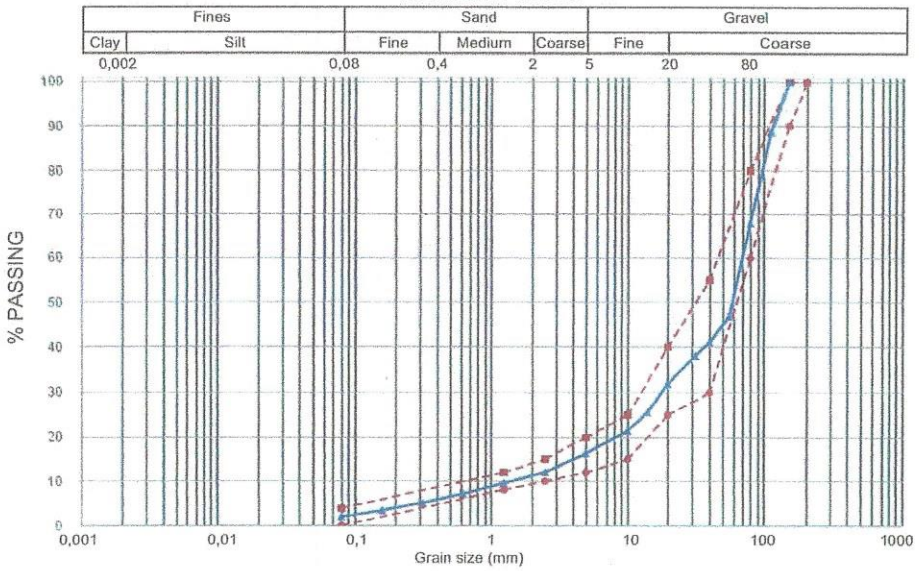
| | | | |
|---|---|---|---|
| Client : | KUDLIK CONSTRUCTION LTD | Project n° : | KUCE-218525-005400 |
| | | Sample n° : | IQ-1079 |
| Project : | Iqaluit 2014 à 2017 | **Client Ref.:** | |

| | | | |
|---|---|---|---|
| Material : | 0-200mm (Iqaluit) , Crushed stone (Type 2) | Sampling date : | 2017-09-09 by EXP |
| Source : | Quarry north of the airport, Iqaluit | Location : | Stockpile |
| Utilisation : | Backfilling | Receiving date : | 2017-09-09 |

**Grain size analysis**
**LC 21-040**

| Sieve (mm) | Grading (%passing) | | |
|---|---|---|---|
| | Value | Specifications | |
| 200 | | 100 | 100 |
| 150 | 100 | 90 | 100 |
| 112 | 89 | | |
| 80 | 68 | 60 | 80 |
| 56 | 47 | | |
| 40 | 41 | 30 | 55 |
| 31,5 | 38 | | |
| 20 | 32 | 25 | 40 |
| 14 | 26 | | |
| 10 | 21 | 15 | 25 |
| 5 | 16 | 12 | 20 |
| 2,5 | 12 | 10 | 15 |
| 1,25 | 9 | 8 | 12 |
| 0,630 | 7 | | |
| 0,315 | 5 | | |
| 0,160 | 4 | | |
| 0,080 | 2,1 | 0,0 | 4,0 |

**Gradation Curve**




| Proctor | Other tests | Results | Specifications |
|---|---|---|---|
| Method : | | | |
| Masse vol. max. : | | | |
| Optimum water | | | |

Remarks :

Verified by : CHUONG SONG LU

Approved by : André Arbour

Date : 2017-09-10

4500, rue Louis-B.-Mayer
Laval (QC) H7P 6E4
Phone: 450-682-8013
www.exp.com

Cetified: ISO 9001:2008

# SOILS AND AGGREGATES

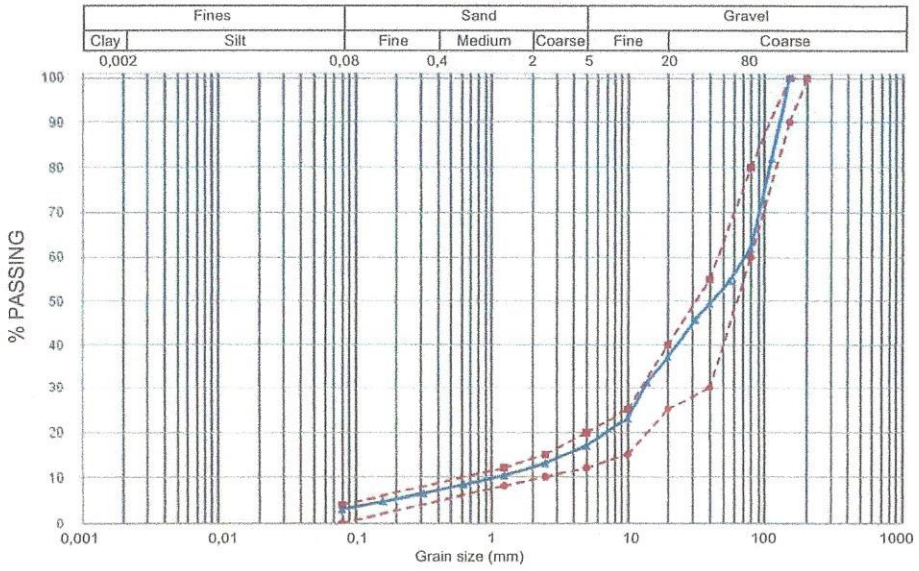
| | | | |
|---|---|---|---|
| Client : | KUDLIK CONSTRUCTION LTD | Project n° : | KUCE-218525-005400 |
| | | Sample n° : | IQ-1080 |
| Project : | Iqaluit 2014 à 2017 | **Client Ref.:** | |

| | | | |
|---|---|---|---|
| Material : | 0-200mm (Iqaluit) , Crushed stone (Type 2) | Sampling date : | 2017-09-10 by EXP |
| Source : | Quarry north of the airport, Iqaluit | Location : | Stockpile |
| Utilisation : | Backfilling | Receiving date : | 2017-09-10 |

**Grain size analysis**
**LC 21-040**

| Sieve (mm) | Grading (%passing) | | |
|---|---|---|---|
| | Value | Specifications | |
| 200 | | 100 | 100 |
| 150 | 100 | 90 | 100 |
| 112 | 82 | | |
| 80 | 62 | 60 | 80 |
| 56 | 54 | | |
| 40 | 49 | 30 | 55 |
| 31,5 | 46 | | |
| 20 | 37 | 25 | 40 |
| 14 | 31 | | |
| 10 | 23 | 15 | 25 |
| 5 | 17 | 12 | 20 |
| 2,5 | 13 | 10 | 15 |
| 1,25 | 10 | 8 | 12 |
| 0,630 | 8 | | |
| 0,315 | 7 | | |
| 0,160 | 5 | | |
| 0,080 | 3,1 | 0,0 | 4,0 |

**Gradation Curve**




| Proctor | Other tests | Results | Specifications |
|---|---|---|---|
| Method :<br>Masse vol. max. :<br>Optimum water | | | |

Remarks :

Verified by : CHUONG SONG LU

Approved by : André Arbour

Date : 2017-09-10

4500, rue Louis-B.-Mayer
Laval (QC) H7P 6E4
Phone: 450-682-8013
www.exp.com

Cetified: ISO 9001:2008

# SOILS AND AGGREGATES

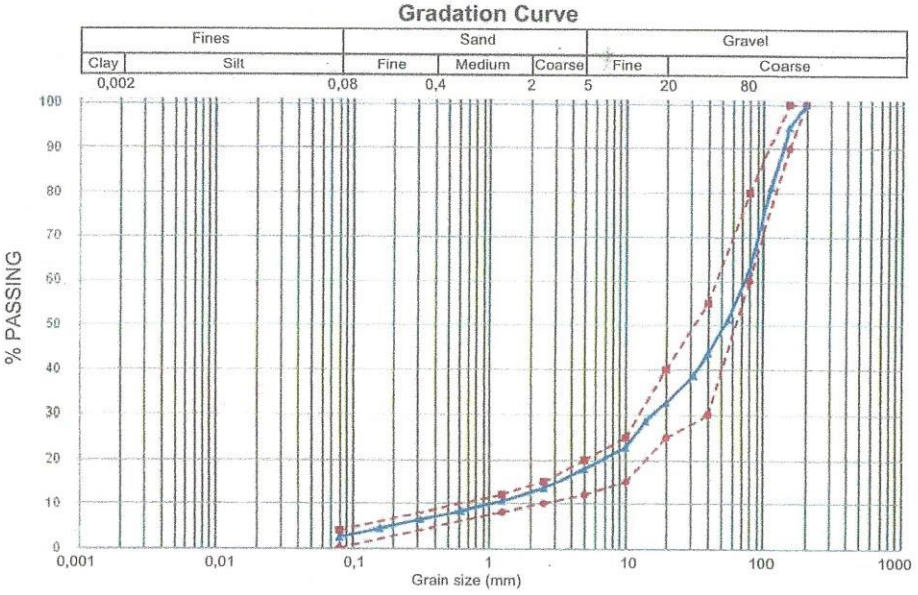
| | | | |
|---|---|---|---|
| Client : | KUDLIK CONSTRUCTION LTD | Project n° : | KUCE-218525-005400 |
| Project : | Iqaluit 2014 à 2017 | Sample n° : | IQ-1081 |
| | | **Client Ref.:** | |

| | | | |
|---|---|---|---|
| Material : | 0-200mm (Iqaluit) , Crushed stone (Type 2) | Sampling date : | 2017-09-11 by EXP |
| Source : | Quarry north of the airport, Iqaluit | Location : | Stockpile |
| Utilisation : | Backfilling | Receiving date : | 2017-09-11 |

**Grain size analysis**
**LC 21-040**

| Sieve (mm) | Grading (%passing) | | |
|---|---|---|---|
| | Value | Specifications | |
| 200 | 100 | 100 | 100 |
| 150 | 95 | 90 | 100 |
| 112 | 81 | | |
| 80 | 62 | 60 | 80 |
| 56 | 51 | | |
| 40 | 44 | 30 | 55 |
| 31,5 | 39 | | |
| 20 | 33 | 25 | 40 |
| 14 | 29 | | |
| 10 | 23 | 15 | 25 |
| 5 | 18 | 12 | 20 |
| 2,5 | 13 | 10 | 15 |
| 1,25 | 11 | 8 | 12 |
| 0,630 | 8 | | |
| 0,315 | 6 | | |
| 0,160 | 4 | | |
| 0,080 | 2,6 | 0,0 | 4,0 |

**Gradation Curve**




| Proctor | Other tests | Results | Specifications |
|---|---|---|---|
| Method :<br>Masse vol. max. :<br>Optimum water | | | |

Remarks :

Verified by : CHUONG SONG LU

Approved by : André Arbour

Date : 2017-09-11

4500, rue Louis-B.-Mayer
Laval (QC) H7P 6E4
Phone: 450-682-8013
www.exp.com

Cetified: ISO 9001:2008

# SOILS AND AGGREGATES

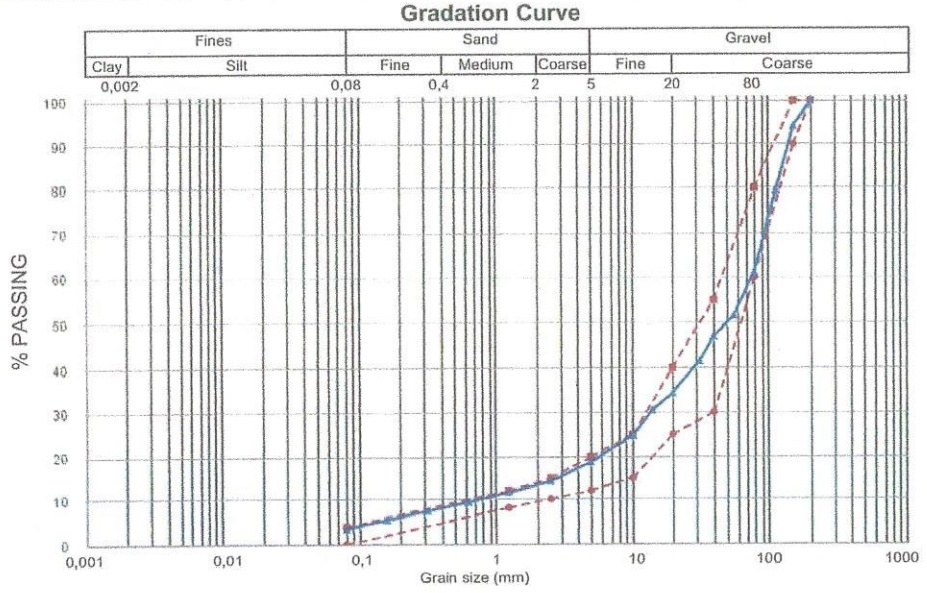
| | | | |
|---|---|---|---|
| Client : | KUDLIK CONSTRUCTION LTD | Project n° : | KUCE-218525-005400 |
| | | Sample n° : | IQ-1082 |
| Project : | Iqaluit 2014 à 2017 | **Client Ref.:** | |

| | | | |
|---|---|---|---|
| Material : | 0-200mm (Iqaluit) , Crushed stone (Type 2) | Sampling date : | 2017-09-12 by EXP |
| Source : | Quarry north of the airport, Iqaluit | Location : | Stockpile |
| Utilisation : | Backfilling | Receiving date : | 2017-09-12 |

**Grain size analysis**
**LC 21-040**

| Sieve (mm) | Grading (%passing) | | |
|---|---|---|---|
| | Value | Specifications | |
| 200 | 100 | 100 | 100 |
| 150 | 94 | 90 | 100 |
| 112 | 79 | | |
| 80 | 61 | 60 | 80 |
| 56 | 52 | | |
| 40 | 47 | 30 | 55 |
| 31,5 | 41 | | |
| 20 | 34 | 25 | 40 |
| 14 | 30 | | |
| 10 | 25 | 15 | 25 |
| 5 | 19 | 12 | 20 |
| 2,5 | 14 | 10 | 15 |
| 1,25 | 11 | 8 | 12 |
| 0,630 | 9 | | |
| 0,315 | 7 | | |
| 0,160 | 5 | | |
| 0,080 | 3,4 | 0,0 | 4,0 |

**Gradation Curve**




| Proctor | Other tests | Results | Specifications |
|---|---|---|---|
| Method :<br>Masse vol. max. :<br>Optimum water | | | |

Remarks :

Verified by : CHUONG SONG LU

Approved by : André Arbour Date : 2017-09-12
André Arbour

4500, rue Louis-B.-Mayer
Laval (QC) H7P 6E4
Phone: 450-682-8013
www.exp.com

Cetified: ISO 9001:2008

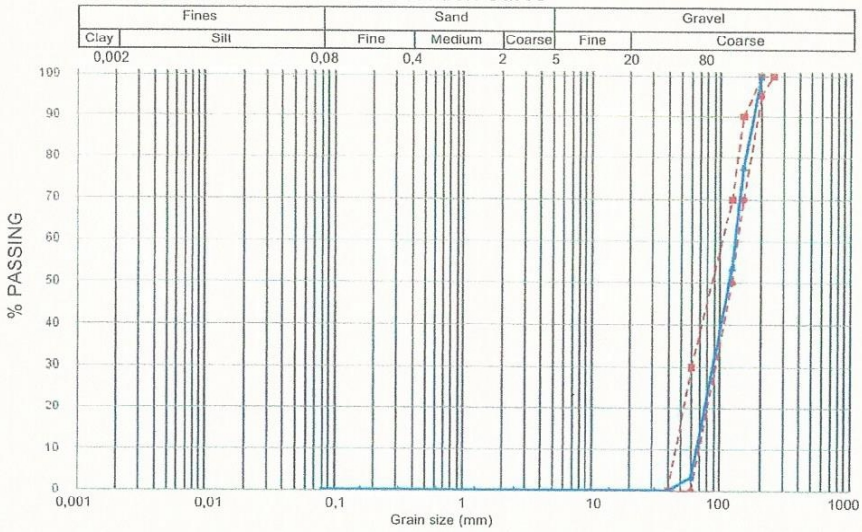
# SOILS AND AGGREGATES

| | | | |
|---|---|---|---|
| Client : | KUDLIK CONSTRUCTION LTD | Project n° : | KUCE-218525-005400 |
| Project : | Iqaluit 2014 à 2017 | Sample n° : | IQ-0971 |
| | | **Client Ref.:** | |
| Material : | RIP RAP , Crushed stone (Type 3) | Sampling date : | 2017-07-11 by EXP |
| Source : | Quarry north of the airport, Iqaluit | Location : | Stockpile |
| Utilisation : | Backfilling | Receiving date : | 2017-07-11 |

**Grain size analysis**
**LC 21-040**

| Sieve (mm) | Grading (%passing) Value | Specifications | |
|---|---|---|---|
| 250 | | 100 | 100 |
| 200 | 100 | 95 | 100 |
| 150 | 78 | 70 | 90 |
| 125 | 54 | 50 | 70 |
| 60 | 3 | 0 | 30 |
| 40 | 0 | 0 | 0 |
| 31,5 | 0 | | |
| 20 | 0 | | |
| 14 | 0 | | |
| 10 | 0 | | |
| 5 | 0 | | |
| 2,5 | 0 | | |
| 1,25 | 0 | | |
| 0,630 | 0 | | |
| 0,315 | 0 | | |
| 0,160 | 0 | | |
| 0,080 | 0,0 | | |

**Gradation Curve**




| Proctor | Other tests | Results | Specifications |
|---|---|---|---|
| Method :<br>Masse vol. max. :<br>Optimum water | | | |

Remarks :

Verified by : CHUONG SONG LU

Approved by : André Arbour Date : 2017-07-12
André Arbour

4500, rue Louis-B.-Mayer
Laval (QC) H7P 6E4
Phone: 450-682-8013
www.exp.com

Cetified: ISO 9001:2008

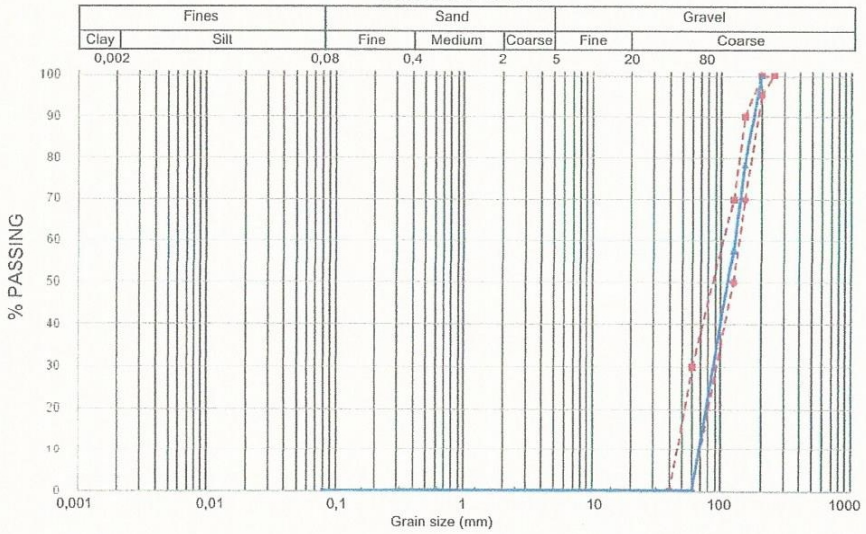
**SOILS AND AGGREGATES**

| | | | |
|---|---|---|---|
| Client : | KUDLIK CONSTRUCTION LTD | Project n° : | KUCE-218525-005400 |
| | | Sample n° : | IQ-0979 |
| Project : | Iqaluit 2014 à 2017 | **Client Ref.:** | |
| Material : | RIP RAP , Crushed stone (Type 3) | Sampling date : | 2017-07-12 by EXP |
| Source : | Quarry north of the airport, Iqaluit | Location : | Stockpile |
| Utilisation : | Backfilling | Receiving date : | 2017-07-12 |

**Grain size analysis**
**LC 21-040**

| Sieve (mm) | Grading (%passing) Value | Specifications | |
|---|---|---|---|
| 250 | | 100 | 100 |
| 200 | 100 | 95 | 100 |
| 150 | 78 | 70 | 90 |
| 125 | 58 | 50 | 70 |
| 60 | 0 | 0 | 30 |
| 40 | 0 | 0 | 0 |
| 31,5 | 0 | | |
| 20 | 0 | | |
| 14 | 0 | | |
| 10 | 0 | | |
| 5 | 0 | | |
| 2,5 | 0 | | |
| 1,25 | 0 | | |
| 0,630 | 0 | | |
| 0,315 | 0 | | |
| 0,160 | 0 | | |
| 0,080 | 0,1 | | |

**Gradation Curve**




| Proctor | Other tests | Results | Specifications |
|---|---|---|---|
| Method :<br>Masse vol. max. :<br>Optimum water | | | |

Remarks :

Verified by : CHUONG SONG LU

Approved by : André Arbour

Date : 2017-07-13

4500, rue Louis-B.-Mayer
Laval (QC) H7P 6E4
Phone: 450-682-8013
www.exp.com

Cetified: ISO 9001:2008

**SOILS AND AGGREGATES**

Client : KUDLIK CONSTRUCTION LTD

Project n° : KUCE-218525-005400

Sample n° : IQ-0983

Project : Iqaluit 2014 à 2017

**Client Ref.:**

Material : RIP RAP , Crushed stone (Type 3)

Source : Quarry north of the airport, Iqaluit

Sampling date : 2017-07-13 by EXP

Location : Stockpile

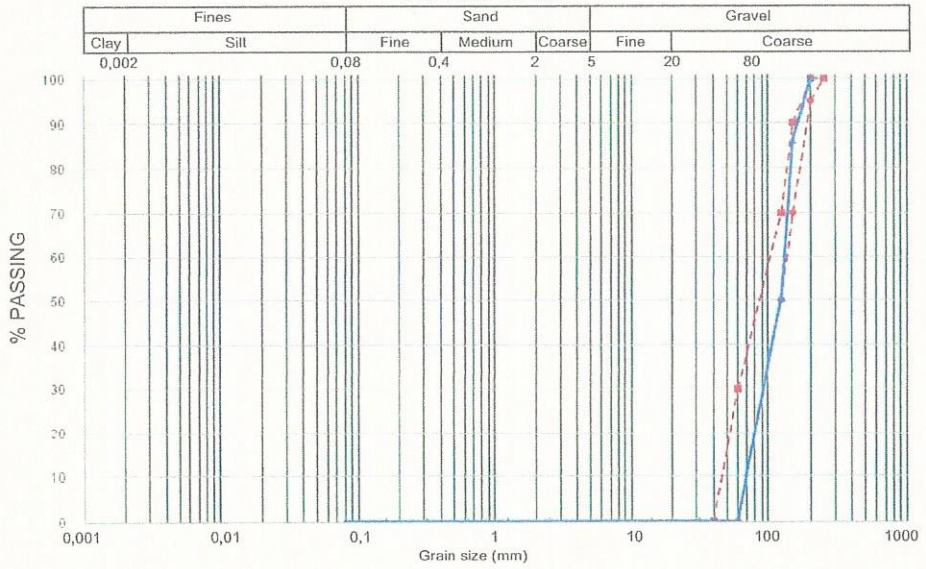
Utilisation : Backfilling

Receiving date : 2017-07-13

**Grain size analysis**
**LC 21-040**

| Sieve (mm) | Grading (%passing) | | |
|---|---|---|---|
| | Value | Specifications | |
| 250 | | 100 | 100 |
| 200 | 100 | 95 | 100 |
| 150 | 86 | 70 | 90 |
| 125 | 51 | 50 | 70 |
| 60 | 0 | 0 | 30 |
| 40 | 0 | 0 | 0 |
| 31,5 | 0 | | |
| 20 | 0 | | |
| 14 | 0 | | |
| 10 | 0 | | |
| 5 | 0 | | |
| 2,5 | 0 | | |
| 1,25 | 0 | | |
| 0,630 | 0 | | |
| 0,315 | 0 | | |
| 0,160 | 0 | | |
| 0,080 | 0,0 | | |

**Gradation Curve**




| Proctor | Other tests | Results | Specifications |
|---|---|---|---|
| Method :<br>Masse vol. max. :<br>Optimum water | | | |

Remarks :

Verified by : CHUONG SONG LU

Approved by : André Arbour

Date : 2017-07-13

4500, rue Louis-B.-Mayer
Laval, QC H7P 6E4
Tél. : 450-682-8013

## RESULTS OF SIEVE ANALYSIS

OUR/REF. : **LAV-218525** PROJECT : **0-20 mm blast 2016** MATERIAL : **Crushed stone MG-20 (type 1)**

CLIENT : **Kudlik Construction ltd** PERIOD : SOURCE : **Quarry north of the airport, Iqaluit,**

MPLED BY : **Simon Plouffe** **Stockpile 2016** PROPOSED USAC **Backfilling**

SOURCE : **Quarry north of the airport, Iqaluit, Nunavut**

| # LAB. | SAMPLING | | SIEVES IN MILLIMETER | | | | | | | | | | SIEVES IN MICRON | | | | Cumulative at the End of the day |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE | DATE | 80 | 56 | 40 | 31,5 | 20 | 14 | 10 | 5 | 2,5 | 1,25 | 630 | 315 | 160 | 80 | |
| IQ-792 | 1 | 2016-07-02 D | | | | 100 | 90 | 71 | 57 | 38 | 26 | 19 | 15 | 11 | 8 | 4,8 | |
| IQ-794 | 2 | 2016-07-03 D | | | | 100 | 97 | 79 | 62 | 41 | 30 | 22 | 18 | 13 | 9 | 5,7 | |
| IQ-795 | 3 | 2016-07-03 D | | | | 100 | 96 | 83 | 71 | 47 | 31 | 23 | 17 | 13 | 9 | 5,7 | |
| IQ-796 | 4 | 2016-07-04 D | | | | 100 | 92 | 68 | 53 | 34 | 25 | 19 | 14 | 11 | 7 | 4,7 | |
| IQ-798 | 5 | 2016-07-05 D | | | | 100 | 100 | 78 | 57 | 31 | 21 | 16 | 13 | 10 | 7 | 4,5 | |
| IQ-801 | 6 | 2016-07-06 D | | | | 100 | 100 | 85 | 66 | 39 | 27 | 20 | 16 | 12 | 9 | 5,5 | |
| IQ-803 | 7 | 2016-07-07 D | | | | 100 | 100 | 87 | 70 | 40 | 26 | 20 | 16 | 12 | 9 | 5,5 | |
| IQ-806 | 8 | 2016-07-08 D | | | | 100 | 100 | 87 | 71 | 43 | 31 | 24 | 19 | 15 | 10 | 6,4 | |
| IQ-807 | 9 | 2016-07-09 D | | | | 100 | 100 | 89 | 73 | 44 | 30 | 22 | 17 | 13 | 9 | 5,5 | **10 890 MT (2-9 juillet)** |
| | | | | | | | | | | | | | | | | | |
| ***AVERAGE*** | | | | | | **100** | **97** | **81** | **63** | **40** | **27** | **21** | **16** | **12** | **9** | **5,4** | |

* Out of specifications

| REQUIREMENT | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MIN. | | | | | 100 | 90 | 68 | | 35 | | 15 | | 5 | | 2 |
| | MAX. | | | | | 100 | 100 | 93 | | 60 | | 38 | | 17 | | 7 |

Prepared by : Simon Plouffe ate : July 14 2016 Approved by : Date : July 21 2016

# APPENDIX G

## Compaction Testing Results

# Soils and Aggregates
## Field Density Tests

| | |
|---|---|
| Client: Government of Nunavut | Record no.: |
| Project: 2017-093 Metal dump | Project Sheet no.: 218525 |
| Contractor: KUDLIK | Report No.: Date: 2017-07-26 |

### Reference Values

Materials: MG-20 Stockpile 2015 Size: 0-20 mm Origin: Kudlik Career

Maximum mass density (kg/m³): 2098 Water content (%): 5,1 Reference area:

### Legend

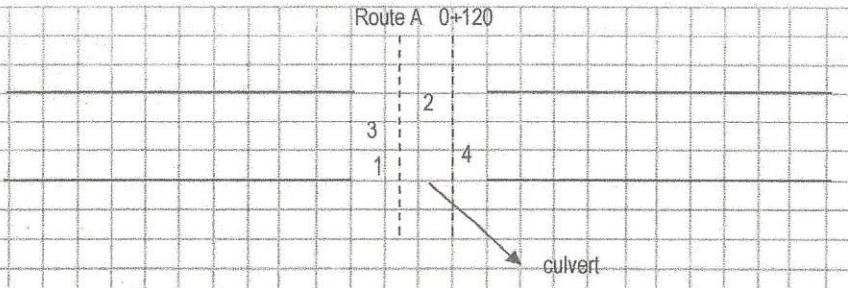
| | | |
|---|---|---|
| **IN:** INFRASTRUCTURE | **CL:** CAPPING LAYER | **E:** EMBANKMENT |
| **SB:** SUB-BASE | **BC:** BASE COURSE | **OTHERS:** |
| **CO:** COMPLIANT | **NC:** NON COMPLIANT | |
| **AC:** ACCEPTABLE | **MR:** MAXIMUM REACHED | |

| Test no. | Location | TESTS IN SITU | | | | |
|---|---|---|---|---|---|---|
| | | Elevation | Mass density obtained (kg/m³) | Water content (%) | Compactness% | Comment |
| 1 | 1 | 250mm over bottom excavation | 2141 | 2.6 | 100 | CO |
| 2 | 2 | 250mm over bottom excavation | 2102 | 2.0 | 100 | CO |
| 3 | 3 | 750mm over bottom excavation | 2102 | 2.1 | 100 | CO |
| 4 | 4 | 750mm over bottom excavation | 2108 | 2.1 | 100 | CO |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Nuclear density gauge no.: 123-16

Compactness requirement (%): 98 %

### Location Sketch and/or Comment




The compaction was performed with 4-6 passes for each layer of compaction tests were performed after the implementation of one layers of 250 mm. No sign of instability after compaction

Handed to: Firm:

(This document remains a preliminary report until it is approved by management)

Technician: SONG LUCHUONG Project manager: André Arbour Date: 2017-07-27

# Soils and Aggregates
## Field Density Tests

| | |
|---|---|
| Client: Government of Nunavut | Record no.: |
| Project: 2017-093 Metal dump | Project Sheet no.: 218525 |
| Contractor: KUDLIK | Report No.: Date: 2017-10-04 |

**Reference Values**

Materials: Crushed stone Size: 0-5 mm Origin: Kudlik Career

Maximum mass density (kg/m³): 2078 Water content (%): 9,3 Reference area:

**Legend**

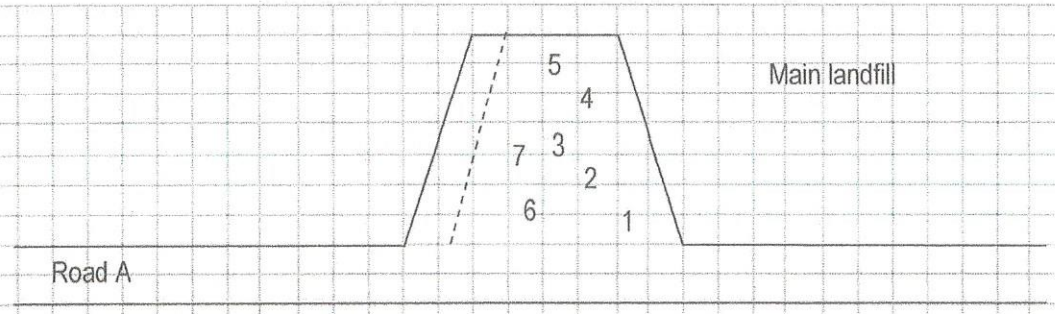
| | | |
|---|---|---|
| **IN:** INFRASTRUCTURE | **CL:** CAPPING LAYER | **E:** EMBANKMENT |
| **SB:** SUB-BASE | **BC:** BASE COURSE | **OTHERS:** |
| **CO:** COMPLIANT | **NC:** NON COMPLIANT | |
| **AC:** ACCEPTABLE | **MR:** MAXIMUM REACHED | |

| Test no. | Location | TESTS IN SITU | | | | |
|---|---|---|---|---|---|---|
| | | Elevation | Mass density obtained (kg/m³) | Water content (%) | Compactness% | Comment |
| 1 | 1 Main landfill | 100mm final layer | 2061 | 2,8 | 99 | CO |
| 2 | 2 Main landfill | 100mm final layer | 2068 | 2,7 | 100 | CO |
| 3 | 3 Main landfill | 100mm final layer | 2110 | 3,1 | 100 | CO |
| 4 | 4 Main landfill | 100mm final layer | 2090 | 3,4 | 100 | CO |
| 5 | 5 Main landfill | 100mm final layer | 2088 | 3,6 | 100 | CO |
| 6 | 6 Main landfill | 100mm final layer | 2081 | 3,5 | 100 | CO |
| 7 | 7 Main landfill | 100mm final layer | 2087 | 3,8 | 100 | CO |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Nuclear density gauge no.: 123-16

Compactness requirement (%): 98 %

**Location Sketch and/or Comment**




The compaction was performed with 4 passes for each layer of compaction tests were performed after the implementation of one layers of 100 mm. No sign of instability after compaction

Handed to: Firm:

(This document remains a preliminary report until it is approved by management)

Technician: SONG LU CHUONG Project manager: Andrei Arbour Date: 2017-10-09

# Soils and Aggregates
## Field Density Tests

| | |
|---|---|
| Client: Government of Nunavut | Record no.: |
| Project: 2017-093 Metal dump | Project Sheet no.: 218525 |
| Contractor: KUDLIK | Report No.: Date: 2017-10-03 |

### Reference Values

Materials: MG-20 Stockpile 2015 Size: 0-20 mm Origin: Kudlik Career

Maximum mass density (kg/m³): 2140 Water content (%): 3.4 Reference area:

### Legend

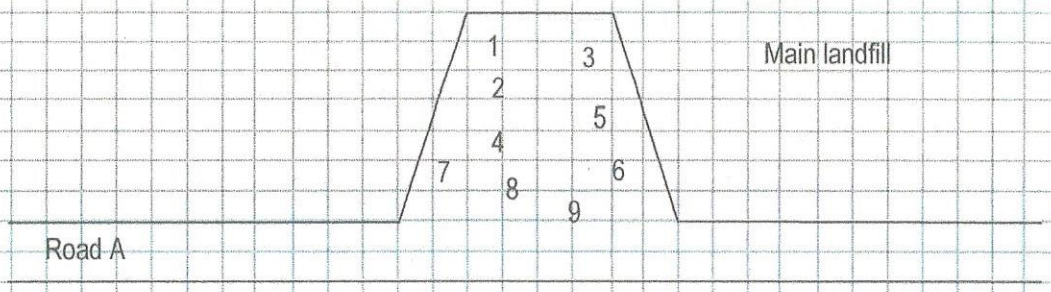
**IN:** INFRASTRUCTURE **CL:** CAPPING LAYER **E:** EMBANKMENT
**SB:** SUB-BASE **BC:** BASE COURSE **OTHERS:**
**CO:** COMPLIANT **NC:** NON COMPLIANT
**AC:** ACCEPTABLE **MR:** MAXIMUM REACHED

| Test no. | Location | TESTS IN SITU | | | | |
|---|---|---|---|---|---|---|
| | | Elevation | Mass density obtained (kg/m³) | Water content (%) | Compactness% | Comment |
| 1 | 1 Main landfill | + 250mm over 0-200mm | 2142 | 3.2 | 100 | CO |
| 2 | 2 Main landfill | + 250mm over 0-200mm | 2170 | 2.5 | 100 | CO |
| 3 | 3 Main landfill | + 250mm over 0-200mm | 2152 | 2.4 | 100 | CO |
| 4 | 4 Main landfill | + 250mm over 0-200mm | 2163 | 2.6 | 100 | CO |
| 5 | 5 Main landfill | + 250mm over 0-200mm | 2144 | 2.4 | 100 | CO |
| 6 | 6 Main landfill | + 250mm over 0-200mm | 2140 | 2.9 | 100 | CO |
| 7 | 7 Main landfill | + 250mm over 0-200mm | 2141 | 3.0 | 100 | CO |
| 8 | 8 Main landfill | + 250mm over 0-200mm | 2166 | 2.2 | 100 | CO |
| 9 | 9 Main landfill | + 250mm over 0-200mm | 2155 | 2.3 | 100 | CO |
| | | | | | | |
| | | | | | | |

Nuclear density gauge no.: 123-16

Compactness requirement (%): 98 %

### Location Sketch and/or Comment




The compaction was performed with 4 passes for each layer of compaction tests were performed after the implementation of one layers of 250 mm. No sign of instability after compaction

Handed to: Firm:

(This document remains a preliminary report until it is approved by management)

Technician: SONG LU CHUONG Project manager: Andrei Arbour Date: 2017-10-04

Kudlik Construction Ltd.

# Transmittal

**No. :** 002
**Rev. :** 00
**Date :** 2017-07-18

**Project :** METAL DUMP REMEDIATION, IQALUIT
R.083118.001
**Project No.:** 2017-093

**Subject :** AGGREGATE MATERIALS

**Transmitted to :**
Arcadis
329 Churchill Ave
Ottawa, Ontario, K1Z 5B8

Stephen Livingstone
Stephen.Livingstone@arcadis.com
(613) 721 0555

**Copy to :**

**Discipline :** CIVIL
**Specification :** 31 05 16
**Drawings reference :**
**Transmitted as :**

**Transmited for :**
**Review requested by :** **2017-07-24**
**Color choice :**
**Number of page :** 5 including this cover

**Sub contractor or supplier :**
Kudlik Construction Ltd
1519 Federal Roal
Iqaluit, Nu, X0A 0H0

François Bourassa
fbourassa@kudlik.biz
867-979-1166

**Manufacturer :**

**Description :** SIEVE ANALYSIS

**Supplier SD No. :**
**Comments :** TYPE 1, 2, 3 AND 4

**Reviewed and submitted by :**

Prepared by :
François Bourassa, P. Eng.
Project Manager
Kudlik Construction Ltd.

##
##
##
##
##
###

**Comments and review by :**

# APPENDIX H

## Waste Disposal Manifests (to be updated when they become available)

Qikiqtaaluk environmental
ᖁᑭᖅᑕᐊᓗᒃ ᐊᔪᕐᓇᓱᒃ

# Certificate of Storage, Transfer & Disposal

**HAZARDOUS WASTE RECEIVER (NUR# 300001)**

| Date |
|---|
| 2017-11-23 |
| **Certificate number** |
| 17-005 |

## Client Information

| | |
|---|---|
| **Company name:** | Kudlik Construction Ltd. |
| **Generator no.:** | na |
| **Mailing address:** | PO Box 727, 1519 Federal Road |
| | Iqaluit, NU X0A 0H0 |
| **Contact name:** | Jean-David Laberge |
| **Telephone no.:** | (418) 933-5351 |
| **Project no.:** | QE17-124-2 |
| **Purchase Order:** | 2017093 |

## Shipping Site Information

| | |
|---|---|
| **Site address:** | Old Metal Dump via TWA |
| | Iqaluit, NU |
| | |
| **Contact name:** | same |
| **Telephone no.:** | same |

| Description of wastes | Quantity | Type of package | Package condition | Lab results received (y/n) |
|---|---|---|---|---|
| PHC Impacted Soil | 81m³ | Bulk | Na | y |
| PHC Impacted Water | 4,520L | Bulk | Na | n |
| Metals Contaminated Soils | 42.02 | Big Bags | Good | y |
| LCP on metal | 4.75 | 20' Marine container | Good | n |
| Tires | 300 | Bulk | Na | n |
| Lead Batteries | 18 | Battery Quatrex | Good | n |
| Miscelaneous Waste Liquids | 1600L | Drums | Good | n |
| Miscelaneous Wastes Solid | 3.2m³ | Quatrex Bags | Good | n |
| Asbestos Containing Debris | 1m³ | 6mil bags | Good | n |

The undersigned hereby certifies that the wastes listed above were received at QE's Environmental Waste Processing Facility and will be disposed of in accordance with QE's Hazardous Waste Management Facility registration (NUF400006) and all applicable laws and regulations.

**QE**

Signature : _____

Name : Olivier Simard

Title : Project Manager

**CLIENT**

Signature : _____

Name : Jean-David Laberge

Title : Project Manager

2027 Iqaluit Lane, Iqaluit, Nunavut X0A 0H0
867-979-8400 / 867-222-8194 www.qenv.ca

# REÇU DE CARGAISON / *CARGO RECEIPT*

538

NEAS

ESPACE RÉSERVÉ À L'INFORMATIQUE / *SPACE RESERVED FOR DATA PROCESSING*

N° RÉSERVATION / *BOOKING NO.* 0565-17 VM (JGA)

N° REÇU PROVISOIRE / *TEMPORARY RECEIPT NO.*

RÉTROGRADE / *RETROGRADE* ☑

LATÉRAL / *LATERAL* ☐

PORT DE CHARGEMENT / *LOADING PORT* Iqaluit

PORT DE DÉCHARGEMENT / *UNLOADING PORT* Valleyfield

DATE / *DATE* Oct. 11/17

NAVIRE / *SHIP*

N° VOYAGE / *TRIP NO.*

Ce reçu de cargaison est émis conformément et sujet aux termes et conditions du contrat de transport applicable à la cargaison à être transportée et dont il est fait référence au présent reçu.
*This cargo receipt is issued pursuant to and subject to the terms and conditions of the contract of contract of carriage applicable to the cargo to be carried and which is referred to herein.*

Les marchandises transportées en pontée le sont aux risques du Marchand.
*Cargoes carried on deck are done so at the Merchant's risks.*

Marchand / *Merchant* Nikotrauk Environmental
(867) 222-8194 (Oliver)

| N° COLIS / *PACK NO.* | QTÉ / *QTY* | DESCRIPTION | DIMENSIONS *LENGHT X WIDTH X HEIGHT / LONGUEUR X LARGEUR X HAUTEUR* | POIDS / *WEIGHT* KG / LB | CONTENEUR / *CONTAINER* N° / *NO.* | PLEIN / *FULL* | VIDE / *EMPTY* | TRANSPORT SITE-PLAGE / *SITE-BEACH* | TRANSPORT PLAGE-SITE / *BEACH-SITE* | N° LIV. / *DEL. NO.* |
|---|---|---|---|---|---|---|---|---|---|---|
| | 11 | Bulk Bag of Soil | | | | | | | | |
| | 6 | Sea Cans - NEAS | 20' x 6 | | | | | | | |

**CHARGEMENT / *LOADING***

Représentant Marchand / *Merchant Representative*

Représentant Transporteur / *Carrier Representative*

**REMARQUES / *REMARKS***

Hold for pick up.

**DÉCHARGEMENT / *UNLOADING***

Latéral reçu le / *Lateral received on*

Représentant Marchand / *Merchant Representative*

Représentant Transporteur / *Carrier Representative*

REQ (REV 05/12)

*Blanche-White = TERMINAL MARITIME - Jaune-Yellow = CLIENT / CUSTOMER - Rose-Pink = NAVIRE / VESSEL*

Solva Rec Environnement

| Date |
| --- |
| 04/12/2017 |
| Certificat de traitement |
| 032111 |

# Certificat de traitement des matières résiduelles dangereuses

*Nom du client:*
Qikiqtaaluq Environnemental
*Adresse:*
P.O. Box, 1228
Iqaluit, NU, CANADA
X0A 0H0

*Tel.:* *Fax:*

| Description du produit | Code | Qte | Format | Poids KG |
| --- | --- | --- | --- | --- |
| Steel contaminated equipment | L01-0.0-S | 1,00 | UNITE | 4 900,00 |

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Gabriel Chabot 2016-092 QUÉBEC

Gabriel Chabot, Chimiste — *04/12/2017* Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

| Date |
| --- |
| 05/12/2017 |
| Certificat de traitement |
| 032117 |

# Certificat de traitement des matières résiduelles dangereuses

*Nom du client:*
Qikiqtaaluq Environnemental
*Adresse:*
P.O. Box, 1228
Iqaluit, NU, CANADA
X0A 0H0

*Tel.:* *Fax:*

| Description du produit | Code | Qte | Format | Poids KG |
| --- | --- | --- | --- | --- |
| Steel contaminated equipment | L01-0.0-S | 1,00 | UNITE | 5 070,00 |

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

Gabriel Chabot, Chimiste

CHIMISTE
Gabriel Chabot
2016-092
QUÉBEC

*05/12/2017*
Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 (450) 347-1270 www.solva-rec.com

Solva Rec Environnement

| Date |
| --- |
| 06/12/2017 |
| Certificat de traitement |
| 032130 |

# Certificat de traitement des matières résiduelles dangereuses

*Nom du client:*
Qikiqtaaluq Environnemental
*Adresse:*
P.O. Box, 1228
Iqaluit, NU, CANADA
X0A 0H0

*Tel.:* *Fax:*

| Description du produit | Code | Qte | Format | Poids KG |
| --- | --- | --- | --- | --- |
| Steel contaminated equipment | L01-0.0-S | 1,00 | UNITE | 5 070,00 |

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

Gabriel Chabot, Chimiste

CHIMISTE
Gabriel Chabot
2016-092
QUÉBEC

*06/12/2017*
Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

| Date |
| --- |
| 06/12/2017 |
| Certificat de traitement |
| 032147 |

# Certificat de traitement des matières résiduelles dangereuses

*Nom du client:*
Qikiqtaaluq Environnemental
*Adresse:*
P.O. Box, 1228
Iqaluit, NU, CANADA
X0A 0H0

*Tel.:* *Fax:*

| Description du produit | Code | Qte | Format | Poids KG |
| --- | --- | --- | --- | --- |
| Steel contaminated equipment | L01-0.0-S | 1,00 | UNITE | 6 090,00 |

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE
Gabriel Chabot
2016-092
QUÉBEC

Gabriel Chabot, Chimiste — Date: *06/12/2017*

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

| Date |
| --- |
| 07/12/2017 |
| Certificat de traitement |
| 032165 |

# Certificat de traitement des matières résiduelles dangereuses

*Nom du client:*
Qikiqtaaluq Environnemental
*Adresse:*
P.O. Box, 1228
Iqaluit, NU, CANADA
X0A 0H0

*Tel.:* *Fax:*

| Description du produit | Code | Qte | Format | Poids KG |
| --- | --- | --- | --- | --- |
| Steel contaminated equipment | L01-0.0-S | 1,00 | UNITE | 6 130,00 |

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE (Q) Gabriel Chabot 2016-092 QUÉBEC

Gabriel Chabot, Chimiste — *07/12/2017* Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 (450) 347-1270 www.solva-rec.com

LAFARGE NORTH AMERICA

# LAFARGE CANADA INC.
# RÉCEPTION – USINE DE ST-CONSTANT

**PRODUIT** PNEU

**TRANSPORTEUR**

· **COMPAGNIE :** Recuperation Mario Hart

· **CHAUFFEUR (SIGNATURE) :**

· **LAFARGE (SIGNATURE) :** D. Paquin

**DATE :** 14 dec 2017

No. Seq: 761
2017-12-14
72 MH
PNEU / TIRE
Gross 21720 kg 10:10:10
Tare 14950 kg 10:48:22
NET 6770 kg

F-150

COPIE TRANSPORTEUR

SOL+ MC

SANEXEN
SERVICES ENVIRONNEMENTAUX INC.

10930, rue Sherbrooke Est
Montréal-Est (Québec) H1B 1B4
450 649-7484

| | |
|---|---|
| **Billet** | **4455** |
| **Date** | 2017-12-04 12:12:39 |
| **Plaque** | 642861 |
| MBL | |
| DANIEL | |

**Client**
QIKIQTAALUK ENVIRONMENTAL
9935 RUE DE CHÂTEAUNEUF
BROSSARD, QC

**Provenance**
2027 IQALUIT LANE
NUNAVUT

**Manifeste** 4148

**Type** Entrée

**Lot** 0
NON CARAC

**Contrat** 1171 QIKIQTAALUK ENVIRONMENTAL

**Produit** À ÉCHANTILLONNER **Par** Préposée balance

| BRUT (kg) | TARE (kg) | NET (kg) | Cumulatif (t.m.) |
|---|---|---|---|
| **44160** | **20380** | **23780** | **23.78 / 93.88** |

Signature

SOL+ MC

SANEXEN
SERVICES ENVIRONNEMENTAUX INC.

10930, rue Sherbrooke Est
Montréal-Est (Québec) H1B 1B4
450 649-7484

**Billet** 4458
**Date** 2017-12-05 11:32:25
**Plaque** 633806
MBL
GHYSLAIN

**Client**
QIKIQTAALUK ENVIRONMENTAL
9935 RUE DE CHÂTEAUNEUF
BROSSARD, QC

**Provenance**
2027 IQALUIT LANE
NUNAVUT

**Manifeste** 4150

**Type** Entrée

**Lot** 0
NON CARAC

**Contrat** 1171 QIKIQTAALUK ENVIRONMENTAL

**Produit** À ÉCHANTILLONNER **Par** Préposée balance

Signature

| BRUT (kg) | TARE (kg) | NET (kg) | Cumulatif (t.m.) |
|---|---|---|---|
| **49050** | **20390** | **28660** | **28.66 / 28.66** |

# APPENDIX I

## Laboratory Certificates of Analysis

Maxxam
A Bureau Veritas Group Company

Your Project #: 102153-000-TC IQUALIT LANDFILL
Your C.O.C. #: 621108-03-01

**Attention:Ryan Fletcher**

ARCADIS Canada Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

**Report Date: 2017/08/21**
Report #: R4666740
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B7H4617**
**Received: 2017/08/14, 11:05**

Sample Matrix: Soil
# Samples Received: 5

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Reference |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | 5 | N/A | 2017/08/11 | CAM SOP-00301 | EPA 8270D m |
| Hot Water Extractable Boron (1) | 5 | 2017/08/18 | 2017/08/18 | CAM SOP-00408 | R153 Ana. Prot. 2011 |
| 1,3-Dichloropropene Sum (1) | 5 | N/A | 2017/08/18 | | EPA 8260C m |
| Hexavalent Chromium in Soil by IC (1, 2) | 5 | 2017/08/17 | 2017/08/18 | CAM SOP-00436 | EPA 3060/7199 m |
| Petroleum Hydro. CCME F1 & BTEX in Soil (3) | 5 | N/A | 2017/08/19 | OTT SOP-00002 | CCME CWS |
| Petroleum Hydrocarbons F2-F4 in Soil (4) | 5 | 2017/08/16 | 2017/08/18 | OTT SOP-00001 | CCME CWS |
| Strong Acid Leachable Metals by ICPMS (1) | 1 | 2017/08/18 | 2017/08/18 | CAM SOP-00447 | EPA 6020B m |
| Strong Acid Leachable Metals by ICPMS (1) | 4 | 2017/08/18 | 2017/08/20 | CAM SOP-00447 | EPA 6020B m |
| Moisture | 5 | N/A | 2017/08/17 | CAM SOP-00445 | McKeague 2nd ed 1978 |
| PAH Compounds in Soil by GC/MS (SIM) | 5 | 2017/08/17 | 2017/08/18 | OTT SOP-00011 | EPA 8270D m |
| Polychlorinated Biphenyl in Soil (1) | 3 | 2017/08/17 | 2017/08/17 | CAM SOP-00309 | EPA 8082A m |
| Polychlorinated Biphenyl in Soil (1) | 2 | 2017/08/17 | 2017/08/21 | CAM SOP-00309 | EPA 8082A m |
| Volatile Organic Compounds in Soil (1) | 5 | N/A | 2017/08/17 | CAM SOP-00228 | EPA 8260 m |

**Remarks:**

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Your Project #: 102153-000-TC IQUALIT LANDFILL
Your C.O.C. #: 621108-03-01

**Attention:Ryan Fletcher**

ARCADIS Canada Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

**Report Date: 2017/08/21**
Report #: R4666740
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B7H4617**
**Received: 2017/08/14, 11:05**

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Analytics Mississauga
(2) Soils are reported on a dry weight basis unless otherwise specified.
(3) No lab extraction date is given for F1BTEX & VOC samples that are field preserved with methanol. Extraction date is the date sampled unless otherwise stated.
(4) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Alison Cameron, Project Manager
Email: ACameron@maxxam.ca
Phone# (613) 274-0573

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B7H4617
Report Date: 2017/08/21

ARCADIS Canada Inc
Client Project #: 102153-000-TC IQUALIT LANDFILL
Sampler Initials: RF

## CCME PETROLEUM HYDROCARBONS IN SOIL (SOIL)

| Maxxam ID | | EYB188 | EYB188 | EYB189 | EYB190 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/08/10 08:00 | 2017/08/10 08:00 | 2017/08/10 08:30 | 2017/08/10 09:00 | | |
| COC Number | | 621108-03-01 | 621108-03-01 | 621108-03-01 | 621108-03-01 | | |
| | **UNITS** | **TWA1-2017-08-10** | **TWA1-2017-08-10 Lab-Dup** | **TWA2-2017-08-10** | **TWA3-2017-08-10** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | |
| Moisture | % | 5.6 | 6.2 | 5.8 | 6.1 | 0.2 | 5121191 |
| **BTEX & F1 Hydrocarbons** | | | | | | | |
| Benzene | ug/g | <0.0050 | | <0.0050 | <0.0050 | 0.0050 | 5122168 |
| Toluene | ug/g | <0.020 | | 0.17 | <0.020 | 0.020 | 5122168 |
| Ethylbenzene | ug/g | <0.010 | | 0.038 | <0.010 | 0.010 | 5122168 |
| o-Xylene | ug/g | <0.020 | | 0.052 | <0.020 | 0.020 | 5122168 |
| p+m-Xylene | ug/g | <0.040 | | 0.14 | <0.040 | 0.040 | 5122168 |
| Total Xylenes | ug/g | <0.040 | | 0.19 | <0.040 | 0.040 | 5122168 |
| F1 (C6-C10) | ug/g | <10 | | <10 | <10 | 10 | 5122168 |
| F1 (C6-C10) - BTEX | ug/g | <10 | | <10 | <10 | 10 | 5122168 |
| **F2-F4 Hydrocarbons** | | | | | | | |
| F2 (C10-C16 Hydrocarbons) | ug/g | 27 | | 79 | 94 | 10 | 5121186 |
| F3 (C16-C34 Hydrocarbons) | ug/g | 250 | | 540 | 470 | 50 | 5121186 |
| F4 (C34-C50 Hydrocarbons) | ug/g | 100 | | 130 | 110 | 50 | 5121186 |
| Reached Baseline at C50 | ug/g | Yes | | Yes | Yes | | 5121186 |
| **Surrogate Recovery (%)** | | | | | | | |
| 1,4-Difluorobenzene | % | 89 | | 87 | 91 | | 5122168 |
| 4-Bromofluorobenzene | % | 88 | | 97 | 99 | | 5122168 |
| D10-Ethylbenzene | % | 80 | | 72 | 89 | | 5122168 |
| D4-1,2-Dichloroethane | % | 83 | | 81 | 93 | | 5122168 |
| o-Terphenyl | % | 94 | | 96 | 99 | | 5121186 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Maxxam Job #: B7H4617
Report Date: 2017/08/21

ARCADIS Canada Inc
Client Project #: 102153-000-TC IQUALIT LANDFILL
Sampler Initials: RF

## CCME PETROLEUM HYDROCARBONS IN SOIL (SOIL)

| Maxxam ID | | EYB191 | EYB192 | EYB192 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2017/08/10 09:30 | 2017/08/10 | 2017/08/10 | | |
| COC Number | | 621108-03-01 | 621108-03-01 | 621108-03-01 | | |
| | **UNITS** | **TWA4-2017-08-10** | **DUP-2017-08-10** | **DUP-2017-08-10 Lab-Dup** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | |
| Moisture | % | 7.6 | 5.4 | | 0.2 | 5121191 |
| **BTEX & F1 Hydrocarbons** | | | | | | |
| Benzene | ug/g | <0.0050 | <0.0050 | <0.0050 | 0.0050 | 5122169 |
| Toluene | ug/g | 0.046 | <0.020 | <0.020 | 0.020 | 5122169 |
| Ethylbenzene | ug/g | 0.018 | <0.010 | <0.010 | 0.010 | 5122169 |
| o-Xylene | ug/g | 0.067 | <0.020 | <0.020 | 0.020 | 5122169 |
| p+m-Xylene | ug/g | 0.12 | <0.040 | <0.040 | 0.040 | 5122169 |
| Total Xylenes | ug/g | 0.19 | <0.040 | <0.040 | 0.040 | 5122169 |
| F1 (C6-C10) | ug/g | 58 | <10 | <10 | 10 | 5122169 |
| F1 (C6-C10) - BTEX | ug/g | 57 | <10 | <10 | 10 | 5122169 |
| **F2-F4 Hydrocarbons** | | | | | | |
| F2 (C10-C16 Hydrocarbons) | ug/g | 100 | 15 | | 10 | 5121186 |
| F3 (C16-C34 Hydrocarbons) | ug/g | 1400 | 240 | | 50 | 5121186 |
| F4 (C34-C50 Hydrocarbons) | ug/g | 300 | <50 | | 50 | 5121186 |
| Reached Baseline at C50 | ug/g | Yes | Yes | | | 5121186 |
| **Surrogate Recovery (%)** | | | | | | |
| 1,4-Difluorobenzene | % | 82 | 83 | 86 | | 5122169 |
| 4-Bromofluorobenzene | % | 90 | 97 | 90 | | 5122169 |
| D10-Ethylbenzene | % | 90 | 118 | 111 | | 5122169 |
| D4-1,2-Dichloroethane | % | 84 | 90 | 93 | | 5122169 |
| o-Terphenyl | % | 98 | 96 | | | 5121186 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Maxxam Job #: B7H4617
Report Date: 2017/08/21

ARCADIS Canada Inc
Client Project #: 102153-000-TC IQUALIT LANDFILL
Sampler Initials: RF

## O.REG 153 METALS PACKAGE (SOIL)

| Maxxam ID | | EYB188 | | EYB189 | EYB189 | EYB190 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/08/10 08:00 | | 2017/08/10 08:30 | 2017/08/10 08:30 | 2017/08/10 09:00 | | |
| COC Number | | 621108-03-01 | | 621108-03-01 | 621108-03-01 | 621108-03-01 | | |
| | **UNITS** | **TWA1-2017-08-10** | **QC Batch** | **TWA2-2017-08-10** | **TWA2-2017-08-10 Lab-Dup** | **TWA3-2017-08-10** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | |
| Chromium (VI) | ug/g | <0.2 | 5124046 | 0.3 | | <0.2 | 0.2 | 5124046 |
| **Metals** | | | | | | | | |
| Hot Water Ext. Boron (B) | ug/g | 0.67 | 5125484 | 0.98 | 1.0 | 2.1 | 0.050 | 5125484 |
| Acid Extractable Antimony (Sb) | ug/g | 0.23 | 5125349 | 1.3 | | 0.52 | 0.20 | 5125250 |
| Acid Extractable Arsenic (As) | ug/g | <1.0 | 5125349 | 12 | | 1.0 | 1.0 | 5125250 |
| Acid Extractable Barium (Ba) | ug/g | 25 | 5125349 | 31 | | 25 | 0.50 | 5125250 |
| Acid Extractable Beryllium (Be) | ug/g | <0.20 | 5125349 | <0.20 | | <0.20 | 0.20 | 5125250 |
| Acid Extractable Boron (B) | ug/g | 6.9 | 5125349 | 12 | | 15 | 5.0 | 5125250 |
| Acid Extractable Cadmium (Cd) | ug/g | 0.42 | 5125349 | 0.89 | | 0.14 | 0.10 | 5125250 |
| Acid Extractable Chromium (Cr) | ug/g | 24 | 5125349 | 31 | | 21 | 1.0 | 5125250 |
| Acid Extractable Cobalt (Co) | ug/g | 4.8 | 5125349 | 5.1 | | 4.7 | 0.10 | 5125250 |
| Acid Extractable Copper (Cu) | ug/g | 19 | 5125349 | 47 | | 120 | 0.50 | 5125250 |
| Acid Extractable Lead (Pb) | ug/g | 24 | 5125349 | 250 | | 53 | 1.0 | 5125250 |
| Acid Extractable Molybdenum (Mo) | ug/g | 1.3 | 5125349 | 2.2 | | 1.1 | 0.50 | 5125250 |
| Acid Extractable Nickel (Ni) | ug/g | 10 | 5125349 | 13 | | 7.4 | 0.50 | 5125250 |
| Acid Extractable Selenium (Se) | ug/g | <0.50 | 5125349 | <0.50 | | <0.50 | 0.50 | 5125250 |
| Acid Extractable Silver (Ag) | ug/g | <0.20 | 5125349 | 0.27 | | <0.20 | 0.20 | 5125250 |
| Acid Extractable Thallium (Tl) | ug/g | <0.050 | 5125349 | 0.056 | | <0.050 | 0.050 | 5125250 |
| Acid Extractable Uranium (U) | ug/g | 0.35 | 5125349 | 0.39 | | 0.42 | 0.050 | 5125250 |
| Acid Extractable Vanadium (V) | ug/g | 41 | 5125349 | 57 | | 46 | 5.0 | 5125250 |
| Acid Extractable Zinc (Zn) | ug/g | 85 | 5125349 | 350 | | 120 | 5.0 | 5125250 |
| Acid Extractable Mercury (Hg) | ug/g | <0.050 | 5125349 | <0.050 | | <0.050 | 0.050 | 5125250 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



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## O.REG 153 METALS PACKAGE (SOIL)

| Maxxam ID | | EYB191 | EYB192 | | |
|---|---|---|---|---|---|
| Sampling Date | | 2017/08/10 09:30 | 2017/08/10 | | |
| COC Number | | 621108-03-01 | 621108-03-01 | | |
| | **UNITS** | **TWA4-2017-08-10** | **DUP-2017-08-10** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | |
| Chromium (VI) | ug/g | <0.2 | <0.2 | 0.2 | 5124046 |
| **Metals** | | | | | |
| Hot Water Ext. Boron (B) | ug/g | 0.71 | 0.63 | 0.050 | 5125484 |
| Acid Extractable Antimony (Sb) | ug/g | <0.20 | 0.42 | 0.20 | 5125250 |
| Acid Extractable Arsenic (As) | ug/g | 1.0 | <1.0 | 1.0 | 5125250 |
| Acid Extractable Barium (Ba) | ug/g | 20 | 23 | 0.50 | 5125250 |
| Acid Extractable Beryllium (Be) | ug/g | <0.20 | <0.20 | 0.20 | 5125250 |
| Acid Extractable Boron (B) | ug/g | 6.1 | <5.0 | 5.0 | 5125250 |
| Acid Extractable Cadmium (Cd) | ug/g | 0.20 | 0.28 | 0.10 | 5125250 |
| Acid Extractable Chromium (Cr) | ug/g | 24 | 24 | 1.0 | 5125250 |
| Acid Extractable Cobalt (Co) | ug/g | 4.2 | 4.3 | 0.10 | 5125250 |
| Acid Extractable Copper (Cu) | ug/g | 9.8 | 16 | 0.50 | 5125250 |
| Acid Extractable Lead (Pb) | ug/g | 46 | 16 | 1.0 | 5125250 |
| Acid Extractable Molybdenum (Mo) | ug/g | 1.2 | 1.2 | 0.50 | 5125250 |
| Acid Extractable Nickel (Ni) | ug/g | 7.0 | 8.8 | 0.50 | 5125250 |
| Acid Extractable Selenium (Se) | ug/g | <0.50 | <0.50 | 0.50 | 5125250 |
| Acid Extractable Silver (Ag) | ug/g | <0.20 | <0.20 | 0.20 | 5125250 |
| Acid Extractable Thallium (Tl) | ug/g | <0.050 | <0.050 | 0.050 | 5125250 |
| Acid Extractable Uranium (U) | ug/g | 0.47 | 0.28 | 0.050 | 5125250 |
| Acid Extractable Vanadium (V) | ug/g | 62 | 39 | 5.0 | 5125250 |
| Acid Extractable Zinc (Zn) | ug/g | 83 | 71 | 5.0 | 5125250 |
| Acid Extractable Mercury (Hg) | ug/g | <0.050 | <0.050 | 0.050 | 5125250 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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## O.REG 153 PAHS (SOIL)

| Maxxam ID | | EYB188 | EYB188 | EYB189 | EYB190 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/08/10 08:00 | 2017/08/10 08:00 | 2017/08/10 08:30 | 2017/08/10 09:00 | | |
| COC Number | | 621108-03-01 | 621108-03-01 | 621108-03-01 | 621108-03-01 | | |
| | **UNITS** | **TWA1-2017-08-10** | **TWA1-2017-08-10 Lab-Dup** | **TWA2-2017-08-10** | **TWA3-2017-08-10** | **RDL** | **QC Batch** |
| **Calculated Parameters** | | | | | | | |
| Methylnaphthalene, 2-(1-) | ug/g | <0.014 | | 0.014 | 0.040 | 0.014 | 5119339 |
| **Polyaromatic Hydrocarbons** | | | | | | | |
| Acenaphthene | ug/g | <0.0050 | <0.0050 | <0.0050 | <0.0050 | 0.0050 | 5123327 |
| Acenaphthylene | ug/g | <0.0050 | <0.0050 | <0.0050 | <0.0050 | 0.0050 | 5123327 |
| Anthracene | ug/g | <0.0050 | <0.0050 | <0.0050 | 0.0078 | 0.0050 | 5123327 |
| Benzo(a)anthracene | ug/g | <0.0050 | 0.0080 | 0.010 | 0.020 | 0.0050 | 5123327 |
| Benzo(a)pyrene | ug/g | 0.0054 | 0.014 | 0.0086 | 0.014 | 0.0050 | 5123327 |
| Benzo(b/j)fluoranthene | ug/g | 0.0099 | 0.019 | 0.014 | 0.022 | 0.0050 | 5123327 |
| Benzo(g,h,i)perylene | ug/g | 0.0081 | 0.016 | 0.0090 | 0.012 | 0.0050 | 5123327 |
| Benzo(k)fluoranthene | ug/g | <0.0050 | <0.0050 | 0.0052 | 0.0083 | 0.0050 | 5123327 |
| Chrysene | ug/g | <0.0050 | 0.0071 | 0.0081 | 0.016 | 0.0050 | 5123327 |
| Dibenz(a,h)anthracene | ug/g | <0.0050 | <0.0050 | <0.0050 | <0.0050 | 0.0050 | 5123327 |
| Fluoranthene | ug/g | 0.0076 | 0.012 | 0.020 | 0.051 | 0.0050 | 5123327 |
| Fluorene | ug/g | <0.0050 | <0.0050 | <0.0050 | 0.0099 | 0.0050 | 5123327 |
| Indeno(1,2,3-cd)pyrene | ug/g | 0.0072 | 0.016 | 0.0086 | 0.011 | 0.0050 | 5123327 |
| 1-Methylnaphthalene | ug/g | <0.0050 | <0.0050 | 0.0067 | 0.017 | 0.0050 | 5123327 |
| 2-Methylnaphthalene | ug/g | <0.0050 | <0.0050 | 0.0076 | 0.023 | 0.0050 | 5123327 |
| Naphthalene | ug/g | <0.0050 | <0.0050 | 0.0057 | 0.014 | 0.0050 | 5123327 |
| Phenanthrene | ug/g | <0.0050 | <0.0050 | 0.012 | 0.024 | 0.0050 | 5123327 |
| Pyrene | ug/g | 0.0099 | 0.012 | 0.028 | 0.051 | 0.0050 | 5123327 |
| **Surrogate Recovery (%)** | | | | | | | |
| D10-Anthracene | % | 93 | 89 | 90 | 89 | | 5123327 |
| D14-Terphenyl (FS) | % | 96 | 92 | 98 | 94 | | 5123327 |
| D8-Acenaphthylene | % | 87 | 86 | 88 | 85 | | 5123327 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



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## O.REG 153 PAHS (SOIL)

| Maxxam ID | | EYB191 | EYB192 | | |
|---|---|---|---|---|---|
| Sampling Date | | 2017/08/10 09:30 | 2017/08/10 | | |
| COC Number | | 621108-03-01 | 621108-03-01 | | |
| | **UNITS** | **TWA4-2017-08-10** | **DUP-2017-08-10** | **RDL** | **QC Batch** |
| **Calculated Parameters** | | | | | |
| Methylnaphthalene, 2-(1-) | ug/g | 0.026 | <0.014 | 0.014 | 5119339 |
| **Polyaromatic Hydrocarbons** | | | | | |
| Acenaphthene | ug/g | <0.0050 | <0.0050 | 0.0050 | 5123327 |
| Acenaphthylene | ug/g | <0.0050 | <0.0050 | 0.0050 | 5123327 |
| Anthracene | ug/g | 0.0075 | 0.0051 | 0.0050 | 5123327 |
| Benzo(a)anthracene | ug/g | 0.016 | 0.013 | 0.0050 | 5123327 |
| Benzo(a)pyrene | ug/g | 0.013 | 0.010 | 0.0050 | 5123327 |
| Benzo(b/j)fluoranthene | ug/g | 0.014 | 0.017 | 0.0050 | 5123327 |
| Benzo(g,h,i)perylene | ug/g | 0.013 | 0.013 | 0.0050 | 5123327 |
| Benzo(k)fluoranthene | ug/g | <0.0050 | 0.0059 | 0.0050 | 5123327 |
| Chrysene | ug/g | 0.010 | 0.0089 | 0.0050 | 5123327 |
| Dibenz(a,h)anthracene | ug/g | <0.0050 | <0.0050 | 0.0050 | 5123327 |
| Fluoranthene | ug/g | 0.013 | 0.023 | 0.0050 | 5123327 |
| Fluorene | ug/g | 0.010 | <0.0050 | 0.0050 | 5123327 |
| Indeno(1,2,3-cd)pyrene | ug/g | 0.011 | 0.011 | 0.0050 | 5123327 |
| 1-Methylnaphthalene | ug/g | 0.015 | <0.0050 | 0.0050 | 5123327 |
| 2-Methylnaphthalene | ug/g | 0.011 | <0.0050 | 0.0050 | 5123327 |
| Naphthalene | ug/g | 0.0063 | <0.0050 | 0.0050 | 5123327 |
| Phenanthrene | ug/g | 0.016 | 0.011 | 0.0050 | 5123327 |
| Pyrene | ug/g | 0.041 | 0.023 | 0.0050 | 5123327 |
| **Surrogate Recovery (%)** | | | | | |
| D10-Anthracene | % | 89 | 94 | | 5123327 |
| D14-Terphenyl (FS) | % | 97 | 99 | | 5123327 |
| D8-Acenaphthylene | % | 86 | 90 | | 5123327 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7H4617
Report Date: 2017/08/21

ARCADIS Canada Inc
Client Project #: 102153-000-TC IQUALIT LANDFILL
Sampler Initials: RF

## O.REG 153 PCBS (SOIL)

| Maxxam ID | | EYB188 | EYB189 | EYB190 | EYB191 | EYB192 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/08/10 08:00 | 2017/08/10 08:30 | 2017/08/10 09:00 | 2017/08/10 09:30 | 2017/08/10 | | |
| COC Number | | 621108-03-01 | 621108-03-01 | 621108-03-01 | 621108-03-01 | 621108-03-01 | | |
| | **UNITS** | **TWA1-2017-08-10** | **TWA2-2017-08-10** | **TWA3-2017-08-10** | **TWA4-2017-08-10** | **DUP-2017-08-10** | **RDL** | **QC Batch** |
| **PCBs** | | | | | | | | |
| Aroclor 1242 | ug/g | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5123850 |
| Aroclor 1248 | ug/g | <0.010 | 0.14 | 0.27 | 0.018 | 0.019 | 0.010 | 5123850 |
| Aroclor 1254 | ug/g | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5123850 |
| Aroclor 1260 | ug/g | <0.010 | 0.019 | 0.70 | <0.010 | <0.010 | 0.010 | 5123850 |
| Total PCB | ug/g | <0.010 | 0.16 | 0.97 | 0.074 | 0.019 | 0.010 | 5123850 |
| **Surrogate Recovery (%)** | | | | | | | | |
| Decachlorobiphenyl | % | 86 | 95 | 143 (1) | 106 | 102 | | 5123850 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Surrogate recovery was above the upper control limit due to matrix interference. This may represent a high bias in some results.



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## VOLATILE ORGANICS BY GC/MS (SOIL)

| Maxxam ID | | EYB188 | EYB188 | EYB189 | EYB190 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/08/10 08:00 | 2017/08/10 08:00 | 2017/08/10 08:30 | 2017/08/10 09:00 | | |
| COC Number | | 621108-03-01 | 621108-03-01 | 621108-03-01 | 621108-03-01 | | |
| | **UNITS** | **TWA1-2017-08-10** | **TWA1-2017-08-10 Lab-Dup** | **TWA2-2017-08-10** | **TWA3-2017-08-10** | **RDL** | **QC Batch** |
| **Calculated Parameters** | | | | | | | |
| 1,3-Dichloropropene (cis+trans) | ug/g | <0.050 | | <0.050 | <0.050 | 0.050 | 5119117 |
| **Volatile Organics** | | | | | | | |
| Acetone (2-Propanone) | ug/g | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5122000 |
| Benzene | ug/g | <0.0060 | <0.0060 | 0.0076 | <0.0060 | 0.0060 | 5122000 |
| Bromodichloromethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| Bromoform | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| Bromomethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| Carbon Tetrachloride | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| Chlorobenzene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| Chloroform | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| Dibromochloromethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| 1,2-Dichlorobenzene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| 1,3-Dichlorobenzene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| 1,4-Dichlorobenzene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| Dichlorodifluoromethane (FREON 12) | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| 1,1-Dichloroethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| 1,2-Dichloroethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| 1,1-Dichloroethylene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| cis-1,2-Dichloroethylene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| trans-1,2-Dichloroethylene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| 1,2-Dichloropropane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| cis-1,3-Dichloropropene | ug/g | <0.030 | <0.030 | <0.030 | <0.030 | 0.030 | 5122000 |
| trans-1,3-Dichloropropene | ug/g | <0.040 | <0.040 | <0.040 | <0.040 | 0.040 | 5122000 |
| Ethylbenzene | ug/g | <0.010 | <0.010 | 0.015 | <0.010 | 0.010 | 5122000 |
| Ethylene Dibromide | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| Hexane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| Methylene Chloride(Dichloromethane) | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| Methyl Isobutyl Ketone | ug/g | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5122000 |
| Methyl Ethyl Ketone (2-Butanone) | ug/g | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5122000 |
| Methyl t-butyl ether (MTBE) | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| Styrene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| 1,1,1,2-Tetrachloroethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| 1,1,2,2-Tetrachloroethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| Tetrachloroethylene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



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## VOLATILE ORGANICS BY GC/MS (SOIL)

| Maxxam ID | | EYB188 | EYB188 | EYB189 | EYB190 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/08/10 08:00 | 2017/08/10 08:00 | 2017/08/10 08:30 | 2017/08/10 09:00 | | |
| COC Number | | 621108-03-01 | 621108-03-01 | 621108-03-01 | 621108-03-01 | | |
| | **UNITS** | **TWA1-2017-08-10** | **TWA1-2017-08-10 Lab-Dup** | **TWA2-2017-08-10** | **TWA3-2017-08-10** | **RDL** | **QC Batch** |
| Toluene | ug/g | <0.020 | <0.020 | 0.088 | <0.020 | 0.020 | 5122000 |
| 1,1,1-Trichloroethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| 1,1,2-Trichloroethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5122000 |
| Trichloroethylene | ug/g | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5122000 |
| Vinyl Chloride | ug/g | <0.020 | <0.020 | <0.020 | <0.020 | 0.020 | 5122000 |
| p+m-Xylene | ug/g | <0.020 | <0.020 | 0.060 | <0.020 | 0.020 | 5122000 |
| o-Xylene | ug/g | <0.020 | <0.020 | 0.023 | <0.020 | 0.020 | 5122000 |
| Total Xylenes | ug/g | <0.020 | <0.020 | 0.083 | <0.020 | 0.020 | 5122000 |
| Trichlorofluoromethane (FREON 11) | ug/g | 0.10 | 0.11 | 0.35 | 0.079 | 0.050 | 5122000 |
| **Surrogate Recovery (%)** | | | | | | | |
| 4-Bromofluorobenzene | % | 98 | 98 | 99 | 99 | | 5122000 |
| D10-o-Xylene | % | 82 | 84 | 89 | 90 | | 5122000 |
| D4-1,2-Dichloroethane | % | 103 | 103 | 104 | 103 | | 5122000 |
| D8-Toluene | % | 96 | 96 | 98 | 97 | | 5122000 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



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## VOLATILE ORGANICS BY GC/MS (SOIL)

| Maxxam ID | | EYB191 | EYB192 | | |
|---|---|---|---|---|---|
| Sampling Date | | 2017/08/10 09:30 | 2017/08/10 | | |
| COC Number | | 621108-03-01 | 621108-03-01 | | |
| | **UNITS** | **TWA4-2017-08-10** | **DUP-2017-08-10** | **RDL** | **QC Batch** |
| **Calculated Parameters** | | | | | |
| 1,3-Dichloropropene (cis+trans) | ug/g | <0.050 | <0.050 | 0.050 | 5119117 |
| **Volatile Organics** | | | | | |
| Acetone (2-Propanone) | ug/g | <0.50 | <0.50 | 0.50 | 5122000 |
| Benzene | ug/g | <0.0060 | <0.0060 | 0.0060 | 5122000 |
| Bromodichloromethane | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| Bromoform | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| Bromomethane | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| Carbon Tetrachloride | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| Chlorobenzene | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| Chloroform | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| Dibromochloromethane | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| 1,2-Dichlorobenzene | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| 1,3-Dichlorobenzene | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| 1,4-Dichlorobenzene | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| Dichlorodifluoromethane (FREON 12) | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| 1,1-Dichloroethane | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| 1,2-Dichloroethane | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| 1,1-Dichloroethylene | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| cis-1,2-Dichloroethylene | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| trans-1,2-Dichloroethylene | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| 1,2-Dichloropropane | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| cis-1,3-Dichloropropene | ug/g | <0.030 | <0.030 | 0.030 | 5122000 |
| trans-1,3-Dichloropropene | ug/g | <0.040 | <0.040 | 0.040 | 5122000 |
| Ethylbenzene | ug/g | <0.010 | <0.010 | 0.010 | 5122000 |
| Ethylene Dibromide | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| Hexane | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| Methylene Chloride(Dichloromethane) | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| Methyl Isobutyl Ketone | ug/g | <0.50 | <0.50 | 0.50 | 5122000 |
| Methyl Ethyl Ketone (2-Butanone) | ug/g | <0.50 | <0.50 | 0.50 | 5122000 |
| Methyl t-butyl ether (MTBE) | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| Styrene | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| 1,1,1,2-Tetrachloroethane | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| 1,1,2,2-Tetrachloroethane | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| Tetrachloroethylene | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| Toluene | ug/g | 0.032 | <0.020 | 0.020 | 5122000 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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## VOLATILE ORGANICS BY GC/MS (SOIL)

| Maxxam ID | | EYB191 | EYB192 | | |
|---|---|---|---|---|---|
| Sampling Date | | 2017/08/10 09:30 | 2017/08/10 | | |
| COC Number | | 621108-03-01 | 621108-03-01 | | |
| | **UNITS** | **TWA4-2017-08-10** | **DUP-2017-08-10** | **RDL** | **QC Batch** |
| 1,1,1-Trichloroethane | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| 1,1,2-Trichloroethane | ug/g | <0.050 | <0.050 | 0.050 | 5122000 |
| Trichloroethylene | ug/g | <0.010 | <0.010 | 0.010 | 5122000 |
| Vinyl Chloride | ug/g | <0.020 | <0.020 | 0.020 | 5122000 |
| p+m-Xylene | ug/g | 0.059 | <0.020 | 0.020 | 5122000 |
| o-Xylene | ug/g | 0.035 | <0.020 | 0.020 | 5122000 |
| Total Xylenes | ug/g | 0.095 | <0.020 | 0.020 | 5122000 |
| Trichlorofluoromethane (FREON 11) | ug/g | 0.15 | 0.13 | 0.050 | 5122000 |
| **Surrogate Recovery (%)** | | | | | |
| 4-Bromofluorobenzene | % | 99 | 98 | | 5122000 |
| D10-o-Xylene | % | 80 | 91 | | 5122000 |
| D4-1,2-Dichloroethane | % | 102 | 103 | | 5122000 |
| D8-Toluene | % | 97 | 96 | | 5122000 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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## TEST SUMMARY

**Maxxam ID:** EYB188
**Sample ID:** TWA1-2017-08-10
**Matrix:** Soil

**Collected:** 2017/08/10
**Shipped:**
**Received:** 2017/08/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | CALC | 5119339 | N/A | 2017/08/11 | Liliana Gaburici |
| Hot Water Extractable Boron | ICP | 5125484 | 2017/08/18 | 2017/08/18 | Jolly John |
| 1,3-Dichloropropene Sum | CALC | 5119117 | N/A | 2017/08/18 | Automated Statchk |
| Hexavalent Chromium in Soil by IC | IC/SPEC | 5124046 | 2017/08/17 | 2017/08/18 | Sally Coughlin |
| Petroleum Hydro. CCME F1 & BTEX in Soil | HSGC/MSFD | 5122168 | N/A | 2017/08/19 | Lyndsey Hart |
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5121186 | 2017/08/16 | 2017/08/18 | Paul Rubinato |
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5125349 | 2017/08/18 | 2017/08/18 | Daniel Teclu |
| Moisture | BAL | 5121191 | N/A | 2017/08/17 | Liliana Gaburici |
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5123327 | 2017/08/17 | 2017/08/18 | Liliana Gaburici |
| Polychlorinated Biphenyl in Soil | GC/ECD | 5123850 | 2017/08/17 | 2017/08/17 | Li Peng |
| Volatile Organic Compounds in Soil | GC/MS | 5122000 | N/A | 2017/08/17 | Anna Gabrielyan |

**Maxxam ID:** EYB188 Dup
**Sample ID:** TWA1-2017-08-10
**Matrix:** Soil

**Collected:** 2017/08/10
**Shipped:**
**Received:** 2017/08/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Moisture | BAL | 5121191 | N/A | 2017/08/17 | Liliana Gaburici |
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5123327 | 2017/08/17 | 2017/08/18 | Liliana Gaburici |
| Volatile Organic Compounds in Soil | GC/MS | 5122000 | N/A | 2017/08/17 | Anna Gabrielyan |

**Maxxam ID:** EYB189
**Sample ID:** TWA2-2017-08-10
**Matrix:** Soil

**Collected:** 2017/08/10
**Shipped:**
**Received:** 2017/08/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | CALC | 5119339 | N/A | 2017/08/11 | Liliana Gaburici |
| Hot Water Extractable Boron | ICP | 5125484 | 2017/08/18 | 2017/08/18 | Jolly John |
| 1,3-Dichloropropene Sum | CALC | 5119117 | N/A | 2017/08/18 | Automated Statchk |
| Hexavalent Chromium in Soil by IC | IC/SPEC | 5124046 | 2017/08/17 | 2017/08/18 | Sally Coughlin |
| Petroleum Hydro. CCME F1 & BTEX in Soil | HSGC/MSFD | 5122168 | N/A | 2017/08/19 | Lyndsey Hart |
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5121186 | 2017/08/16 | 2017/08/18 | Paul Rubinato |
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5125250 | 2017/08/18 | 2017/08/20 | Viviana Canzonieri |
| Moisture | BAL | 5121191 | N/A | 2017/08/17 | Liliana Gaburici |
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5123327 | 2017/08/17 | 2017/08/18 | Liliana Gaburici |
| Polychlorinated Biphenyl in Soil | GC/ECD | 5123850 | 2017/08/17 | 2017/08/17 | Li Peng |
| Volatile Organic Compounds in Soil | GC/MS | 5122000 | N/A | 2017/08/17 | Anna Gabrielyan |

**Maxxam ID:** EYB189 Dup
**Sample ID:** TWA2-2017-08-10
**Matrix:** Soil

**Collected:** 2017/08/10
**Shipped:**
**Received:** 2017/08/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hot Water Extractable Boron | ICP | 5125484 | 2017/08/18 | 2017/08/18 | Jolly John |



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Maxxam Job #: B7H4617
Report Date: 2017/08/21

ARCADIS Canada Inc
Client Project #: 102153-000-TC IQUALIT LANDFILL
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** EYB190
**Sample ID:** TWA3-2017-08-10
**Matrix:** Soil

**Collected:** 2017/08/10
**Shipped:**
**Received:** 2017/08/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | CALC | 5119339 | N/A | 2017/08/11 | Liliana Gaburici |
| Hot Water Extractable Boron | ICP | 5125484 | 2017/08/18 | 2017/08/18 | Jolly John |
| 1,3-Dichloropropene Sum | CALC | 5119117 | N/A | 2017/08/18 | Automated Statchk |
| Hexavalent Chromium in Soil by IC | IC/SPEC | 5124046 | 2017/08/17 | 2017/08/18 | Sally Coughlin |
| Petroleum Hydro. CCME F1 & BTEX in Soil | HSGC/MSFD | 5122168 | N/A | 2017/08/19 | Lyndsey Hart |
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5121186 | 2017/08/16 | 2017/08/18 | Paul Rubinato |
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5125250 | 2017/08/18 | 2017/08/20 | Viviana Canzonieri |
| Moisture | BAL | 5121191 | N/A | 2017/08/17 | Liliana Gaburici |
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5123327 | 2017/08/17 | 2017/08/18 | Liliana Gaburici |
| Polychlorinated Biphenyl in Soil | GC/ECD | 5123850 | 2017/08/17 | 2017/08/17 | Li Peng |
| Volatile Organic Compounds in Soil | GC/MS | 5122000 | N/A | 2017/08/17 | Anna Gabrielyan |

**Maxxam ID:** EYB191
**Sample ID:** TWA4-2017-08-10
**Matrix:** Soil

**Collected:** 2017/08/10
**Shipped:**
**Received:** 2017/08/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | CALC | 5119339 | N/A | 2017/08/11 | Liliana Gaburici |
| Hot Water Extractable Boron | ICP | 5125484 | 2017/08/18 | 2017/08/18 | Jolly John |
| 1,3-Dichloropropene Sum | CALC | 5119117 | N/A | 2017/08/18 | Automated Statchk |
| Hexavalent Chromium in Soil by IC | IC/SPEC | 5124046 | 2017/08/17 | 2017/08/18 | Sally Coughlin |
| Petroleum Hydro. CCME F1 & BTEX in Soil | HSGC/MSFD | 5122169 | N/A | 2017/08/19 | Lyndsey Hart |
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5121186 | 2017/08/16 | 2017/08/18 | Paul Rubinato |
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5125250 | 2017/08/18 | 2017/08/20 | Viviana Canzonieri |
| Moisture | BAL | 5121191 | N/A | 2017/08/17 | Liliana Gaburici |
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5123327 | 2017/08/17 | 2017/08/18 | Liliana Gaburici |
| Polychlorinated Biphenyl in Soil | GC/ECD | 5123850 | 2017/08/17 | 2017/08/21 | Li Peng |
| Volatile Organic Compounds in Soil | GC/MS | 5122000 | N/A | 2017/08/17 | Anna Gabrielyan |

**Maxxam ID:** EYB192
**Sample ID:** DUP-2017-08-10
**Matrix:** Soil

**Collected:** 2017/08/10
**Shipped:**
**Received:** 2017/08/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | CALC | 5119339 | N/A | 2017/08/11 | Liliana Gaburici |
| Hot Water Extractable Boron | ICP | 5125484 | 2017/08/18 | 2017/08/18 | Jolly John |
| 1,3-Dichloropropene Sum | CALC | 5119117 | N/A | 2017/08/18 | Automated Statchk |
| Hexavalent Chromium in Soil by IC | IC/SPEC | 5124046 | 2017/08/17 | 2017/08/18 | Sally Coughlin |
| Petroleum Hydro. CCME F1 & BTEX in Soil | HSGC/MSFD | 5122169 | N/A | 2017/08/19 | Lyndsey Hart |
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5121186 | 2017/08/16 | 2017/08/18 | Paul Rubinato |
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5125250 | 2017/08/18 | 2017/08/20 | Viviana Canzonieri |
| Moisture | BAL | 5121191 | N/A | 2017/08/17 | Liliana Gaburici |
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5123327 | 2017/08/17 | 2017/08/18 | Liliana Gaburici |
| Polychlorinated Biphenyl in Soil | GC/ECD | 5123850 | 2017/08/17 | 2017/08/21 | Li Peng |
| Volatile Organic Compounds in Soil | GC/MS | 5122000 | N/A | 2017/08/17 | Anna Gabrielyan |



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Maxxam Job #: B7H4617
Report Date: 2017/08/21

ARCADIS Canada Inc
Client Project #: 102153-000-TC IQUALIT LANDFILL
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** EYB192 Dup
**Sample ID:** DUP-2017-08-10
**Matrix:** Soil

**Collected:** 2017/08/10
**Shipped:**
**Received:** 2017/08/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Petroleum Hydro. CCME F1 & BTEX in Soil | HSGC/MSFD | 5122169 | N/A | 2017/08/19 | Lyndsey Hart |



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ARCADIS Canada Inc
Client Project #: 102153-000-TC IQUALIT LANDFILL
Sampler Initials: RF

## GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

| | |
|---|---|
| Package 1 | 2.3°C |

Sample EYB191 [TWA4-2017-08-10] : PCB analysis: Aroclor 1262 was detected in the sample. This Aroclor's presence is reflected in the total PCB value.

**Results relate only to the items tested.**



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Maxxam Job #: B7H4617
Report Date: 2017/08/21

## QUALITY ASSURANCE REPORT

ARCADIS Canada Inc
Client Project #: 102153-000-TC IQUALIT LANDFILL
Sampler Initials: RF

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5121186 | o-Terphenyl | 2017/08/16 | 91 | 30 - 130 | 89 | 30 - 130 | 87 | % | | |
| 5122000 | 4-Bromofluorobenzene | 2017/08/17 | 101 | 60 - 140 | 101 | 60 - 140 | 99 | % | | |
| 5122000 | D10-o-Xylene | 2017/08/17 | 86 | 60 - 130 | 100 | 60 - 130 | 95 | % | | |
| 5122000 | D4-1,2-Dichloroethane | 2017/08/17 | 101 | 60 - 140 | 105 | 60 - 140 | 109 | % | | |
| 5122000 | D8-Toluene | 2017/08/17 | 102 | 60 - 140 | 100 | 60 - 140 | 94 | % | | |
| 5122168 | 1,4-Difluorobenzene | 2017/08/18 | 73 | 60 - 140 | 79 | 60 - 140 | 92 | % | | |
| 5122168 | 4-Bromofluorobenzene | 2017/08/18 | 119 | 60 - 140 | 86 | 60 - 140 | 100 | % | | |
| 5122168 | D10-Ethylbenzene | 2017/08/18 | 119 | 30 - 130 | 96 | 30 - 130 | 91 | % | | |
| 5122168 | D4-1,2-Dichloroethane | 2017/08/18 | 82 | 60 - 140 | 81 | 60 - 140 | 95 | % | | |
| 5122169 | 1,4-Difluorobenzene | 2017/08/19 | 83 | 60 - 140 | 82 | 60 - 140 | 85 | % | | |
| 5122169 | 4-Bromofluorobenzene | 2017/08/19 | 87 | 60 - 140 | 92 | 60 - 140 | 88 | % | | |
| 5122169 | D10-Ethylbenzene | 2017/08/19 | 104 | 30 - 130 | 92 | 30 - 130 | 95 | % | | |
| 5122169 | D4-1,2-Dichloroethane | 2017/08/19 | 83 | 60 - 140 | 95 | 60 - 140 | 90 | % | | |
| 5123327 | D10-Anthracene | 2017/08/18 | 92 | 50 - 130 | 97 | 50 - 130 | 97 | % | | |
| 5123327 | D14-Terphenyl (FS) | 2017/08/18 | 102 | 50 - 130 | 95 | 50 - 130 | 93 | % | | |
| 5123327 | D8-Acenaphthylene | 2017/08/18 | 89 | 50 - 130 | 93 | 50 - 130 | 91 | % | | |
| 5123850 | Decachlorobiphenyl | 2017/08/17 | 83 | 60 - 130 | 99 | 60 - 130 | 99 | % | | |
| 5121186 | F2 (C10-C16 Hydrocarbons) | 2017/08/16 | 103 | 50 - 130 | 106 | 80 - 120 | <10 | ug/g | NC | 50 |
| 5121186 | F3 (C16-C34 Hydrocarbons) | 2017/08/16 | 103 | 50 - 130 | 106 | 80 - 120 | <50 | ug/g | NC | 50 |
| 5121186 | F4 (C34-C50 Hydrocarbons) | 2017/08/16 | 103 | 50 - 130 | 106 | 80 - 120 | <50 | ug/g | NC | 50 |
| 5121191 | Moisture | 2017/08/17 | | | | | | | 10 | 50 |
| 5122000 | 1,1,1,2-Tetrachloroethane | 2017/08/17 | 103 | 60 - 140 | 103 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | 1,1,1-Trichloroethane | 2017/08/17 | 99 | 60 - 140 | 98 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | 1,1,2,2-Tetrachloroethane | 2017/08/17 | 97 | 60 - 140 | 105 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | 1,1,2-Trichloroethane | 2017/08/17 | 100 | 60 - 140 | 102 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | 1,1-Dichloroethane | 2017/08/17 | 105 | 60 - 140 | 105 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | 1,1-Dichloroethylene | 2017/08/17 | 112 | 60 - 140 | 111 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | 1,2-Dichlorobenzene | 2017/08/17 | 95 | 60 - 140 | 95 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | 1,2-Dichloroethane | 2017/08/17 | 98 | 60 - 140 | 102 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | 1,2-Dichloropropane | 2017/08/17 | 94 | 60 - 140 | 97 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | 1,3-Dichlorobenzene | 2017/08/17 | 98 | 60 - 140 | 95 | 60 - 130 | <0.050 | ug/g | NC | 50 |



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## QUALITY ASSURANCE REPORT(CONT'D)



| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5122000 | 1,4-Dichlorobenzene | 2017/08/17 | 98 | 60 - 140 | 96 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | Acetone (2-Propanone) | 2017/08/17 | 94 | 60 - 140 | 103 | 60 - 140 | <0.50 | ug/g | NC | 50 |
| 5122000 | Benzene | 2017/08/17 | 103 | 60 - 140 | 104 | 60 - 130 | <0.0060 | ug/g | NC | 50 |
| 5122000 | Bromodichloromethane | 2017/08/17 | 97 | 60 - 140 | 101 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | Bromoform | 2017/08/17 | 103 | 60 - 140 | 110 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | Bromomethane | 2017/08/17 | 106 | 60 - 140 | 110 | 60 - 140 | <0.050 | ug/g | NC | 50 |
| 5122000 | Carbon Tetrachloride | 2017/08/17 | 99 | 60 - 140 | 97 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | Chlorobenzene | 2017/08/17 | 98 | 60 - 140 | 97 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | Chloroform | 2017/08/17 | 97 | 60 - 140 | 98 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | cis-1,2-Dichloroethylene | 2017/08/17 | 97 | 60 - 140 | 99 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | cis-1,3-Dichloropropene | 2017/08/17 | 96 | 60 - 140 | 102 | 60 - 130 | <0.030 | ug/g | NC | 50 |
| 5122000 | Dibromochloromethane | 2017/08/17 | 101 | 60 - 140 | 105 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | Dichlorodifluoromethane (FREON 12) | 2017/08/17 | 108 | 60 - 140 | 112 | 60 - 140 | <0.050 | ug/g | NC | 50 |
| 5122000 | Ethylbenzene | 2017/08/17 | 99 | 60 - 140 | 97 | 60 - 130 | <0.010 | ug/g | NC | 50 |
| 5122000 | Ethylene Dibromide | 2017/08/17 | 102 | 60 - 140 | 107 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | Hexane | 2017/08/17 | 113 | 60 - 140 | 112 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | Methyl Ethyl Ketone (2-Butanone) | 2017/08/17 | 96 | 60 - 140 | 109 | 60 - 140 | <0.50 | ug/g | NC | 50 |
| 5122000 | Methyl Isobutyl Ketone | 2017/08/17 | 96 | 60 - 140 | 109 | 60 - 130 | <0.50 | ug/g | NC | 50 |
| 5122000 | Methyl t-butyl ether (MTBE) | 2017/08/17 | 98 | 60 - 140 | 100 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | Methylene Chloride(Dichloromethane) | 2017/08/17 | 106 | 60 - 140 | 108 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | o-Xylene | 2017/08/17 | 98 | 60 - 140 | 97 | 60 - 130 | <0.020 | ug/g | NC | 50 |
| 5122000 | p+m-Xylene | 2017/08/17 | 103 | 60 - 140 | 101 | 60 - 130 | <0.020 | ug/g | NC | 50 |
| 5122000 | Styrene | 2017/08/17 | 99 | 60 - 140 | 99 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | Tetrachloroethylene | 2017/08/17 | 93 | 60 - 140 | 90 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | Toluene | 2017/08/17 | 100 | 60 - 140 | 98 | 60 - 130 | <0.020 | ug/g | NC | 50 |
| 5122000 | Total Xylenes | 2017/08/17 | | | | | <0.020 | ug/g | NC | 50 |
| 5122000 | trans-1,2-Dichloroethylene | 2017/08/17 | 103 | 60 - 140 | 103 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5122000 | trans-1,3-Dichloropropene | 2017/08/17 | 102 | 60 - 140 | 108 | 60 - 130 | <0.040 | ug/g | NC | 50 |
| 5122000 | Trichloroethylene | 2017/08/17 | 97 | 60 - 140 | 96 | 60 - 130 | <0.010 | ug/g | NC | 50 |
| 5122000 | Trichlorofluoromethane (FREON 11) | 2017/08/17 | 104 | 60 - 140 | 102 | 60 - 130 | <0.050 | ug/g | 0.76 | 50 |
| 5122000 | Vinyl Chloride | 2017/08/17 | 107 | 60 - 140 | 108 | 60 - 130 | <0.020 | ug/g | NC | 50 |



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## QUALITY ASSURANCE REPORT(CONT'D)



| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5122168 | Benzene | 2017/08/21 | 91 | 60 - 140 | 97 | 60 - 140 | <0.0050 | ug/g | 7.7 | 50 |
| 5122168 | Ethylbenzene | 2017/08/21 | 122 | 60 - 140 | 107 | 60 - 140 | <0.010 | ug/g | 17 | 50 |
| 5122168 | F1 (C6-C10) - BTEX | 2017/08/21 | | | | | <10 | ug/g | 39 | 50 |
| 5122168 | F1 (C6-C10) | 2017/08/21 | 70 | 60 - 140 | 95 | 80 - 120 | <10 | ug/g | 39 | 50 |
| 5122168 | o-Xylene | 2017/08/21 | 126 | 60 - 140 | 105 | 60 - 140 | <0.020 | ug/g | 27 | 50 |
| 5122168 | p+m-Xylene | 2017/08/21 | 130 | 60 - 140 | 109 | 60 - 140 | <0.040 | ug/g | 14 | 50 |
| 5122168 | Toluene | 2017/08/21 | 98 | 60 - 140 | 98 | 60 - 140 | <0.020 | ug/g | 40 | 50 |
| 5122168 | Total Xylenes | 2017/08/21 | | | | | <0.040 | ug/g | 19 | 50 |
| 5122169 | Benzene | 2017/08/19 | 120 | 60 - 140 | 96 | 60 - 140 | <0.0050 | ug/g | NC | 50 |
| 5122169 | Ethylbenzene | 2017/08/19 | 124 | 60 - 140 | 105 | 60 - 140 | <0.010 | ug/g | NC | 50 |
| 5122169 | F1 (C6-C10) - BTEX | 2017/08/19 | | | | | <10 | ug/g | NC | 50 |
| 5122169 | F1 (C6-C10) | 2017/08/19 | 77 | 60 - 140 | 92 | 80 - 120 | <10 | ug/g | NC | 50 |
| 5122169 | o-Xylene | 2017/08/19 | 124 | 60 - 140 | 103 | 60 - 140 | <0.020 | ug/g | NC | 50 |
| 5122169 | p+m-Xylene | 2017/08/19 | 129 | 60 - 140 | 109 | 60 - 140 | <0.040 | ug/g | NC | 50 |
| 5122169 | Toluene | 2017/08/19 | 111 | 60 - 140 | 99 | 60 - 140 | <0.020 | ug/g | NC | 50 |
| 5122169 | Total Xylenes | 2017/08/19 | | | | | <0.040 | ug/g | NC | 50 |
| 5123327 | 1-Methylnaphthalene | 2017/08/18 | 86 | 50 - 130 | 89 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5123327 | 2-Methylnaphthalene | 2017/08/18 | 83 | 50 - 130 | 84 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5123327 | Acenaphthene | 2017/08/18 | 93 | 50 - 130 | 96 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5123327 | Acenaphthylene | 2017/08/18 | 90 | 50 - 130 | 94 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5123327 | Anthracene | 2017/08/18 | 94 | 50 - 130 | 98 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5123327 | Benzo(a)anthracene | 2017/08/18 | 90 | 50 - 130 | 92 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5123327 | Benzo(a)pyrene | 2017/08/18 | 77 | 50 - 130 | 82 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5123327 | Benzo(b/j)fluoranthene | 2017/08/18 | 92 | 50 - 130 | 92 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5123327 | Benzo(g,h,i)perylene | 2017/08/18 | 72 | 50 - 130 | 82 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5123327 | Benzo(k)fluoranthene | 2017/08/18 | 85 | 50 - 130 | 89 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5123327 | Chrysene | 2017/08/18 | 84 | 50 - 130 | 90 | 50 - 130 | <0.0050 | ug/g | 35 | 40 |
| 5123327 | Dibenz(a,h)anthracene | 2017/08/18 | 83 | 50 - 130 | 88 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5123327 | Fluoranthene | 2017/08/18 | 104 | 50 - 130 | 104 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5123327 | Fluorene | 2017/08/18 | 112 | 50 - 130 | 105 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5123327 | Indeno(1,2,3-cd)pyrene | 2017/08/18 | 82 | 50 - 130 | 98 | 50 - 130 | <0.0050 | ug/g | NC | 40 |

## QUALITY ASSURANCE REPORT(CONT'D)



| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5123327 | Naphthalene | 2017/08/18 | 77 | 50 - 130 | 78 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5123327 | Phenanthrene | 2017/08/18 | 86 | 50 - 130 | 92 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5123327 | Pyrene | 2017/08/18 | 106 | 50 - 130 | 100 | 50 - 130 | <0.0050 | ug/g | 23 | 40 |
| 5123850 | Aroclor 1242 | 2017/08/17 | | | | | <0.010 | ug/g | NC | 50 |
| 5123850 | Aroclor 1248 | 2017/08/17 | | | | | <0.010 | ug/g | NC | 50 |
| 5123850 | Aroclor 1254 | 2017/08/17 | | | | | <0.010 | ug/g | NC | 50 |
| 5123850 | Aroclor 1260 | 2017/08/17 | 98 | 60 - 130 | 103 | 60 - 130 | <0.010 | ug/g | NC | 50 |
| 5123850 | Total PCB | 2017/08/17 | 98 | 60 - 130 | 103 | 60 - 130 | <0.010 | ug/g | NC | 50 |
| 5124046 | Chromium (VI) | 2017/08/18 | 0 (1) | 75 - 125 | 89 | 80 - 120 | <0.2 | ug/g | NC | 35 |
| 5125250 | Acid Extractable Antimony (Sb) | 2017/08/20 | 95 | 75 - 125 | 102 | 80 - 120 | <0.20 | ug/g | NC | 30 |
| 5125250 | Acid Extractable Arsenic (As) | 2017/08/20 | 103 | 75 - 125 | 104 | 80 - 120 | <1.0 | ug/g | 0.82 | 30 |
| 5125250 | Acid Extractable Barium (Ba) | 2017/08/20 | NC | 75 - 125 | 105 | 80 - 120 | <0.50 | ug/g | 3.4 | 30 |
| 5125250 | Acid Extractable Beryllium (Be) | 2017/08/20 | 102 | 75 - 125 | 100 | 80 - 120 | <0.20 | ug/g | 0.76 | 30 |
| 5125250 | Acid Extractable Boron (B) | 2017/08/20 | 99 | 75 - 125 | 96 | 80 - 120 | <5.0 | ug/g | 1.7 | 30 |
| 5125250 | Acid Extractable Cadmium (Cd) | 2017/08/20 | 101 | 75 - 125 | 100 | 80 - 120 | <0.10 | ug/g | 7.6 | 30 |
| 5125250 | Acid Extractable Chromium (Cr) | 2017/08/20 | 105 | 75 - 125 | 100 | 80 - 120 | <1.0 | ug/g | 1.4 | 30 |
| 5125250 | Acid Extractable Cobalt (Co) | 2017/08/20 | 102 | 75 - 125 | 101 | 80 - 120 | <0.10 | ug/g | 3.3 | 30 |
| 5125250 | Acid Extractable Copper (Cu) | 2017/08/20 | 77 | 75 - 125 | 105 | 80 - 120 | <0.50 | ug/g | 33 (2) | 30 |
| 5125250 | Acid Extractable Lead (Pb) | 2017/08/20 | 99 | 75 - 125 | 99 | 80 - 120 | <1.0 | ug/g | 0.43 | 30 |
| 5125250 | Acid Extractable Mercury (Hg) | 2017/08/19 | 92 | 75 - 125 | 92 | 80 - 120 | <0.050 | ug/g | | |
| 5125250 | Acid Extractable Molybdenum (Mo) | 2017/08/20 | 104 | 75 - 125 | 101 | 80 - 120 | <0.50 | ug/g | NC | 30 |
| 5125250 | Acid Extractable Nickel (Ni) | 2017/08/20 | 100 | 75 - 125 | 103 | 80 - 120 | <0.50 | ug/g | 1.2 | 30 |
| 5125250 | Acid Extractable Selenium (Se) | 2017/08/20 | 99 | 75 - 125 | 100 | 80 - 120 | <0.50 | ug/g | NC | 30 |
| 5125250 | Acid Extractable Silver (Ag) | 2017/08/20 | 103 | 75 - 125 | 100 | 80 - 120 | <0.20 | ug/g | NC | 30 |
| 5125250 | Acid Extractable Thallium (Tl) | 2017/08/20 | 98 | 75 - 125 | 98 | 80 - 120 | <0.050 | ug/g | 0.26 | 30 |
| 5125250 | Acid Extractable Uranium (U) | 2017/08/20 | 102 | 75 - 125 | 100 | 80 - 120 | <0.050 | ug/g | 5.0 | 30 |
| 5125250 | Acid Extractable Vanadium (V) | 2017/08/20 | NC | 75 - 125 | 105 | 80 - 120 | <5.0 | ug/g | 3.8 | 30 |
| 5125250 | Acid Extractable Zinc (Zn) | 2017/08/20 | NC | 75 - 125 | 104 | 80 - 120 | <5.0 | ug/g | 9.9 | 30 |
| 5125349 | Acid Extractable Antimony (Sb) | 2017/08/18 | 91 | 75 - 125 | 95 | 80 - 120 | <0.20 | ug/g | NC | 30 |
| 5125349 | Acid Extractable Arsenic (As) | 2017/08/18 | 98 | 75 - 125 | 96 | 80 - 120 | <1.0 | ug/g | 7.2 | 30 |
| 5125349 | Acid Extractable Barium (Ba) | 2017/08/18 | NC | 75 - 125 | 94 | 80 - 120 | <0.50 | ug/g | 1.8 | 30 |

## QUALITY ASSURANCE REPORT(CONT'D)



| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5125349 | Acid Extractable Beryllium (Be) | 2017/08/18 | 100 | 75 - 125 | 95 | 80 - 120 | <0.20 | ug/g | 1.3 | 30 |
| 5125349 | Acid Extractable Boron (B) | 2017/08/18 | 93 | 75 - 125 | 92 | 80 - 120 | <5.0 | ug/g | 3.8 | 30 |
| 5125349 | Acid Extractable Cadmium (Cd) | 2017/08/18 | 98 | 75 - 125 | 93 | 80 - 120 | <0.10 | ug/g | NC | 30 |
| 5125349 | Acid Extractable Chromium (Cr) | 2017/08/18 | NC | 75 - 125 | 97 | 80 - 120 | <1.0 | ug/g | 0.84 | 30 |
| 5125349 | Acid Extractable Cobalt (Co) | 2017/08/18 | 96 | 75 - 125 | 94 | 80 - 120 | <0.10 | ug/g | 2.1 | 30 |
| 5125349 | Acid Extractable Copper (Cu) | 2017/08/18 | 96 | 75 - 125 | 95 | 80 - 120 | <0.50 | ug/g | 0.77 | 30 |
| 5125349 | Acid Extractable Lead (Pb) | 2017/08/18 | 96 | 75 - 125 | 96 | 80 - 120 | <1.0 | ug/g | 0.29 | 30 |
| 5125349 | Acid Extractable Mercury (Hg) | 2017/08/18 | 92 | 75 - 125 | 89 | 80 - 120 | <0.050 | ug/g | NC | 30 |
| 5125349 | Acid Extractable Molybdenum (Mo) | 2017/08/18 | 97 | 75 - 125 | 94 | 80 - 120 | <0.50 | ug/g | NC | 30 |
| 5125349 | Acid Extractable Nickel (Ni) | 2017/08/18 | 96 | 75 - 125 | 97 | 80 - 120 | <0.50 | ug/g | 1.9 | 30 |
| 5125349 | Acid Extractable Selenium (Se) | 2017/08/18 | 97 | 75 - 125 | 96 | 80 - 120 | <0.50 | ug/g | NC | 30 |
| 5125349 | Acid Extractable Silver (Ag) | 2017/08/18 | 99 | 75 - 125 | 94 | 80 - 120 | <0.20 | ug/g | NC | 30 |
| 5125349 | Acid Extractable Thallium (Tl) | 2017/08/18 | 96 | 75 - 125 | 94 | 80 - 120 | <0.050 | ug/g | 4.9 | 30 |
| 5125349 | Acid Extractable Uranium (U) | 2017/08/18 | 99 | 75 - 125 | 96 | 80 - 120 | <0.050 | ug/g | 0.056 | 30 |
| 5125349 | Acid Extractable Vanadium (V) | 2017/08/18 | NC | 75 - 125 | 94 | 80 - 120 | <5.0 | ug/g | 1.6 | 30 |
| 5125349 | Acid Extractable Zinc (Zn) | 2017/08/18 | NC | 75 - 125 | 101 | 80 - 120 | <5.0 | ug/g | 0.99 | 30 |
| 5125484 | Hot Water Ext. Boron (B) | 2017/08/18 | 109 | 75 - 125 | 101 | 75 - 125 | <0.050 | ug/g | 4.9 | 40 |

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) The matrix spike recovery was below the lower control limit. This may be due in part to the reducing environment of the sample. The sample was reanalyzed with the same results.

(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.



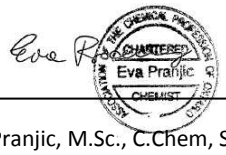
Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Maxxam Job #: B7H4617
Report Date: 2017/08/21

ARCADIS Canada Inc
Client Project #: 102153-000-TC IQUALIT LANDFILL
Sampler Initials: RF

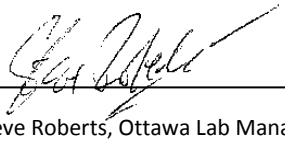
## VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).




Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Paul Rubinato, Analyst, Maxxam Analytics



Steve Roberts, Ottawa Lab Manager

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Maxxam
A Bureau Veritas Group Company

Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.maxxam.ca

# CHAIN OF CUSTODY RECORD

Page 1 of 1

| INVOICE TO: | | REPORT TO: | | PROJECT INFORMATION: | | Laboratory Use Only: | |
|---|---|---|---|---|---|---|---|
| Company Name: | #10988 ARCADIS Canada Inc | Company Name: | | Quotation #: | B54416 | Maxxam Job #: | Bottle Order #: |
| Attention: | Ryan Fletcher | Attention: | Ryan Fletcher | P.O. #: | | | 621108 |
| Address: | 329 Churchill Ave N Suite 200<br>Ottawa ON K1Z 5B8 | Address: | | Project: | 102153-000 | COC #: | Project Manager: |
| Tel: | (613) 721-0555 x Fax: (613) 721-0029 x | Tel: | (613) 721-0555 x Fax: | Project Name: | TC Iqaluit Landfill | C#621108-03-01 | Alison Cameron |
| Email: | ryan.fletcher@arcadis.com | Email: | ryan.fletcher@arcadis.com + ryan.janzen@... | Site #: | | | |
| | | | | Sampled By: | RF | | |

**MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY**

**Regulation 153 (2011)**
☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☐ Ind/Comm ☒ Coarse
☐ Table 3 ☐ Agri/Other ☐ For RSC
☐ Table ___

**Other Regulations**
☒ CCME ☐ Sanitary Sewer Bylaw
☐ Reg 558. ☐ Storm Sewer Bylaw
☐ MISA Municipality ___
☐ PWQO
☐ Other ___

**Special Instructions**

*Include Criteria on Certificate of Analysis (Y/N)?* ___

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

**Regular (Standard) TAT:** ☒
*(will be applied if Rush TAT is not specified):*
*Standard TAT = 5-7 Working days for most tests..*
*Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.*

**Job Specific Rush TAT (if applies to entire submission)**
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

| | Sample Barcode Label | Sample (Location) Identification | Date Sampled | Time Sampled | Matrix | Field Filtered (please circle): Metals / Hg / Cr VI | CCME Petroleum Hydrocarbons Soil | PAHs | PCBs | VOCs | Metals (ICAMS) | # of Bottles | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | TWA1-20170810 | Aug 10 | 8:00 | SOIL | NA | X | X | X | X | X | 8 | |
| 2 | | TWA2-20170810 | | 8:30 | SOIL | | X | X | X | X | X | 8 | |
| 3 | | TWA3-20170810 | | 9:06 | SOIL | | X | X | X | X | X | 8 | |
| 4 | | TWA4-20170810 | | 9:30 | SOIL | | X | X | X | X | X | 8 | |
| 5 | | DUP-20170810 | ↓ | — | SOIL | ↓ | X | X | X | X | X | 8 | |
| 6 | | | | | SOIL | | | | | | | | |
| 7 | | | | | SOIL | | | | | | | | RECEIVED IN OTTAWA |
| 8 | | | | | SOIL | | | | | | | | |
| 9 | | | | | SOIL | | | | | | | | |
| 10 | | | | | SOIL | | | | | | | | ON Ice |

14-Aug-17 11:05
Alison Cameron
B7H4617
KIY OTT-001

| * RELINQUISHED BY: (Signature/Print) | Date: (YY/MM/DD) | Time | RECEIVED BY: (Signature/Print) | Date: (YY/MM/DD) | Time | # jars used and not submitted | Laboratory Use Only | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Ryan Fletcher | Aug 11/17 | 8 am | [illegible] Janzen MS | 2017/08/14 | 11:05 | | Time Sensitive | Temperature (°C) on Recei: 2 \| 2 \| 3 | Custody Seal Present ☒ / Intact ☒ | Yes / No |

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT HTTP://MAXXAM.CA/WP-CONTENT/UPLOADS/ONTARIO-COC.PDF.

SAMPLES MUST BE KEPT COOL ( < 10° C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

White: Maxxa Yellow: Client

2 2 3 MS 11/8/17

Maxxam Analytics International Corporation o/a Maxxam Analytics

Maxxam
A Bureau Veritas Group Company

Your Project #: 102153-000
Site Location: TC IQALUIT
Your C.O.C. #: 621108-04-01

**Attention:Ryan Fletcher**

ARCADIS Canada Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

**Report Date: 2017/09/21**
Report #: R4725467
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B7K2314**
**Received: 2017/09/15, 10:00**

Sample Matrix: Soil
# Samples Received: 8

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Reference |
|---|---|---|---|---|---|
| Hot Water Extractable Boron (1) | 4 | 2017/09/19 | 2017/09/19 | CAM SOP-00408 | R153 Ana. Prot. 2011 |
| Hexavalent Chromium in Soil by IC (1, 2) | 4 | 2017/09/19 | 2017/09/19 | CAM SOP-00436 | EPA 3060/7199 m |
| F2-F4 PHCs with extra silica gel cleanup (1, 3) | 4 | 2017/09/20 | 2017/09/21 | CAM SOP-00316 | CCME CWS m |
| Strong Acid Leachable Metals by ICPMS (1) | 4 | 2017/09/19 | 2017/09/20 | CAM SOP-00447 | EPA 6020B m |
| Moisture (1) | 8 | N/A | 2017/09/19 | CAM SOP-00445 | Carter 2nd ed 51.2 m |
| Volatile Organic Compounds and F1 PHCs (1) | 4 | N/A | 2017/09/20 | CAM SOP-00230 | EPA 8260 m |

**Remarks:**

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Maxxam Analytics Mississauga
(2) Soils are reported on a dry weight basis unless otherwise specified.
(3) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Your Project #: 102153-000
Site Location: TC IQALUIT
Your C.O.C. #: 621108-04-01

**Attention:Ryan Fletcher**

ARCADIS Canada Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

**Report Date: 2017/09/21**
Report #: R4725467
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B7K2314**
**Received: 2017/09/15, 10:00**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Alison Cameron, Project Manager
Email: ACameron@maxxam.ca
Phone# (613) 274-0573

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B7K2314
Report Date: 2017/09/21

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## CCME PETROLEUM HYDROCARBONS SOIL (SOIL)

| Maxxam ID | | FDE482 | | FDE483 | FDE484 | FDE484 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/13 13:00 | | 2017/09/13 13:00 | 2017/09/13 13:00 | 2017/09/13 13:00 | | |
| COC Number | | 621108-04-01 | | 621108-04-01 | 621108-04-01 | 621108-04-01 | | |
| | **UNITS** | **AEC1-EX03-WALL1** | **RDL** | **AEC1-EX03-WALL2** | **AEC1-EX03-WALL3** | **AEC1-EX03-WALL3 Lab-Dup** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | |
| Moisture | % | 59 | 1.0 | 36 | 26 | | 1.0 | 5170993 |
| **Volatile Organics** | | | | | | | | |
| Benzene | ug/g | <0.012 | 0.012 | <0.0060 | <0.0060 | <0.0060 | 0.0060 | 5169353 |
| Ethylbenzene | ug/g | <0.020 | 0.020 | <0.010 | <0.010 | <0.010 | 0.010 | 5169353 |
| Toluene | ug/g | <0.040 | 0.040 | <0.020 | <0.020 | <0.020 | 0.020 | 5169353 |
| p+m-Xylene | ug/g | <0.040 | 0.040 | <0.020 | <0.020 | <0.020 | 0.020 | 5169353 |
| o-Xylene | ug/g | <0.040 | 0.040 | <0.020 | <0.020 | <0.020 | 0.020 | 5169353 |
| Total Xylenes | ug/g | <0.040 | 0.040 | <0.020 | <0.020 | <0.020 | 0.020 | 5169353 |
| F1 (C6-C10) | ug/g | <20 | 20 | <10 | <10 | <10 | 10 | 5169353 |
| F1 (C6-C10) - BTEX | ug/g | <20 | 20 | <10 | <10 | <10 | 10 | 5169353 |
| **Surrogate Recovery (%)** | | | | | | | | |
| 4-Bromofluorobenzene | % | 94 | | 92 | 96 | 96 | | 5169353 |
| D10-o-Xylene | % | 92 | | 103 | 97 | 97 | | 5169353 |
| D4-1,2-Dichloroethane | % | 104 | | 104 | 101 | 102 | | 5169353 |
| D8-Toluene | % | 102 | | 102 | 101 | 102 | | 5169353 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Maxxam Job #: B7K2314
Report Date: 2017/09/21

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## CCME PETROLEUM HYDROCARBONS SOIL (SOIL)

| Maxxam ID | | FDE485 | | |
|---|---|---|---|---|
| Sampling Date | | 2017/09/13 13:00 | | |
| COC Number | | 621108-04-01 | | |
| | **UNITS** | **AEC1-EX03-WALL4** | **RDL** | **QC Batch** |
| **Inorganics** | | | | |
| Moisture | % | 31 | 1.0 | 5170993 |
| **Volatile Organics** | | | | |
| Benzene | ug/g | <0.0060 | 0.0060 | 5169353 |
| Ethylbenzene | ug/g | <0.010 | 0.010 | 5169353 |
| Toluene | ug/g | <0.020 | 0.020 | 5169353 |
| p+m-Xylene | ug/g | <0.020 | 0.020 | 5169353 |
| o-Xylene | ug/g | <0.020 | 0.020 | 5169353 |
| Total Xylenes | ug/g | <0.020 | 0.020 | 5169353 |
| F1 (C6-C10) | ug/g | <10 | 10 | 5169353 |
| F1 (C6-C10) - BTEX | ug/g | <10 | 10 | 5169353 |
| **Surrogate Recovery (%)** | | | | |
| 4-Bromofluorobenzene | % | 93 | | 5169353 |
| D10-o-Xylene | % | 103 | | 5169353 |
| D4-1,2-Dichloroethane | % | 103 | | 5169353 |
| D8-Toluene | % | 102 | | 5169353 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7K2314
Report Date: 2017/09/21

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## O.REG 153 METALS PACKAGE (SOIL)

| Maxxam ID | | FDE478 | FDE479 | FDE480 | FDE481 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/13 13:30 | 2017/09/13 13:30 | 2017/09/13 13:30 | 2017/09/13 13:30 | | |
| COC Number | | 621108-04-01 | 621108-04-01 | 621108-04-01 | 621108-04-01 | | |
| | **UNITS** | **AEC1-EX02-WALL1** | **AEC1-EX02-WALL2** | **AEC1-EX02-WALL3** | **AEC1-EX02-WALL4** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | |
| Moisture | % | 9.7 | 15 | 11 | 12 | 1.0 | 5172209 |
| Chromium (VI) | ug/g | <0.2 | <0.2 | <0.2 | <0.2 | 0.2 | 5170386 |
| **Metals** | | | | | | | |
| Hot Water Ext. Boron (B) | ug/g | 0.064 | 0.12 | 0.17 | 0.097 | 0.050 | 5170882 |
| Acid Extractable Antimony (Sb) | ug/g | 1.0 | 0.81 | 1.6 | 0.60 | 0.20 | 5171386 |
| Acid Extractable Arsenic (As) | ug/g | <1.0 | 1.2 | 1.3 | <1.0 | 1.0 | 5171386 |
| Acid Extractable Barium (Ba) | ug/g | 27 | 42 | 42 | 30 | 0.50 | 5171386 |
| Acid Extractable Beryllium (Be) | ug/g | <0.20 | 0.26 | 0.25 | 0.20 | 0.20 | 5171386 |
| Acid Extractable Boron (B) | ug/g | <5.0 | <5.0 | <5.0 | <5.0 | 5.0 | 5171386 |
| Acid Extractable Cadmium (Cd) | ug/g | 0.19 | 0.17 | 0.27 | 0.22 | 0.10 | 5171386 |
| Acid Extractable Chromium (Cr) | ug/g | 25 | 26 | 27 | 23 | 1.0 | 5171386 |
| Acid Extractable Cobalt (Co) | ug/g | 5.5 | 7.4 | 7.2 | 5.0 | 0.10 | 5171386 |
| Acid Extractable Copper (Cu) | ug/g | 13 | 15 | 16 | 13 | 0.50 | 5171386 |
| Acid Extractable Lead (Pb) | ug/g | 91 | 70 | 190 | 62 | 1.0 | 5171386 |
| Acid Extractable Molybdenum (Mo) | ug/g | 0.88 | 1.2 | 1.2 | 0.92 | 0.50 | 5171386 |
| Acid Extractable Nickel (Ni) | ug/g | 8.4 | 10 | 9.8 | 8.0 | 0.50 | 5171386 |
| Acid Extractable Selenium (Se) | ug/g | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5171386 |
| Acid Extractable Silver (Ag) | ug/g | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5171386 |
| Acid Extractable Thallium (Tl) | ug/g | <0.050 | 0.061 | 0.072 | 0.054 | 0.050 | 5171386 |
| Acid Extractable Uranium (U) | ug/g | 0.59 | 0.65 | 0.60 | 0.60 | 0.050 | 5171386 |
| Acid Extractable Vanadium (V) | ug/g | 58 | 55 | 59 | 50 | 5.0 | 5171386 |
| Acid Extractable Zinc (Zn) | ug/g | 51 | 54 | 58 | 50 | 5.0 | 5171386 |
| Acid Extractable Mercury (Hg) | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5171386 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7K2314
Report Date: 2017/09/21

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## O.REG 153 METALS PACKAGE (SOIL)

| Maxxam ID | | FDE481 | | |
|---|---|---|---|---|
| Sampling Date | | 2017/09/13 13:30 | | |
| COC Number | | 621108-04-01 | | |
| | **UNITS** | **AEC1-EX02-WALL4 Lab-Dup** | **RDL** | **QC Batch** |
| **Metals** | | | | |
| Hot Water Ext. Boron (B) | ug/g | 0.094 | 0.050 | 5170882 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B7K2314
Report Date: 2017/09/21

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## PETROLEUM HYDROCARBONS (CCME)

| Maxxam ID | | FDE482 | | FDE483 | FDE484 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/13 13:00 | | 2017/09/13 13:00 | 2017/09/13 13:00 | | |
| COC Number | | 621108-04-01 | | 621108-04-01 | 621108-04-01 | | |
| | **UNITS** | **AEC1-EX03-WALL1** | **RDL** | **AEC1-EX03-WALL2** | **AEC1-EX03-WALL3** | **RDL** | **QC Batch** |
| **F2-F4 Hydrocarbons** | | | | | | | |
| Extra Silica Gel F2 (C10-C16 Hydrocarbons) | ug/g | 23 | 20 | <10 | 12 | 10 | 5174227 |
| Extra Silica Gel F3 (C16-C34 Hydrocarbons) | ug/g | <100 | 100 | 53 | <50 | 50 | 5174227 |
| Extra Silica Gel F4 (C34-C50 Hydrocarbons) | ug/g | <100 | 100 | 56 | <50 | 50 | 5174227 |
| Extra Silica Gel Reached Baseline at C50 | ug/g | Yes | | No | Yes | | 5174227 |
| **Surrogate Recovery (%)** | | | | | | | |
| Extra Silica Gel o-Terphenyl | % | 86 | | 79 | 84 | | 5174227 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | FDE485 | | |
|---|---|---|---|---|
| Sampling Date | | 2017/09/13 13:00 | | |
| COC Number | | 621108-04-01 | | |
| | **UNITS** | **AEC1-EX03-WALL4** | **RDL** | **QC Batch** |
| **F2-F4 Hydrocarbons** | | | | |
| Extra Silica Gel F2 (C10-C16 Hydrocarbons) | ug/g | 13 | 10 | 5174227 |
| Extra Silica Gel F3 (C16-C34 Hydrocarbons) | ug/g | 130 | 50 | 5174227 |
| Extra Silica Gel F4 (C34-C50 Hydrocarbons) | ug/g | 53 | 50 | 5174227 |
| Extra Silica Gel Reached Baseline at C50 | ug/g | Yes | | 5174227 |
| **Surrogate Recovery (%)** | | | | |
| Extra Silica Gel o-Terphenyl | % | 84 | | 5174227 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7K2314
Report Date: 2017/09/21

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** FDE478
**Sample ID:** AEC1-EX02-WALL1
**Matrix:** Soil

**Collected:** 2017/09/13
**Shipped:**
**Received:** 2017/09/15

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hot Water Extractable Boron | ICP | 5170882 | 2017/09/19 | 2017/09/19 | Suban Kanapathippllai |
| Hexavalent Chromium in Soil by IC | IC/SPEC | 5170386 | 2017/09/19 | 2017/09/19 | Sally Coughlin |
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5171386 | 2017/09/19 | 2017/09/20 | Daniel Teclu |
| Moisture | BAL | 5172209 | N/A | 2017/09/19 | Min Yang |

**Maxxam ID:** FDE479
**Sample ID:** AEC1-EX02-WALL2
**Matrix:** Soil

**Collected:** 2017/09/13
**Shipped:**
**Received:** 2017/09/15

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hot Water Extractable Boron | ICP | 5170882 | 2017/09/19 | 2017/09/19 | Suban Kanapathippllai |
| Hexavalent Chromium in Soil by IC | IC/SPEC | 5170386 | 2017/09/19 | 2017/09/19 | Sally Coughlin |
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5171386 | 2017/09/19 | 2017/09/20 | Daniel Teclu |
| Moisture | BAL | 5172209 | N/A | 2017/09/19 | Min Yang |

**Maxxam ID:** FDE480
**Sample ID:** AEC1-EX02-WALL3
**Matrix:** Soil

**Collected:** 2017/09/13
**Shipped:**
**Received:** 2017/09/15

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hot Water Extractable Boron | ICP | 5170882 | 2017/09/19 | 2017/09/19 | Suban Kanapathippllai |
| Hexavalent Chromium in Soil by IC | IC/SPEC | 5170386 | 2017/09/19 | 2017/09/19 | Sally Coughlin |
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5171386 | 2017/09/19 | 2017/09/20 | Daniel Teclu |
| Moisture | BAL | 5172209 | N/A | 2017/09/19 | Min Yang |

**Maxxam ID:** FDE481
**Sample ID:** AEC1-EX02-WALL4
**Matrix:** Soil

**Collected:** 2017/09/13
**Shipped:**
**Received:** 2017/09/15

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hot Water Extractable Boron | ICP | 5170882 | 2017/09/19 | 2017/09/19 | Suban Kanapathippllai |
| Hexavalent Chromium in Soil by IC | IC/SPEC | 5170386 | 2017/09/19 | 2017/09/19 | Sally Coughlin |
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5171386 | 2017/09/19 | 2017/09/20 | Daniel Teclu |
| Moisture | BAL | 5172209 | N/A | 2017/09/19 | Min Yang |

**Maxxam ID:** FDE481 Dup
**Sample ID:** AEC1-EX02-WALL4
**Matrix:** Soil

**Collected:** 2017/09/13
**Shipped:**
**Received:** 2017/09/15

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hot Water Extractable Boron | ICP | 5170882 | 2017/09/19 | 2017/09/19 | Suban Kanapathippllai |



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Maxxam Job #: B7K2314
Report Date: 2017/09/21

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** FDE482 **Collected:** 2017/09/13
**Sample ID:** AEC1-EX03-WALL1 **Shipped:**
**Matrix:** Soil **Received:** 2017/09/15

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| F2-F4 PHCs with extra silica gel cleanup | GC/FID | 5174227 | 2017/09/20 | 2017/09/21 | Jeevaraj Jeevaratrnam |
| Moisture | BAL | 5170993 | N/A | 2017/09/19 | Min Yang |
| Volatile Organic Compounds and F1 PHCs | GC/MS | 5169353 | N/A | 2017/09/20 | Manpreet Sarao |

**Maxxam ID:** FDE483 **Collected:** 2017/09/13
**Sample ID:** AEC1-EX03-WALL2 **Shipped:**
**Matrix:** Soil **Received:** 2017/09/15

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| F2-F4 PHCs with extra silica gel cleanup | GC/FID | 5174227 | 2017/09/20 | 2017/09/21 | Jeevaraj Jeevaratrnam |
| Moisture | BAL | 5170993 | N/A | 2017/09/19 | Min Yang |
| Volatile Organic Compounds and F1 PHCs | GC/MS | 5169353 | N/A | 2017/09/20 | Manpreet Sarao |

**Maxxam ID:** FDE484 **Collected:** 2017/09/13
**Sample ID:** AEC1-EX03-WALL3 **Shipped:**
**Matrix:** Soil **Received:** 2017/09/15

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| F2-F4 PHCs with extra silica gel cleanup | GC/FID | 5174227 | 2017/09/20 | 2017/09/21 | Jeevaraj Jeevaratrnam |
| Moisture | BAL | 5170993 | N/A | 2017/09/19 | Min Yang |
| Volatile Organic Compounds and F1 PHCs | GC/MS | 5169353 | N/A | 2017/09/20 | Manpreet Sarao |

**Maxxam ID:** FDE484 Dup **Collected:** 2017/09/13
**Sample ID:** AEC1-EX03-WALL3 **Shipped:**
**Matrix:** Soil **Received:** 2017/09/15

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Volatile Organic Compounds and F1 PHCs | GC/MS | 5169353 | N/A | 2017/09/20 | Manpreet Sarao |

**Maxxam ID:** FDE485 **Collected:** 2017/09/13
**Sample ID:** AEC1-EX03-WALL4 **Shipped:**
**Matrix:** Soil **Received:** 2017/09/15

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| F2-F4 PHCs with extra silica gel cleanup | GC/FID | 5174227 | 2017/09/20 | 2017/09/21 | Jeevaraj Jeevaratrnam |
| Moisture | BAL | 5170993 | N/A | 2017/09/19 | Min Yang |
| Volatile Organic Compounds and F1 PHCs | GC/MS | 5169353 | N/A | 2017/09/20 | Manpreet Sarao |



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Maxxam Job #: B7K2314
Report Date: 2017/09/21

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

| | |
|---|---|
| Package 1 | 14.3°C |
| Package 2 | 11.7°C |

Sample FDE482 [AEC1-EX03-WALL1] : VOCF1 Analysis: Detection limits were raised due to high moisture content of soil provided.

F24 Analysis: Detection limits were adjusted for high moisture content. At the request of the client the sample was treated with an additional portion of silica gel that is above the maximum amount prescribed in the reference method.

F2-F4 Analysis: At the request of the client the sample was treated with an additional portion of silica gel that is above the maximum amount prescribed in the reference method.

Sample FDE483 [AEC1-EX03-WALL2] : F24 Analysis: At the request of the client the sample was treated with an additional portion of silica gel that is above the maximum amount prescribed in the reference method. F2-F4 Analysis: At the request of the client the sample was treated with an additional portion of silica gel that is above the maximum amount prescribed in the reference method.

Sample FDE484 [AEC1-EX03-WALL3] : F24 Analysis: At the request of the client the sample was treated with an additional portion of silica gel that is above the maximum amount prescribed in the reference method.
F2-F4 Analysis: At the request of the client the sample was treated with an additional portion of silica gel that is above the maximum amount prescribed in the reference method.

Sample FDE485 [AEC1-EX03-WALL4] : F24 Analysis: At the request of the client the sample was treated with an additional portion of silica gel that is above the maximum amount prescribed in the reference method.
F2-F4 Analysis: At the request of the client the sample was treated with an additional portion of silica gel that is above the maximum amount prescribed in the reference method.

**Results relate only to the items tested.**



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Maxxam Job #: B7K2314
Report Date: 2017/09/21

## QUALITY ASSURANCE REPORT

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5169353 | 4-Bromofluorobenzene | 2017/09/20 | 98 | 60 - 140 | 100 | 60 - 140 | 96 | % | | |
| 5169353 | D10-o-Xylene | 2017/09/20 | 100 | 60 - 130 | 90 | 60 - 130 | 95 | % | | |
| 5169353 | D4-1,2-Dichloroethane | 2017/09/20 | 101 | 60 - 140 | 105 | 60 - 140 | 102 | % | | |
| 5169353 | D8-Toluene | 2017/09/20 | 103 | 60 - 140 | 102 | 60 - 140 | 102 | % | | |
| 5174227 | Extra Silica Gel o-Terphenyl | 2017/09/21 | 88 | 60 - 130 | 90 | 60 - 130 | 96 | % | | |
| 5169353 | Benzene | 2017/09/20 | 90 | 60 - 140 | 93 | 60 - 130 | <0.0060 | ug/g | NC | 50 |
| 5169353 | Ethylbenzene | 2017/09/20 | 89 | 60 - 140 | 92 | 60 - 130 | <0.010 | ug/g | NC | 50 |
| 5169353 | F1 (C6-C10) - BTEX | 2017/09/20 | | | | | <10 | ug/g | NC | 30 |
| 5169353 | F1 (C6-C10) | 2017/09/20 | 106 | 60 - 140 | 105 | 80 - 120 | <10 | ug/g | NC | 30 |
| 5169353 | o-Xylene | 2017/09/20 | 89 | 60 - 140 | 91 | 60 - 130 | <0.020 | ug/g | NC | 50 |
| 5169353 | p+m-Xylene | 2017/09/20 | 89 | 60 - 140 | 92 | 60 - 130 | <0.020 | ug/g | NC | 50 |
| 5169353 | Toluene | 2017/09/20 | 85 | 60 - 140 | 88 | 60 - 130 | <0.020 | ug/g | NC | 50 |
| 5169353 | Total Xylenes | 2017/09/20 | | | | | <0.020 | ug/g | NC | 50 |
| 5170386 | Chromium (VI) | 2017/09/19 | 51 (1) | 75 - 125 | 87 | 80 - 120 | <0.2 | ug/g | NC | 35 |
| 5170882 | Hot Water Ext. Boron (B) | 2017/09/19 | 104 | 75 - 125 | 101 | 75 - 125 | <0.050 | ug/g | 3.7 | 40 |
| 5170993 | Moisture | 2017/09/19 | | | | | | | 5.3 | 20 |
| 5171386 | Acid Extractable Antimony (Sb) | 2017/09/20 | 95 | 75 - 125 | 99 | 80 - 120 | <0.20 | ug/g | 10 | 30 |
| 5171386 | Acid Extractable Arsenic (As) | 2017/09/20 | 102 | 75 - 125 | 102 | 80 - 120 | <1.0 | ug/g | 8.7 | 30 |
| 5171386 | Acid Extractable Barium (Ba) | 2017/09/20 | NC | 75 - 125 | 103 | 80 - 120 | <0.50 | ug/g | 3.0 | 30 |
| 5171386 | Acid Extractable Beryllium (Be) | 2017/09/20 | 95 | 75 - 125 | 95 | 80 - 120 | <0.20 | ug/g | 10 | 30 |
| 5171386 | Acid Extractable Boron (B) | 2017/09/20 | 90 | 75 - 125 | 96 | 80 - 120 | <5.0 | ug/g | NC | 30 |
| 5171386 | Acid Extractable Cadmium (Cd) | 2017/09/20 | 99 | 75 - 125 | 99 | 80 - 120 | <0.10 | ug/g | NC | 30 |
| 5171386 | Acid Extractable Chromium (Cr) | 2017/09/20 | 104 | 75 - 125 | 103 | 80 - 120 | <1.0 | ug/g | 4.4 | 30 |
| 5171386 | Acid Extractable Cobalt (Co) | 2017/09/20 | 100 | 75 - 125 | 102 | 80 - 120 | <0.10 | ug/g | 1.1 | 30 |
| 5171386 | Acid Extractable Copper (Cu) | 2017/09/20 | 103 | 75 - 125 | 104 | 80 - 120 | <0.50 | ug/g | 6.1 | 30 |
| 5171386 | Acid Extractable Lead (Pb) | 2017/09/20 | NC | 75 - 125 | 101 | 80 - 120 | <1.0 | ug/g | 8.8 | 30 |
| 5171386 | Acid Extractable Mercury (Hg) | 2017/09/20 | 98 | 75 - 125 | 102 | 80 - 120 | <0.050 | ug/g | NC | 30 |
| 5171386 | Acid Extractable Molybdenum (Mo) | 2017/09/20 | 101 | 75 - 125 | 100 | 80 - 120 | <0.50 | ug/g | 2.0 | 30 |
| 5171386 | Acid Extractable Nickel (Ni) | 2017/09/20 | 103 | 75 - 125 | 101 | 80 - 120 | <0.50 | ug/g | 0.82 | 30 |
| 5171386 | Acid Extractable Selenium (Se) | 2017/09/20 | 100 | 75 - 125 | 102 | 80 - 120 | <0.50 | ug/g | NC | 30 |
| 5171386 | Acid Extractable Silver (Ag) | 2017/09/20 | 101 | 75 - 125 | 99 | 80 - 120 | <0.20 | ug/g | NC | 30 |



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Maxxam Job #: B7K2314
Report Date: 2017/09/21

## QUALITY ASSURANCE REPORT(CONT'D)

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5171386 | Acid Extractable Thallium (Tl) | 2017/09/20 | 98 | 75 - 125 | 100 | 80 - 120 | <0.050 | ug/g | 5.7 | 30 |
| 5171386 | Acid Extractable Uranium (U) | 2017/09/20 | 98 | 75 - 125 | 101 | 80 - 120 | <0.050 | ug/g | 5.4 | 30 |
| 5171386 | Acid Extractable Vanadium (V) | 2017/09/20 | NC | 75 - 125 | 104 | 80 - 120 | <5.0 | ug/g | 4.4 | 30 |
| 5171386 | Acid Extractable Zinc (Zn) | 2017/09/20 | NC | 75 - 125 | 103 | 80 - 120 | <5.0 | ug/g | 4.0 | 30 |
| 5172209 | Moisture | 2017/09/19 | | | | | | | 2.3 | 20 |
| 5174227 | Extra Silica Gel F2 (C10-C16 Hydrocarbons) | 2017/09/21 | 86 | 50 - 130 | 88 | 80 - 120 | <10 | ug/g | NC | 30 |
| 5174227 | Extra Silica Gel F3 (C16-C34 Hydrocarbons) | 2017/09/21 | NC | 50 - 130 | 94 | 80 - 120 | <50 | ug/g | 1.8 | 30 |
| 5174227 | Extra Silica Gel F4 (C34-C50 Hydrocarbons) | 2017/09/21 | NC | 50 - 130 | 90 | 80 - 120 | <50 | ug/g | NC | 30 |

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) The matrix spike recovery was below the lower control limit. This may be due in part to the reducing environment of the sample. The matrix spike was reanalyzed to confirm result.



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Report Date: 2017/09/21

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Cristina Carriere

Cristina Carriere, Scientific Service Specialist

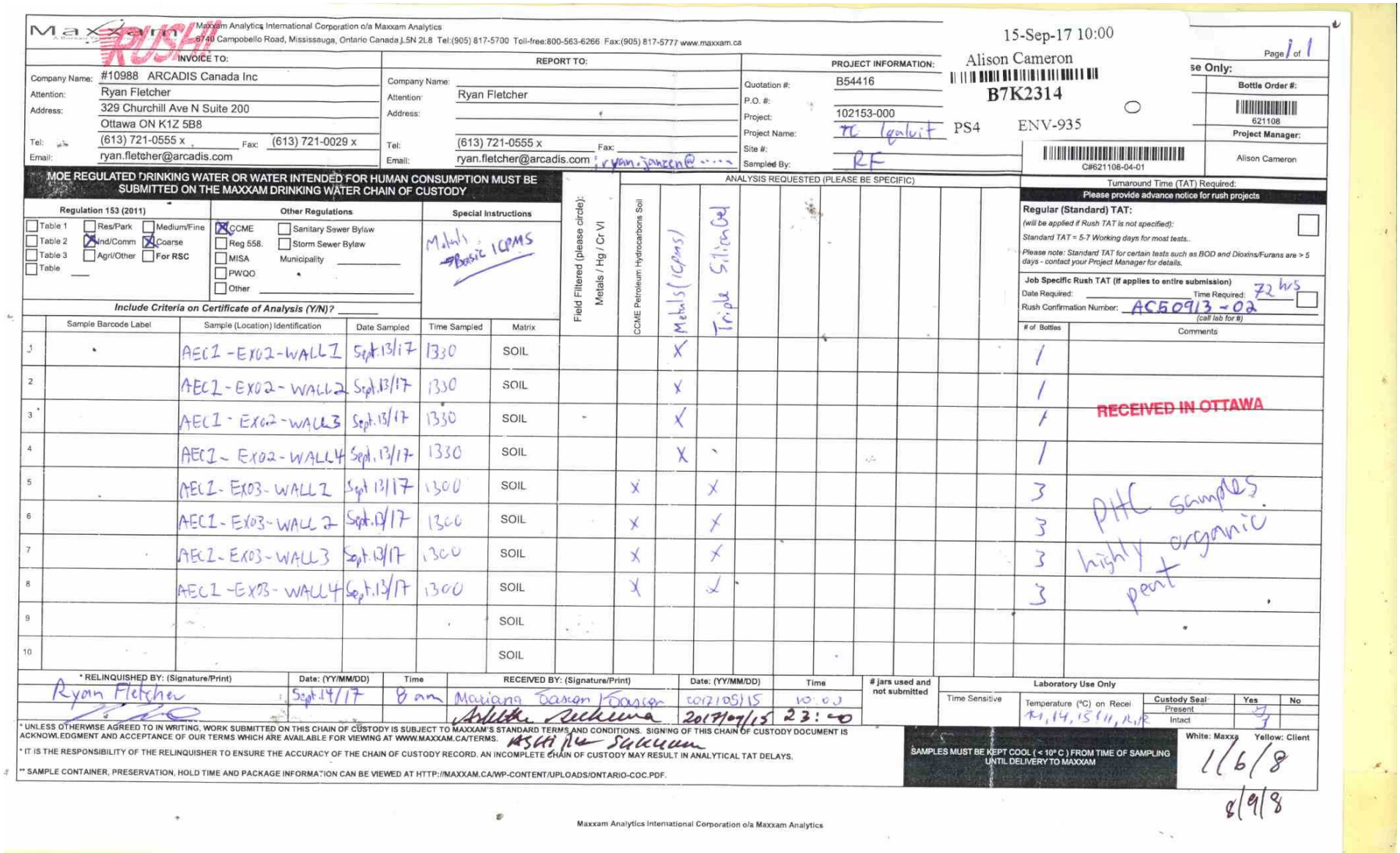
Eva Pranjic

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca



Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.maxxam.ca

RUSH

15-Sep-17 10:00
Alison Cameron
B7K2314
PS4 ENV-935
C#621108-04-01

Page 1 of 1

Use Only:
Bottle Order #: 621108
Project Manager: Alison Cameron

| INVOICE TO: | | REPORT TO: | | PROJECT INFORMATION: | |
|---|---|---|---|---|---|
| Company Name: | #10988 ARCADIS Canada Inc | Company Name: | | Quotation #: | B54416 |
| Attention: | Ryan Fletcher | Attention: | Ryan Fletcher | P.O. #: | |
| Address: | 329 Churchill Ave N Suite 200<br>Ottawa ON K1Z 5B8 | Address: | | Project: | 102153-000 |
| Tel: | (613) 721-0555 x Fax: (613) 721-0029 x | Tel: | (613) 721-0555 x Fax: | Project Name: | TC Iqaluit PS4 |
| Email: | ryan.fletcher@arcadis.com | Email: | ryan.fletcher@arcadis.com ryan.janzen@... | Site #: | |
| | | | | Sampled By: | RF |

**MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY**

**Regulation 153 (2011)**
- ☐ Table 1 ☐ Res/Park ☐ Medium/Fine
- ☐ Table 2 ☒ Ind/Comm ☒ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ For RSC
- ☐ Table ___

**Other Regulations**
- ☒ CCME ☐ Sanitary Sewer Bylaw
- ☐ Reg 558 ☐ Storm Sewer Bylaw
- ☐ MISA Municipality ___
- ☐ PWQO
- ☐ Other ___

**Special Instructions**
Metals - Basic ICPMS

*Include Criteria on Certificate of Analysis (Y/N)?* ___

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

**Regular (Standard) TAT:**
*(will be applied if Rush TAT is not specified):*
*Standard TAT = 5-7 Working days for most tests.*
*Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.*

**Job Specific Rush TAT (if applies to entire submission)**
Date Required: ___ Time Required: 72 hrs
Rush Confirmation Number: AC50913-02 *(call lab for #)*

| | Sample Barcode Label | Sample (Location) Identification | Date Sampled | Time Sampled | Matrix | Field Filtered (please circle): Metals / Hg / Cr VI | CCME Petroleum Hydrocarbons Soil | Metals (ICPMS) | Triple Silicon | # of Bottles | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | AEC1-EX02-WALL1 | Sept.13/17 | 1330 | SOIL | | | X | | 1 | |
| 2 | | AEC1-EX02-WALL2 | Sept.13/17 | 1330 | SOIL | | | X | | 1 | |
| 3 | | AEC1-EX02-WALL3 | Sept.13/17 | 1330 | SOIL | | | X | | 1 | RECEIVED IN OTTAWA |
| 4 | | AEC1-EX02-WALL4 | Sept.13/17 | 1330 | SOIL | | | X | | 1 | |
| 5 | | AEC1-EX03-WALL1 | Sept.13/17 | 1300 | SOIL | | X | | X | 3 | PHC samples |
| 6 | | AEC1-EX03-WALL2 | Sept.13/17 | 1300 | SOIL | | X | | X | 3 | highly organic |
| 7 | | AEC1-EX03-WALL3 | Sept.13/17 | 1300 | SOIL | | X | | X | 3 | peat |
| 8 | | AEC1-EX03-WALL4 | Sept.13/17 | 1300 | SOIL | | X | | X | 3 | |
| 9 | | | | | SOIL | | | | | | |
| 10 | | | | | SOIL | | | | | | |

| * RELINQUISHED BY: (Signature/Print) | Date: (YY/MM/DD) | Time | RECEIVED BY: (Signature/Print) | Date: (YY/MM/DD) | Time | # jars used and not submitted |
|---|---|---|---|---|---|---|
| Ryan Fletcher | Sept.14/17 | 8 am | Mariana Fonseca / Fonseca | 2017/09/15 | 10:00 | |
| | | | | 2017/09/15 | 23:40 | |

**Laboratory Use Only**
Time Sensitive
Temperature (°C) on Recei: 11, 14, 15, 11, 12, 12
Custody Seal Present: Yes ✓ No
Custody Seal Intact: Yes ✓ No

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT HTTP://MAXXAM.CA/WP-CONTENT/UPLOADS/ONTARIO-COC.PDF.

SAMPLES MUST BE KEPT COOL ( < 10° C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

White: Maxxam Yellow: Client

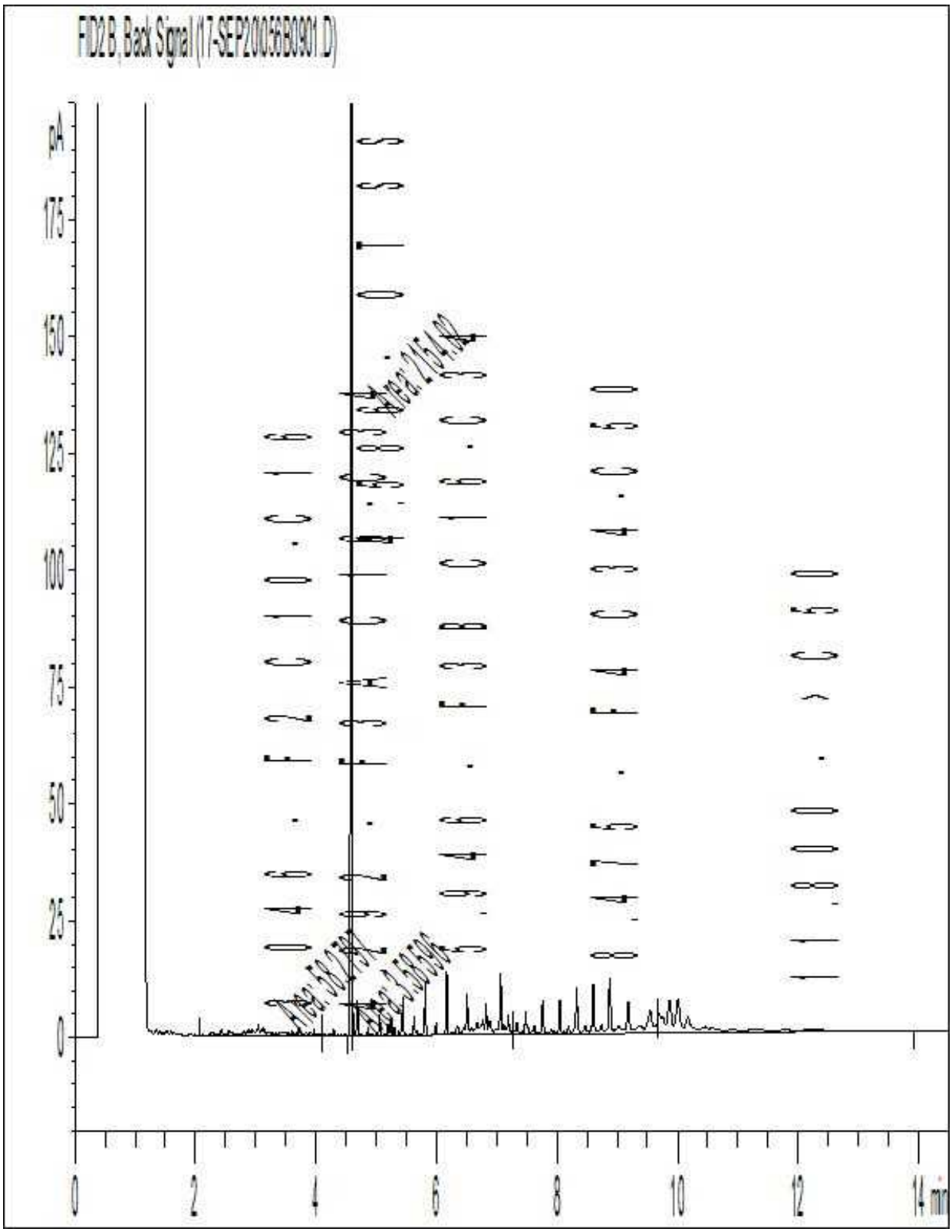
1/6/8
8/9/8

Maxxam Analytics International Corporation o/a Maxxam Analytics

Maxxam Job #: B7K2314
Report Date: 2017/09/21
Maxxam Sample: FDE482

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: AEC1-EX03-WALL1

**F2-F4 PHCs with extra silica gel cleanup Chromatogram**

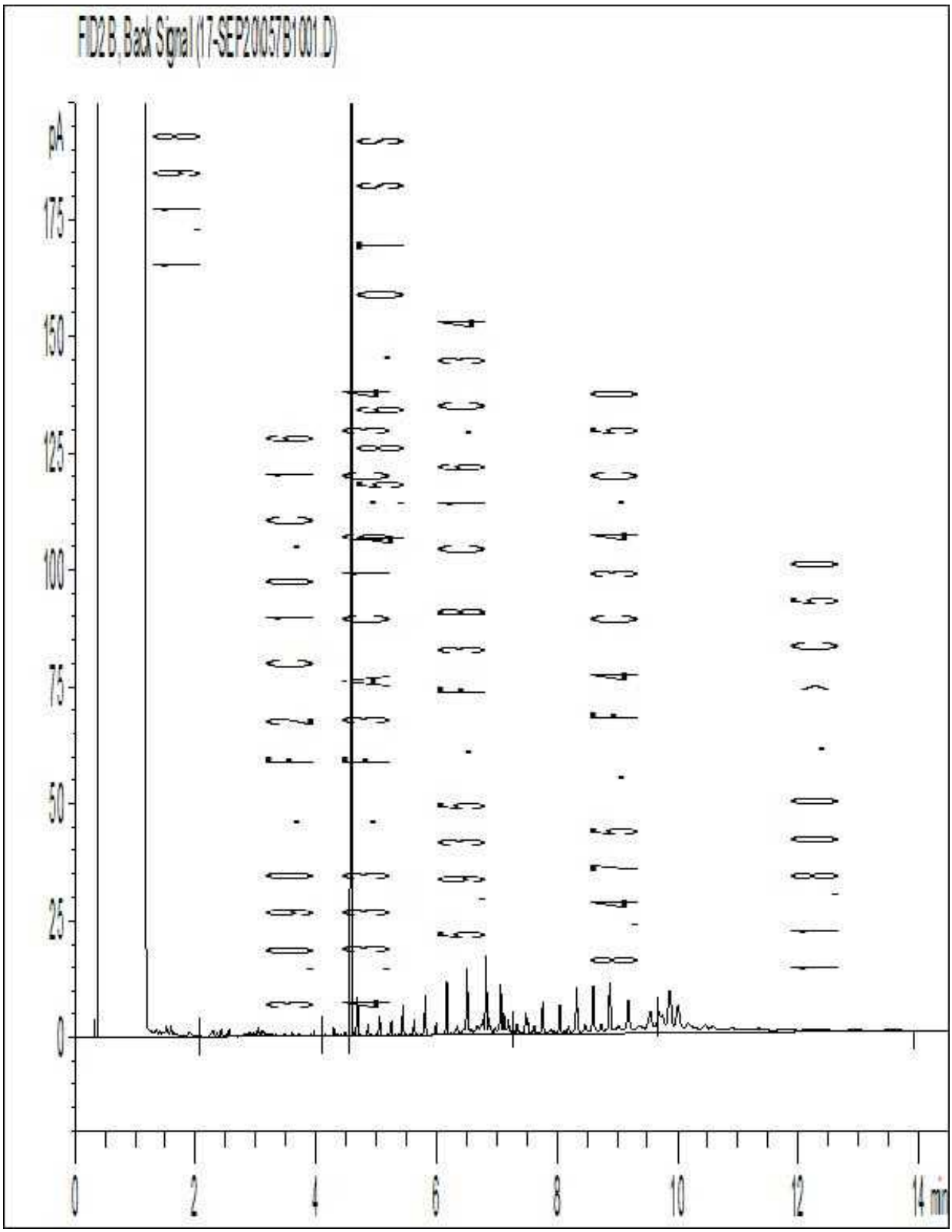



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7K2314
Report Date: 2017/09/21
Maxxam Sample: FDE483

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: AEC1-EX03-WALL2

**F2-F4 PHCs with extra silica gel cleanup Chromatogram**

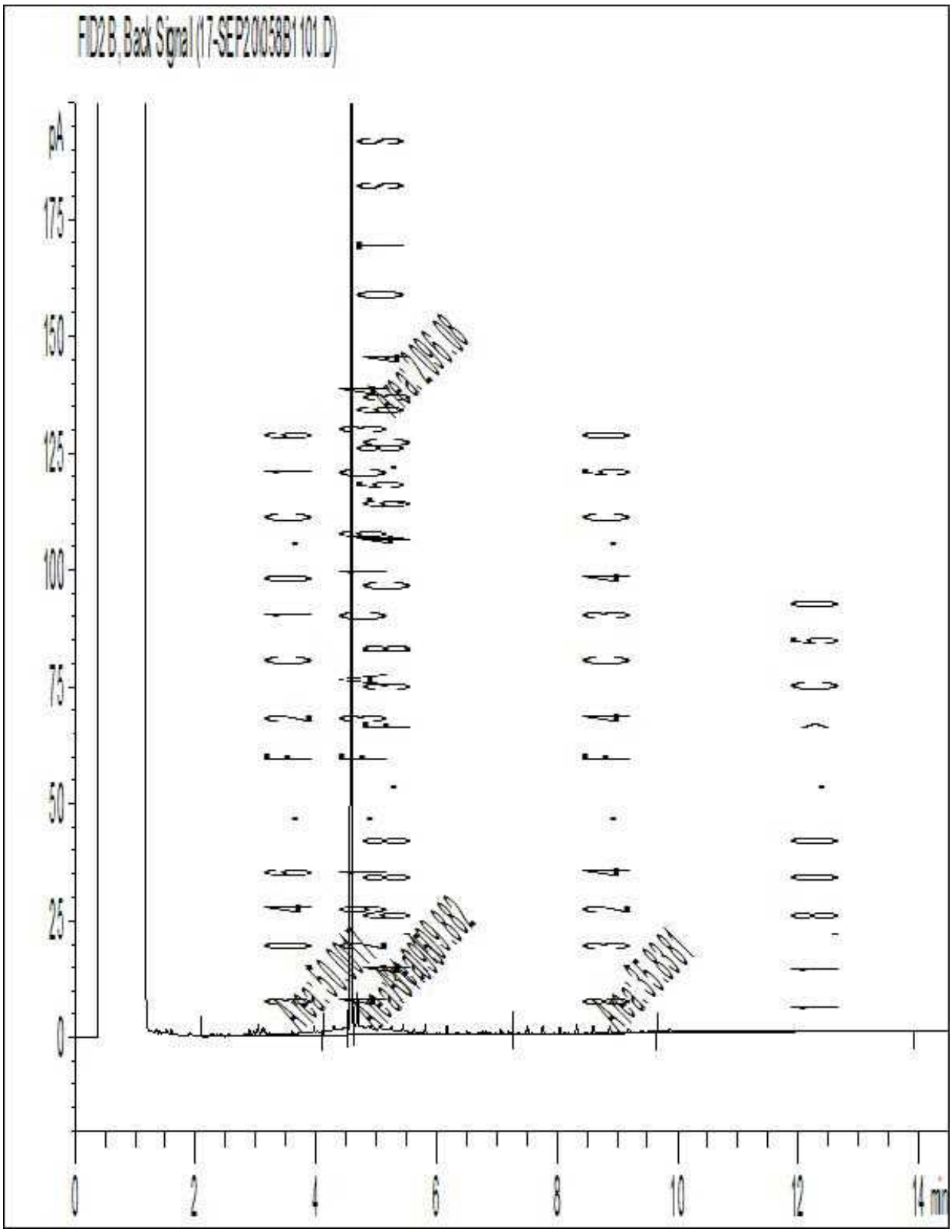



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7K2314
Report Date: 2017/09/21
Maxxam Sample: FDE484

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: AEC1-EX03-WALL3

**F2-F4 PHCs with extra silica gel cleanup Chromatogram**

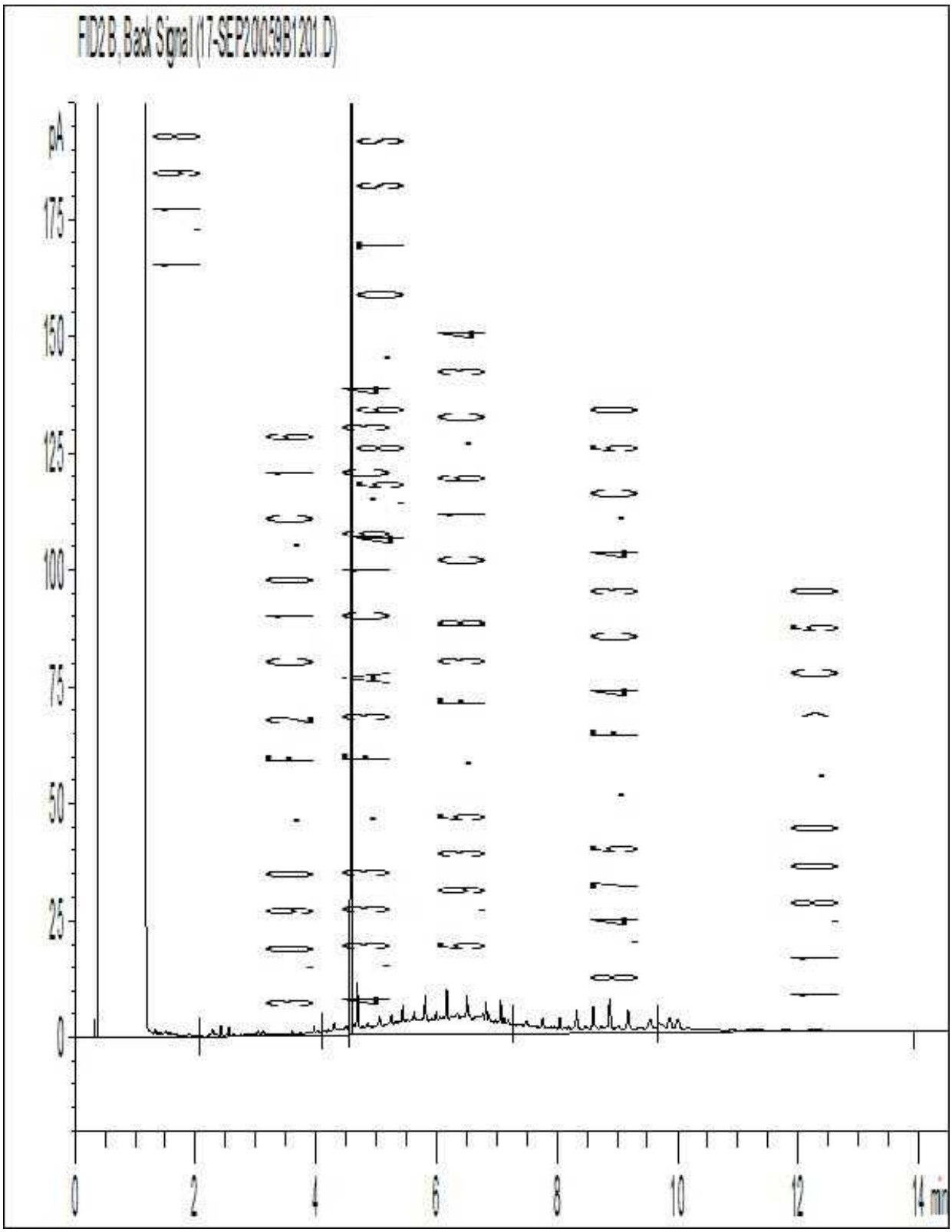



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7K2314
Report Date: 2017/09/21
Maxxam Sample: FDE485

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: AEC1-EX03-WALL4

**F2-F4 PHCs with extra silica gel cleanup Chromatogram**




**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam
A Bureau Veritas Group Company

Your Project #: 102153-000
Site Location: TC IQALUIT
Your C.O.C. #: 621108-05-01

**Attention:Ryan Fletcher**

ARCADIS Canada Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

**Report Date: 2017/09/22**
Report #: R4727508
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B7K2333**
**Received: 2017/09/15, 10:00**

Sample Matrix: Soil
# Samples Received: 6

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Reference |
|---|---|---|---|---|---|
| Methylnaphthalene Sum (1) | 6 | N/A | 2017/09/22 | CAM SOP-00301 | EPA 8270D m |
| Hot Water Extractable Boron (1) | 6 | 2017/09/19 | 2017/09/20 | CAM SOP-00408 | R153 Ana. Prot. 2011 |
| Hexavalent Chromium in Soil by IC (1, 2) | 3 | 2017/09/19 | 2017/09/19 | CAM SOP-00436 | EPA 3060/7199 m |
| Hexavalent Chromium in Soil by IC (1, 2) | 3 | 2017/09/19 | 2017/09/20 | CAM SOP-00436 | EPA 3060/7199 m |
| F2-F4 PHCs with extra silica gel cleanup (1, 3) | 1 | 2017/09/20 | 2017/09/21 | CAM SOP-00316 | CCME CWS m |
| Petroleum Hydrocarbons F2-F4 in Soil (1, 3) | 5 | 2017/09/20 | 2017/09/21 | CAM SOP-00316 | CCME CWS m |
| Strong Acid Leachable Metals by ICPMS (1) | 6 | 2017/09/19 | 2017/09/20 | CAM SOP-00447 | EPA 6020B m |
| Moisture (1) | 6 | N/A | 2017/09/19 | CAM SOP-00445 | Carter 2nd ed 51.2 m |
| PAH Compounds in Soil by GC/MS (SIM) (1) | 6 | 2017/09/20 | 2017/09/21 | CAM SOP-00318 | EPA 8270D m |
| Polychlorinated Biphenyl in Soil (1) | 6 | 2017/09/19 | 2017/09/19 | CAM SOP-00309 | EPA 8082A m |
| Volatile Organic Compounds and F1 PHCs (1) | 6 | N/A | 2017/09/20 | CAM SOP-00230 | EPA 8260 m |

**Remarks:**

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Your Project #: 102153-000
Site Location: TC IQALUIT
Your C.O.C. #: 621108-05-01

**Attention:Ryan Fletcher**

ARCADIS Canada Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

**Report Date: 2017/09/22**
Report #: R4727508
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B7K2333**
**Received: 2017/09/15, 10:00**

(1) This test was performed by Maxxam Analytics Mississauga
(2) Soils are reported on a dry weight basis unless otherwise specified.
(3) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Alison Cameron, Project Manager
Email: ACameron@maxxam.ca
Phone# (613) 274-0573

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B7K2333
Report Date: 2017/09/22

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## CCME VOC F1-F4 (SOIL)

| Maxxam ID | | FDE618 | FDE619 | FDE620 | FDE621 | FDE621 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/13 16:30 | 2017/09/13 16:45 | 2017/09/13 17:00 | 2017/09/13 17:15 | 2017/09/13 17:15 | | |
| COC Number | | 621108-05-01 | 621108-05-01 | 621108-05-01 | 621108-05-01 | 621108-05-01 | | |
| | **UNITS** | **TWA1-SP1** | **TWA1-SP2** | **TWA1-SP3** | **TWA1-SP4** | **TWA1-SP4 Lab-Dup** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | |
| Moisture | % | 14 | 15 | 25 | 13 | | 1.0 | 5171130 |
| **Volatile Organics** | | | | | | | | |
| Acetone (2-Propanone) | ug/g | <0.50 | <0.50 | <0.50 | <0.50 | | 0.50 | 5169353 |
| Benzene | ug/g | <0.0060 | <0.0060 | <0.0060 | <0.0060 | | 0.0060 | 5169353 |
| Bromodichloromethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| Bromoform | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| Bromomethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| Carbon Tetrachloride | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| Chlorobenzene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| Chloroform | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| Dibromochloromethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| 1,2-Dichlorobenzene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| 1,3-Dichlorobenzene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| 1,4-Dichlorobenzene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| Dichlorodifluoromethane (FREON 12) | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| 1,1-Dichloroethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| 1,2-Dichloroethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| 1,1-Dichloroethylene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| cis-1,2-Dichloroethylene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| trans-1,2-Dichloroethylene | ug/g | <0.050 | <0.050 | 0.13 | 0.076 | | 0.050 | 5169353 |
| 1,2-Dichloropropane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| cis-1,3-Dichloropropene | ug/g | <0.030 | <0.030 | <0.030 | <0.030 | | 0.030 | 5169353 |
| trans-1,3-Dichloropropene | ug/g | <0.040 | <0.040 | <0.040 | <0.040 | | 0.040 | 5169353 |
| Ethylbenzene | ug/g | <0.010 | <0.010 | <0.010 | <0.010 | | 0.010 | 5169353 |
| Ethylene Dibromide | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| Hexane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| Methylene Chloride(Dichloromethane) | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| Methyl Isobutyl Ketone | ug/g | <0.50 | <0.50 | <0.50 | <0.50 | | 0.50 | 5169353 |
| Methyl Ethyl Ketone (2-Butanone) | ug/g | <0.50 | <0.50 | <0.50 | <0.50 | | 0.50 | 5169353 |
| Methyl t-butyl ether (MTBE) | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| Styrene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| 1,1,1,2-Tetrachloroethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Maxxam Job #: B7K2333
Report Date: 2017/09/22

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## CCME VOC F1-F4 (SOIL)

| Maxxam ID | | FDE618 | FDE619 | FDE620 | FDE621 | FDE621 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/13 16:30 | 2017/09/13 16:45 | 2017/09/13 17:00 | 2017/09/13 17:15 | 2017/09/13 17:15 | | |
| COC Number | | 621108-05-01 | 621108-05-01 | 621108-05-01 | 621108-05-01 | 621108-05-01 | | |
| | **UNITS** | **TWA1-SP1** | **TWA1-SP2** | **TWA1-SP3** | **TWA1-SP4** | **TWA1-SP4 Lab-Dup** | **RDL** | **QC Batch** |
| 1,1,2,2-Tetrachloroethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| Tetrachloroethylene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| Toluene | ug/g | <0.020 | <0.020 | <0.020 | <0.020 | | 0.020 | 5169353 |
| 1,1,1-Trichloroethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| 1,1,2-Trichloroethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| Trichloroethylene | ug/g | <0.010 | <0.010 | <0.010 | <0.010 | | 0.010 | 5169353 |
| Vinyl Chloride | ug/g | <0.020 | <0.020 | <0.020 | <0.020 | | 0.020 | 5169353 |
| p+m-Xylene | ug/g | <0.020 | <0.020 | <0.020 | <0.020 | | 0.020 | 5169353 |
| o-Xylene | ug/g | <0.020 | <0.020 | <0.020 | <0.020 | | 0.020 | 5169353 |
| Total Xylenes | ug/g | <0.020 | <0.020 | <0.020 | <0.020 | | 0.020 | 5169353 |
| Trichlorofluoromethane (FREON 11) | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | | 0.050 | 5169353 |
| F1 (C6-C10) | ug/g | <10 | <10 | <10 | <10 | | 10 | 5169353 |
| F1 (C6-C10) - BTEX | ug/g | <10 | <10 | <10 | <10 | | 10 | 5169353 |
| **F2-F4 Hydrocarbons** | | | | | | | | |
| F2 (C10-C16 Hydrocarbons) | ug/g | <10 | 14 | | <10 | <10 | 10 | 5173596 |
| F3 (C16-C34 Hydrocarbons) | ug/g | 860 | 1300 | | 270 | 280 | 50 | 5173596 |
| F4 (C34-C50 Hydrocarbons) | ug/g | 280 | 230 | | 88 | 82 | 50 | 5173596 |
| Reached Baseline at C50 | ug/g | No | Yes | | No | No | | 5173596 |
| **Surrogate Recovery (%)** | | | | | | | | |
| o-Terphenyl | % | 101 | 97 | | 97 | 95 | | 5173596 |
| 4-Bromofluorobenzene | % | 95 | 93 | 96 | 93 | | | 5169353 |
| D10-o-Xylene | % | 95 | 99 | 105 | 104 | | | 5169353 |
| D4-1,2-Dichloroethane | % | 103 | 103 | 103 | 103 | | | 5169353 |
| D8-Toluene | % | 102 | 102 | 101 | 101 | | | 5169353 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Maxxam Job #: B7K2333
Report Date: 2017/09/22

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## CCME VOC F1-F4 (SOIL)

| Maxxam ID | | FDE622 | FDE623 | | |
|---|---|---|---|---|---|
| Sampling Date | | 2017/09/13 17:30 | 2017/09/13 | | |
| COC Number | | 621108-05-01 | 621108-05-01 | | |
| | **UNITS** | **TWA1-SP5** | **DUP1** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | |
| Moisture | % | 13 | 13 | 1.0 | 5171130 |
| **Volatile Organics** | | | | | |
| Acetone (2-Propanone) | ug/g | <0.50 | <0.50 | 0.50 | 5169353 |
| Benzene | ug/g | <0.0060 | <0.0060 | 0.0060 | 5169353 |
| Bromodichloromethane | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| Bromoform | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| Bromomethane | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| Carbon Tetrachloride | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| Chlorobenzene | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| Chloroform | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| Dibromochloromethane | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| 1,2-Dichlorobenzene | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| 1,3-Dichlorobenzene | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| 1,4-Dichlorobenzene | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| Dichlorodifluoromethane (FREON 12) | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| 1,1-Dichloroethane | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| 1,2-Dichloroethane | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| 1,1-Dichloroethylene | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| cis-1,2-Dichloroethylene | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| trans-1,2-Dichloroethylene | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| 1,2-Dichloropropane | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| cis-1,3-Dichloropropene | ug/g | <0.030 | <0.030 | 0.030 | 5169353 |
| trans-1,3-Dichloropropene | ug/g | <0.040 | <0.040 | 0.040 | 5169353 |
| Ethylbenzene | ug/g | <0.010 | <0.010 | 0.010 | 5169353 |
| Ethylene Dibromide | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| Hexane | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| Methylene Chloride(Dichloromethane) | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| Methyl Isobutyl Ketone | ug/g | <0.50 | <0.50 | 0.50 | 5169353 |
| Methyl Ethyl Ketone (2-Butanone) | ug/g | <0.50 | <0.50 | 0.50 | 5169353 |
| Methyl t-butyl ether (MTBE) | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| Styrene | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| 1,1,1,2-Tetrachloroethane | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| 1,1,2,2-Tetrachloroethane | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7K2333
Report Date: 2017/09/22

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## CCME VOC F1-F4 (SOIL)

| Maxxam ID | | FDE622 | FDE623 | | |
|---|---|---|---|---|---|
| Sampling Date | | 2017/09/13 17:30 | 2017/09/13 | | |
| COC Number | | 621108-05-01 | 621108-05-01 | | |
| | **UNITS** | **TWA1-SP5** | **DUP1** | **RDL** | **QC Batch** |
| Tetrachloroethylene | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| Toluene | ug/g | <0.020 | <0.020 | 0.020 | 5169353 |
| 1,1,1-Trichloroethane | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| 1,1,2-Trichloroethane | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| Trichloroethylene | ug/g | <0.010 | <0.010 | 0.010 | 5169353 |
| Vinyl Chloride | ug/g | <0.020 | <0.020 | 0.020 | 5169353 |
| p+m-Xylene | ug/g | <0.020 | <0.020 | 0.020 | 5169353 |
| o-Xylene | ug/g | <0.020 | <0.020 | 0.020 | 5169353 |
| Total Xylenes | ug/g | <0.020 | <0.020 | 0.020 | 5169353 |
| Trichlorofluoromethane (FREON 11) | ug/g | <0.050 | <0.050 | 0.050 | 5169353 |
| F1 (C6-C10) | ug/g | <10 | <10 | 10 | 5169353 |
| F1 (C6-C10) - BTEX | ug/g | <10 | <10 | 10 | 5169353 |
| **F2-F4 Hydrocarbons** | | | | | |
| F2 (C10-C16 Hydrocarbons) | ug/g | <10 | 12 | 10 | 5173596 |
| F3 (C16-C34 Hydrocarbons) | ug/g | 640 | 1000 | 50 | 5173596 |
| F4 (C34-C50 Hydrocarbons) | ug/g | 200 | 340 | 50 | 5173596 |
| Reached Baseline at C50 | ug/g | No | No | | 5173596 |
| **Surrogate Recovery (%)** | | | | | |
| o-Terphenyl | % | 101 | 98 | | 5173596 |
| 4-Bromofluorobenzene | % | 96 | 95 | | 5169353 |
| D10-o-Xylene | % | 100 | 97 | | 5169353 |
| D4-1,2-Dichloroethane | % | 103 | 102 | | 5169353 |
| D8-Toluene | % | 102 | 102 | | 5169353 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7K2333
Report Date: 2017/09/22

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## O.REG 153 METALS PACKAGE (SOIL)

| Maxxam ID | | FDE618 | FDE618 | | FDE619 | FDE619 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/13 16:30 | 2017/09/13 16:30 | | 2017/09/13 16:45 | 2017/09/13 16:45 | | |
| COC Number | | 621108-05-01 | 621108-05-01 | | 621108-05-01 | 621108-05-01 | | |
| | **UNITS** | **TWA1-SP1** | **TWA1-SP1 Lab-Dup** | **QC Batch** | **TWA1-SP2** | **TWA1-SP2 Lab-Dup** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | |
| Chromium (VI) | ug/g | <0.2 | <0.2 | 5171970 | <0.2 | | 0.2 | 5170389 |
| **Metals** | | | | | | | | |
| Hot Water Ext. Boron (B) | ug/g | 0.11 | | 5171191 | 0.15 | | 0.050 | 5171191 |
| Acid Extractable Antimony (Sb) | ug/g | 1.2 | | 5171386 | 0.23 | 0.21 | 0.20 | 5171386 |
| Acid Extractable Arsenic (As) | ug/g | 1.4 | | 5171386 | 1.2 | 1.3 | 1.0 | 5171386 |
| Acid Extractable Barium (Ba) | ug/g | 49 | | 5171386 | 40 | 41 | 0.50 | 5171386 |
| Acid Extractable Beryllium (Be) | ug/g | 0.26 | | 5171386 | 0.21 | 0.23 | 0.20 | 5171386 |
| Acid Extractable Boron (B) | ug/g | <5.0 | | 5171386 | <5.0 | <5.0 | 5.0 | 5171386 |
| Acid Extractable Cadmium (Cd) | ug/g | 0.25 | | 5171386 | <0.10 | <0.10 | 0.10 | 5171386 |
| Acid Extractable Chromium (Cr) | ug/g | 26 | | 5171386 | 24 | 23 | 1.0 | 5171386 |
| Acid Extractable Cobalt (Co) | ug/g | 6.7 | | 5171386 | 5.3 | 5.4 | 0.10 | 5171386 |
| Acid Extractable Copper (Cu) | ug/g | 15 | | 5171386 | 9.6 | 10 | 0.50 | 5171386 |
| Acid Extractable Lead (Pb) | ug/g | 77 | | 5171386 | 28 | 25 | 1.0 | 5171386 |
| Acid Extractable Molybdenum (Mo) | ug/g | 1.3 | | 5171386 | 1.1 | 1.1 | 0.50 | 5171386 |
| Acid Extractable Nickel (Ni) | ug/g | 10 | | 5171386 | 9.0 | 8.9 | 0.50 | 5171386 |
| Acid Extractable Selenium (Se) | ug/g | <0.50 | | 5171386 | <0.50 | <0.50 | 0.50 | 5171386 |
| Acid Extractable Silver (Ag) | ug/g | <0.20 | | 5171386 | <0.20 | <0.20 | 0.20 | 5171386 |
| Acid Extractable Thallium (Tl) | ug/g | 0.070 | | 5171386 | 0.056 | 0.059 | 0.050 | 5171386 |
| Acid Extractable Uranium (U) | ug/g | 0.54 | | 5171386 | 0.53 | 0.50 | 0.050 | 5171386 |
| Acid Extractable Vanadium (V) | ug/g | 56 | | 5171386 | 49 | 47 | 5.0 | 5171386 |
| Acid Extractable Zinc (Zn) | ug/g | 130 | | 5171386 | 56 | 58 | 5.0 | 5171386 |
| Acid Extractable Mercury (Hg) | ug/g | <0.050 | | 5171386 | <0.050 | <0.050 | 0.050 | 5171386 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B7K2333
Report Date: 2017/09/22

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## O.REG 153 METALS PACKAGE (SOIL)

| Maxxam ID | | FDE620 | | FDE621 | | FDE622 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/13 17:00 | | 2017/09/13 17:15 | | 2017/09/13 17:30 | | |
| COC Number | | 621108-05-01 | | 621108-05-01 | | 621108-05-01 | | |
| | **UNITS** | **TWA1-SP3** | **QC Batch** | **TWA1-SP4** | **QC Batch** | **TWA1-SP5** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | |
| Chromium (VI) | ug/g | <0.2 | 5171970 | <0.2 | 5170389 | <0.2 | 0.2 | 5171970 |
| **Metals** | | | | | | | | |
| Hot Water Ext. Boron (B) | ug/g | 0.13 | 5171191 | 0.10 | 5171191 | 0.16 | 0.050 | 5171191 |
| Acid Extractable Antimony (Sb) | ug/g | <0.20 | 5171386 | 1.4 | 5171386 | 0.57 | 0.20 | 5171386 |
| Acid Extractable Arsenic (As) | ug/g | <1.0 | 5171386 | 1.3 | 5171386 | 1.6 | 1.0 | 5171386 |
| Acid Extractable Barium (Ba) | ug/g | 32 | 5171386 | 47 | 5171386 | 47 | 0.50 | 5171386 |
| Acid Extractable Beryllium (Be) | ug/g | 0.24 | 5171386 | 0.27 | 5171386 | 0.28 | 0.20 | 5171386 |
| Acid Extractable Boron (B) | ug/g | <5.0 | 5171386 | <5.0 | 5171386 | <5.0 | 5.0 | 5171386 |
| Acid Extractable Cadmium (Cd) | ug/g | 0.10 | 5171386 | <0.10 | 5171386 | 0.22 | 0.10 | 5171386 |
| Acid Extractable Chromium (Cr) | ug/g | 24 | 5171386 | 24 | 5171386 | 26 | 1.0 | 5171386 |
| Acid Extractable Cobalt (Co) | ug/g | 5.2 | 5171386 | 5.5 | 5171386 | 6.5 | 0.10 | 5171386 |
| Acid Extractable Copper (Cu) | ug/g | 10 | 5171386 | 11 | 5171386 | 13 | 0.50 | 5171386 |
| Acid Extractable Lead (Pb) | ug/g | 13 | 5171386 | 34 | 5171386 | 48 | 1.0 | 5171386 |
| Acid Extractable Molybdenum (Mo) | ug/g | 0.75 | 5171386 | 1.3 | 5171386 | 1.4 | 0.50 | 5171386 |
| Acid Extractable Nickel (Ni) | ug/g | 8.2 | 5171386 | 9.3 | 5171386 | 11 | 0.50 | 5171386 |
| Acid Extractable Selenium (Se) | ug/g | <0.50 | 5171386 | <0.50 | 5171386 | <0.50 | 0.50 | 5171386 |
| Acid Extractable Silver (Ag) | ug/g | <0.20 | 5171386 | <0.20 | 5171386 | <0.20 | 0.20 | 5171386 |
| Acid Extractable Thallium (Tl) | ug/g | <0.050 | 5171386 | 0.053 | 5171386 | 0.078 | 0.050 | 5171386 |
| Acid Extractable Uranium (U) | ug/g | 0.65 | 5171386 | 0.55 | 5171386 | 0.65 | 0.050 | 5171386 |
| Acid Extractable Vanadium (V) | ug/g | 58 | 5171386 | 49 | 5171386 | 55 | 5.0 | 5171386 |
| Acid Extractable Zinc (Zn) | ug/g | 54 | 5171386 | 82 | 5171386 | 130 | 5.0 | 5171386 |
| Acid Extractable Mercury (Hg) | ug/g | <0.050 | 5171386 | <0.050 | 5171386 | <0.050 | 0.050 | 5171386 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7K2333
Report Date: 2017/09/22

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## O.REG 153 METALS PACKAGE (SOIL)

| Maxxam ID | | FDE623 | | |
|---|---|---|---|---|
| Sampling Date | | 2017/09/13 | | |
| COC Number | | 621108-05-01 | | |
| | **UNITS** | **DUP1** | **RDL** | **QC Batch** |
| **Inorganics** | | | | |
| Chromium (VI) | ug/g | <0.2 | 0.2 | 5170389 |
| **Metals** | | | | |
| Hot Water Ext. Boron (B) | ug/g | 0.11 | 0.050 | 5171191 |
| Acid Extractable Antimony (Sb) | ug/g | 1.1 | 0.20 | 5171386 |
| Acid Extractable Arsenic (As) | ug/g | 1.5 | 1.0 | 5171386 |
| Acid Extractable Barium (Ba) | ug/g | 50 | 0.50 | 5171386 |
| Acid Extractable Beryllium (Be) | ug/g | 0.24 | 0.20 | 5171386 |
| Acid Extractable Boron (B) | ug/g | <5.0 | 5.0 | 5171386 |
| Acid Extractable Cadmium (Cd) | ug/g | 0.33 | 0.10 | 5171386 |
| Acid Extractable Chromium (Cr) | ug/g | 27 | 1.0 | 5171386 |
| Acid Extractable Cobalt (Co) | ug/g | 6.4 | 0.10 | 5171386 |
| Acid Extractable Copper (Cu) | ug/g | 14 | 0.50 | 5171386 |
| Acid Extractable Lead (Pb) | ug/g | 72 | 1.0 | 5171386 |
| Acid Extractable Molybdenum (Mo) | ug/g | 1.2 | 0.50 | 5171386 |
| Acid Extractable Nickel (Ni) | ug/g | 11 | 0.50 | 5171386 |
| Acid Extractable Selenium (Se) | ug/g | <0.50 | 0.50 | 5171386 |
| Acid Extractable Silver (Ag) | ug/g | <0.20 | 0.20 | 5171386 |
| Acid Extractable Thallium (Tl) | ug/g | 0.069 | 0.050 | 5171386 |
| Acid Extractable Uranium (U) | ug/g | 0.52 | 0.050 | 5171386 |
| Acid Extractable Vanadium (V) | ug/g | 56 | 5.0 | 5171386 |
| Acid Extractable Zinc (Zn) | ug/g | 140 | 5.0 | 5171386 |
| Acid Extractable Mercury (Hg) | ug/g | <0.050 | 0.050 | 5171386 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7K2333
Report Date: 2017/09/22

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## O.REG 153 PAHS (SOIL)

| Maxxam ID | | FDE618 | FDE619 | | FDE620 | | FDE621 | FDE621 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/13 16:30 | 2017/09/13 16:45 | | 2017/09/13 17:00 | | 2017/09/13 17:15 | 2017/09/13 17:15 | | |
| COC Number | | 621108-05-01 | 621108-05-01 | | 621108-05-01 | | 621108-05-01 | 621108-05-01 | | |
| | **UNITS** | **TWA1-SP1** | **TWA1-SP2** | **RDL** | **TWA1-SP3** | **RDL** | **TWA1-SP4** | **TWA1-SP4 Lab-Dup** | **RDL** | **QC Batch** |
| **Calculated Parameters** | | | | | | | | | | |
| Methylnaphthalene, 2-(1-) | ug/g | <0.0071 | 0.015 | 0.0071 | <0.021 | 0.021 | <0.0071 | | 0.0071 | 5167678 |
| **Polyaromatic Hydrocarbons** | | | | | | | | | | |
| Acenaphthene | ug/g | <0.0050 | <0.0050 | 0.0050 | <0.0050 | 0.0050 | <0.0050 | <0.0050 | 0.0050 | 5173545 |
| Acenaphthylene | ug/g | <0.0050 | <0.0050 | 0.0050 | <0.0050 | 0.0050 | <0.0050 | <0.0050 | 0.0050 | 5173545 |
| Anthracene | ug/g | <0.0050 | 0.021 | 0.0050 | <0.0050 | 0.0050 | <0.0050 | <0.0050 | 0.0050 | 5173545 |
| Benzo(a)anthracene | ug/g | 0.0066 | 0.014 | 0.0050 | 0.0052 | 0.0050 | <0.0050 | <0.0050 | 0.0050 | 5173545 |
| Benzo(a)pyrene | ug/g | <0.0050 | <0.0050 | 0.0050 | <0.0050 | 0.0050 | <0.0050 | <0.0050 | 0.0050 | 5173545 |
| Benzo(b/j)fluoranthene | ug/g | 0.0059 | 0.010 | 0.0050 | 0.0069 | 0.0050 | <0.0050 | <0.0050 | 0.0050 | 5173545 |
| Benzo(g,h,i)perylene | ug/g | <0.0050 | <0.0050 | 0.0050 | <0.0050 | 0.0050 | <0.0050 | <0.0050 | 0.0050 | 5173545 |
| Benzo(k)fluoranthene | ug/g | <0.0050 | <0.0050 | 0.0050 | <0.0050 | 0.0050 | <0.0050 | <0.0050 | 0.0050 | 5173545 |
| Chrysene | ug/g | 0.028 | 0.050 | 0.0050 | 0.0080 | 0.0050 | 0.0081 | 0.0089 | 0.0050 | 5173545 |
| Dibenz(a,h)anthracene | ug/g | <0.0050 | <0.0050 | 0.0050 | <0.0050 | 0.0050 | <0.0050 | <0.0050 | 0.0050 | 5173545 |
| Fluoranthene | ug/g | 0.018 | 0.032 | 0.0050 | 0.015 | 0.0050 | <0.0050 | <0.0050 | 0.0050 | 5173545 |
| Fluorene | ug/g | <0.0050 | 0.025 | 0.0050 | <0.0050 | 0.0050 | <0.0050 | <0.0050 | 0.0050 | 5173545 |
| Indeno(1,2,3-cd)pyrene | ug/g | <0.0050 | <0.0050 | 0.0050 | <0.0050 | 0.0050 | <0.0050 | <0.0050 | 0.0050 | 5173545 |
| 1-Methylnaphthalene | ug/g | <0.0050 | 0.0076 | 0.0050 | 0.0084 | 0.0050 | <0.0050 | <0.0050 | 0.0050 | 5173545 |
| 2-Methylnaphthalene | ug/g | <0.0050 | 0.0074 | 0.0050 | <0.020 (1) | 0.020 | <0.0050 | <0.0050 | 0.0050 | 5173545 |
| Naphthalene | ug/g | <0.0050 | <0.0050 | 0.0050 | <0.030 (1) | 0.030 | <0.0050 | <0.0050 | 0.0050 | 5173545 |
| Phenanthrene | ug/g | 0.031 | 0.15 | 0.0050 | 0.010 | 0.0050 | <0.0050 | <0.0050 | 0.0050 | 5173545 |
| Pyrene | ug/g | 0.014 | 0.023 | 0.0050 | 0.020 | 0.0050 | 0.0061 | 0.0070 | 0.0050 | 5173545 |
| **Surrogate Recovery (%)** | | | | | | | | | | |
| D10-Anthracene | % | 99 | 95 | | 96 | | 97 | 100 | | 5173545 |
| D14-Terphenyl (FS) | % | 93 | 99 | | 100 | | 90 | 100 | | 5173545 |
| D8-Acenaphthylene | % | 98 | 104 | | 100 | | 102 | 109 | | 5173545 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
(1) DL was raised due to matrix interference.



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Maxxam Job #: B7K2333
Report Date: 2017/09/22

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## O.REG 153 PAHS (SOIL)

| Maxxam ID | | FDE622 | FDE623 | | |
|---|---|---|---|---|---|
| Sampling Date | | 2017/09/13 17:30 | 2017/09/13 | | |
| COC Number | | 621108-05-01 | 621108-05-01 | | |
| | **UNITS** | **TWA1-SP5** | **DUP1** | **RDL** | **QC Batch** |
| **Calculated Parameters** | | | | | |
| Methylnaphthalene, 2-(1-) | ug/g | 0.017 | 0.012 | 0.0071 | 5167678 |
| **Polyaromatic Hydrocarbons** | | | | | |
| Acenaphthene | ug/g | <0.0050 | <0.0050 | 0.0050 | 5173545 |
| Acenaphthylene | ug/g | <0.0050 | <0.0050 | 0.0050 | 5173545 |
| Anthracene | ug/g | 0.030 | 0.0065 | 0.0050 | 5173545 |
| Benzo(a)anthracene | ug/g | 0.031 | 0.0088 | 0.0050 | 5173545 |
| Benzo(a)pyrene | ug/g | 0.016 | <0.0050 | 0.0050 | 5173545 |
| Benzo(b/j)fluoranthene | ug/g | 0.018 | 0.0084 | 0.0050 | 5173545 |
| Benzo(g,h,i)perylene | ug/g | 0.0067 | <0.0050 | 0.0050 | 5173545 |
| Benzo(k)fluoranthene | ug/g | <0.0050 | <0.0050 | 0.0050 | 5173545 |
| Chrysene | ug/g | 0.051 | 0.036 | 0.0050 | 5173545 |
| Dibenz(a,h)anthracene | ug/g | <0.0050 | <0.0050 | 0.0050 | 5173545 |
| Fluoranthene | ug/g | 0.060 | 0.022 | 0.0050 | 5173545 |
| Fluorene | ug/g | 0.010 | 0.018 | 0.0050 | 5173545 |
| Indeno(1,2,3-cd)pyrene | ug/g | <0.0050 | <0.0050 | 0.0050 | 5173545 |
| 1-Methylnaphthalene | ug/g | 0.0067 | 0.0056 | 0.0050 | 5173545 |
| 2-Methylnaphthalene | ug/g | 0.010 | 0.0068 | 0.0050 | 5173545 |
| Naphthalene | ug/g | 0.0081 | <0.0050 | 0.0050 | 5173545 |
| Phenanthrene | ug/g | 0.17 | 0.14 | 0.0050 | 5173545 |
| Pyrene | ug/g | 0.11 | 0.021 | 0.0050 | 5173545 |
| **Surrogate Recovery (%)** | | | | | |
| D10-Anthracene | % | 95 | 98 | | 5173545 |
| D14-Terphenyl (FS) | % | 94 | 92 | | 5173545 |
| D8-Acenaphthylene | % | 102 | 107 | | 5173545 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7K2333
Report Date: 2017/09/22

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## O.REG 153 PCBS (SOIL)

| Maxxam ID | | FDE618 | FDE619 | FDE620 | FDE621 | FDE622 | FDE623 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/13 16:30 | 2017/09/13 16:45 | 2017/09/13 17:00 | 2017/09/13 17:15 | 2017/09/13 17:30 | 2017/09/13 | | |
| COC Number | | 621108-05-01 | 621108-05-01 | 621108-05-01 | 621108-05-01 | 621108-05-01 | 621108-05-01 | | |
| | **UNITS** | **TWA1-SP1** | **TWA1-SP2** | **TWA1-SP3** | **TWA1-SP4** | **TWA1-SP5** | **DUP1** | **RDL** | **QC Batch** |
| **PCBs** | | | | | | | | | |
| Aroclor 1242 | ug/g | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5171078 |
| Aroclor 1248 | ug/g | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5171078 |
| Aroclor 1254 | ug/g | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5171078 |
| Aroclor 1260 | ug/g | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5171078 |
| Total PCB | ug/g | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5171078 |
| **Surrogate Recovery (%)** | | | | | | | | | |
| Decachlorobiphenyl | % | 80 | 81 | 90 | 77 | 81 | 80 | | 5171078 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7K2333
Report Date: 2017/09/22

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## PETROLEUM HYDROCARBONS (CCME)

| Maxxam ID | | FDE620 | | |
|---|---|---|---|---|
| Sampling Date | | 2017/09/13 17:00 | | |
| COC Number | | 621108-05-01 | | |
| | **UNITS** | **TWA1-SP3** | **RDL** | **QC Batch** |
| **F2-F4 Hydrocarbons** | | | | |
| Extra Silica Gel F2 (C10-C16 Hydrocarbons) | ug/g | 760 | 10 | 5174227 |
| Extra Silica Gel F3 (C16-C34 Hydrocarbons) | ug/g | 1100 | 50 | 5174227 |
| Extra Silica Gel F4 (C34-C50 Hydrocarbons) | ug/g | 650 | 50 | 5174227 |
| Extra Silica Gel Reached Baseline at C50 | ug/g | Yes | | 5174227 |
| **Surrogate Recovery (%)** | | | | |
| Extra Silica Gel o-Terphenyl | % | 92 | | 5174227 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Report Date: 2017/09/22

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** FDE618
**Sample ID:** TWA1-SP1
**Matrix:** Soil

**Collected:** 2017/09/13
**Shipped:**
**Received:** 2017/09/15

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | CALC | 5167678 | N/A | 2017/09/22 | Automated Statchk |
| Hot Water Extractable Boron | ICP | 5171191 | 2017/09/19 | 2017/09/20 | Suban Kanapathippllai |
| Hexavalent Chromium in Soil by IC | IC/SPEC | 5171970 | 2017/09/19 | 2017/09/20 | Sally Coughlin |
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5173596 | 2017/09/20 | 2017/09/21 | Zhiyue (Frank) Zhu |
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5171386 | 2017/09/19 | 2017/09/20 | Daniel Teclu |
| Moisture | BAL | 5171130 | N/A | 2017/09/19 | Chun Yan |
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5173545 | 2017/09/20 | 2017/09/21 | Mitesh Raj |
| Polychlorinated Biphenyl in Soil | GC/ECD | 5171078 | 2017/09/19 | 2017/09/19 | Sarah Huang |
| Volatile Organic Compounds and F1 PHCs | GC/MS | 5169353 | N/A | 2017/09/20 | Manpreet Sarao |

**Maxxam ID:** FDE618 Dup
**Sample ID:** TWA1-SP1
**Matrix:** Soil

**Collected:** 2017/09/13
**Shipped:**
**Received:** 2017/09/15

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hexavalent Chromium in Soil by IC | IC/SPEC | 5171970 | 2017/09/19 | 2017/09/20 | Sally Coughlin |

**Maxxam ID:** FDE619
**Sample ID:** TWA1-SP2
**Matrix:** Soil

**Collected:** 2017/09/13
**Shipped:**
**Received:** 2017/09/15

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | CALC | 5167678 | N/A | 2017/09/22 | Automated Statchk |
| Hot Water Extractable Boron | ICP | 5171191 | 2017/09/19 | 2017/09/20 | Suban Kanapathippllai |
| Hexavalent Chromium in Soil by IC | IC/SPEC | 5170389 | 2017/09/19 | 2017/09/19 | Sally Coughlin |
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5173596 | 2017/09/20 | 2017/09/21 | Zhiyue (Frank) Zhu |
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5171386 | 2017/09/19 | 2017/09/20 | Daniel Teclu |
| Moisture | BAL | 5171130 | N/A | 2017/09/19 | Chun Yan |
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5173545 | 2017/09/20 | 2017/09/21 | Mitesh Raj |
| Polychlorinated Biphenyl in Soil | GC/ECD | 5171078 | 2017/09/19 | 2017/09/19 | Sarah Huang |
| Volatile Organic Compounds and F1 PHCs | GC/MS | 5169353 | N/A | 2017/09/20 | Manpreet Sarao |

**Maxxam ID:** FDE619 Dup
**Sample ID:** TWA1-SP2
**Matrix:** Soil

**Collected:** 2017/09/13
**Shipped:**
**Received:** 2017/09/15

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5171386 | 2017/09/19 | 2017/09/20 | Daniel Teclu |

**Maxxam ID:** FDE620
**Sample ID:** TWA1-SP3
**Matrix:** Soil

**Collected:** 2017/09/13
**Shipped:**
**Received:** 2017/09/15

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | CALC | 5167678 | N/A | 2017/09/22 | Automated Statchk |



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Report Date: 2017/09/22

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** FDE620
**Sample ID:** TWA1-SP3
**Matrix:** Soil

**Collected:** 2017/09/13
**Shipped:**
**Received:** 2017/09/15

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hot Water Extractable Boron | ICP | 5171191 | 2017/09/19 | 2017/09/20 | Suban Kanapathippllai |
| Hexavalent Chromium in Soil by IC | IC/SPEC | 5171970 | 2017/09/19 | 2017/09/20 | Sally Coughlin |
| F2-F4 PHCs with extra silica gel cleanup | GC/FID | 5174227 | 2017/09/20 | 2017/09/21 | Jeevaraj Jeevaratrnam |
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5171386 | 2017/09/19 | 2017/09/20 | Daniel Teclu |
| Moisture | BAL | 5171130 | N/A | 2017/09/19 | Chun Yan |
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5173545 | 2017/09/20 | 2017/09/21 | Mitesh Raj |
| Polychlorinated Biphenyl in Soil | GC/ECD | 5171078 | 2017/09/19 | 2017/09/19 | Sarah Huang |
| Volatile Organic Compounds and F1 PHCs | GC/MS | 5169353 | N/A | 2017/09/20 | Manpreet Sarao |

**Maxxam ID:** FDE621
**Sample ID:** TWA1-SP4
**Matrix:** Soil

**Collected:** 2017/09/13
**Shipped:**
**Received:** 2017/09/15

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | CALC | 5167678 | N/A | 2017/09/22 | Automated Statchk |
| Hot Water Extractable Boron | ICP | 5171191 | 2017/09/19 | 2017/09/20 | Suban Kanapathippllai |
| Hexavalent Chromium in Soil by IC | IC/SPEC | 5170389 | 2017/09/19 | 2017/09/19 | Sally Coughlin |
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5173596 | 2017/09/20 | 2017/09/21 | Zhiyue (Frank) Zhu |
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5171386 | 2017/09/19 | 2017/09/20 | Daniel Teclu |
| Moisture | BAL | 5171130 | N/A | 2017/09/19 | Chun Yan |
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5173545 | 2017/09/20 | 2017/09/21 | Mitesh Raj |
| Polychlorinated Biphenyl in Soil | GC/ECD | 5171078 | 2017/09/19 | 2017/09/19 | Sarah Huang |
| Volatile Organic Compounds and F1 PHCs | GC/MS | 5169353 | N/A | 2017/09/20 | Manpreet Sarao |

**Maxxam ID:** FDE621 Dup
**Sample ID:** TWA1-SP4
**Matrix:** Soil

**Collected:** 2017/09/13
**Shipped:**
**Received:** 2017/09/15

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5173596 | 2017/09/20 | 2017/09/21 | Zhiyue (Frank) Zhu |
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5173545 | 2017/09/20 | 2017/09/21 | Mitesh Raj |

**Maxxam ID:** FDE622
**Sample ID:** TWA1-SP5
**Matrix:** Soil

**Collected:** 2017/09/13
**Shipped:**
**Received:** 2017/09/15

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | CALC | 5167678 | N/A | 2017/09/22 | Automated Statchk |
| Hot Water Extractable Boron | ICP | 5171191 | 2017/09/19 | 2017/09/20 | Suban Kanapathippllai |
| Hexavalent Chromium in Soil by IC | IC/SPEC | 5171970 | 2017/09/19 | 2017/09/20 | Sally Coughlin |
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5173596 | 2017/09/20 | 2017/09/21 | Zhiyue (Frank) Zhu |
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5171386 | 2017/09/19 | 2017/09/20 | Daniel Teclu |
| Moisture | BAL | 5171130 | N/A | 2017/09/19 | Chun Yan |
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5173545 | 2017/09/20 | 2017/09/21 | Mitesh Raj |



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Maxxam Job #: B7K2333
Report Date: 2017/09/22

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** FDE622
**Sample ID:** TWA1-SP5
**Matrix:** Soil

**Collected:** 2017/09/13
**Shipped:**
**Received:** 2017/09/15

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Polychlorinated Biphenyl in Soil | GC/ECD | 5171078 | 2017/09/19 | 2017/09/19 | Sarah Huang |
| Volatile Organic Compounds and F1 PHCs | GC/MS | 5169353 | N/A | 2017/09/20 | Manpreet Sarao |

**Maxxam ID:** FDE623
**Sample ID:** DUP1
**Matrix:** Soil

**Collected:** 2017/09/13
**Shipped:**
**Received:** 2017/09/15

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | CALC | 5167678 | N/A | 2017/09/22 | Automated Statchk |
| Hot Water Extractable Boron | ICP | 5171191 | 2017/09/19 | 2017/09/20 | Suban Kanapathippllai |
| Hexavalent Chromium in Soil by IC | IC/SPEC | 5170389 | 2017/09/19 | 2017/09/19 | Sally Coughlin |
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5173596 | 2017/09/20 | 2017/09/21 | Zhiyue (Frank) Zhu |
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5171386 | 2017/09/19 | 2017/09/20 | Daniel Teclu |
| Moisture | BAL | 5171130 | N/A | 2017/09/19 | Chun Yan |
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5173545 | 2017/09/20 | 2017/09/21 | Mitesh Raj |
| Polychlorinated Biphenyl in Soil | GC/ECD | 5171078 | 2017/09/19 | 2017/09/19 | Sarah Huang |
| Volatile Organic Compounds and F1 PHCs | GC/MS | 5169353 | N/A | 2017/09/20 | Manpreet Sarao |



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Report Date: 2017/09/22

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Sampler Initials: RF

## GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

| | |
|---|---|
| Package 1 | 14.3°C |
| Package 2 | 11.7°C |

Sample FDE620 [TWA1-SP3] : F24 Analysis: At the request of the client the sample was treated with an additional portion of silica gel that is above the maximum amount prescribed in the reference method.
F2-F4 Analysis: At the request of the client the sample was treated with an additional portion of silica gel that is above the maximum amount prescribed in the reference method.

**Results relate only to the items tested.**



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Maxxam Job #: B7K2333
Report Date: 2017/09/22

## QUALITY ASSURANCE REPORT

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5169353 | 4-Bromofluorobenzene | 2017/09/20 | 98 | 60 - 140 | 100 | 60 - 140 | 96 | % | | |
| 5169353 | D10-o-Xylene | 2017/09/20 | 100 | 60 - 130 | 90 | 60 - 130 | 95 | % | | |
| 5169353 | D4-1,2-Dichloroethane | 2017/09/20 | 101 | 60 - 140 | 105 | 60 - 140 | 102 | % | | |
| 5169353 | D8-Toluene | 2017/09/20 | 103 | 60 - 140 | 102 | 60 - 140 | 102 | % | | |
| 5171078 | Decachlorobiphenyl | 2017/09/19 | 98 | 60 - 130 | 98 | 60 - 130 | 91 | % | | |
| 5173545 | D10-Anthracene | 2017/09/21 | 89 | 50 - 130 | 100 | 50 - 130 | 101 | % | | |
| 5173545 | D14-Terphenyl (FS) | 2017/09/21 | 94 | 50 - 130 | 93 | 50 - 130 | 93 | % | | |
| 5173545 | D8-Acenaphthylene | 2017/09/21 | 98 | 50 - 130 | 98 | 50 - 130 | 93 | % | | |
| 5173596 | o-Terphenyl | 2017/09/21 | 84 | 60 - 130 | 88 | 60 - 130 | 101 | % | | |
| 5174227 | Extra Silica Gel o-Terphenyl | 2017/09/21 | 88 | 60 - 130 | 90 | 60 - 130 | 96 | % | | |
| 5169353 | 1,1,1,2-Tetrachloroethane | 2017/09/20 | 96 | 60 - 140 | 99 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | 1,1,1-Trichloroethane | 2017/09/20 | 87 | 60 - 140 | 89 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | 1,1,2,2-Tetrachloroethane | 2017/09/20 | 94 | 60 - 140 | 101 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | 1,1,2-Trichloroethane | 2017/09/20 | 96 | 60 - 140 | 101 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | 1,1-Dichloroethane | 2017/09/20 | 91 | 60 - 140 | 95 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | 1,1-Dichloroethylene | 2017/09/20 | 97 | 60 - 140 | 100 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | 1,2-Dichlorobenzene | 2017/09/20 | 91 | 60 - 140 | 93 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | 1,2-Dichloroethane | 2017/09/20 | 86 | 60 - 140 | 92 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | 1,2-Dichloropropane | 2017/09/20 | 84 | 60 - 140 | 88 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | 1,3-Dichlorobenzene | 2017/09/20 | 94 | 60 - 140 | 98 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | 1,4-Dichlorobenzene | 2017/09/20 | 96 | 60 - 140 | 101 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | Acetone (2-Propanone) | 2017/09/20 | 80 | 60 - 140 | 91 | 60 - 140 | <0.50 | ug/g | | |
| 5169353 | Benzene | 2017/09/20 | 90 | 60 - 140 | 93 | 60 - 130 | <0.0060 | ug/g | NC | 50 |
| 5169353 | Bromodichloromethane | 2017/09/20 | 86 | 60 - 140 | 91 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | Bromoform | 2017/09/20 | 97 | 60 - 140 | 104 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | Bromomethane | 2017/09/20 | 89 | 60 - 140 | 91 | 60 - 140 | <0.050 | ug/g | | |
| 5169353 | Carbon Tetrachloride | 2017/09/20 | 88 | 60 - 140 | 90 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | Chlorobenzene | 2017/09/20 | 89 | 60 - 140 | 92 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | Chloroform | 2017/09/20 | 86 | 60 - 140 | 89 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | cis-1,2-Dichloroethylene | 2017/09/20 | 87 | 60 - 140 | 91 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | cis-1,3-Dichloropropene | 2017/09/20 | 76 | 60 - 140 | 77 | 60 - 130 | <0.030 | ug/g | | |



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Maxxam Job #: B7K2333
Report Date: 2017/09/22

## QUALITY ASSURANCE REPORT(CONT'D)

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5169353 | Dibromochloromethane | 2017/09/20 | 96 | 60 - 140 | 101 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | Dichlorodifluoromethane (FREON 12) | 2017/09/20 | 95 | 60 - 140 | 98 | 60 - 140 | <0.050 | ug/g | | |
| 5169353 | Ethylbenzene | 2017/09/20 | 89 | 60 - 140 | 92 | 60 - 130 | <0.010 | ug/g | NC | 50 |
| 5169353 | Ethylene Dibromide | 2017/09/20 | 95 | 60 - 140 | 102 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | F1 (C6-C10) - BTEX | 2017/09/20 | | | | | <10 | ug/g | NC | 30 |
| 5169353 | F1 (C6-C10) | 2017/09/20 | 106 | 60 - 140 | 105 | 80 - 120 | <10 | ug/g | NC | 30 |
| 5169353 | Hexane | 2017/09/20 | 90 | 60 - 140 | 92 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | Methyl Ethyl Ketone (2-Butanone) | 2017/09/20 | 82 | 60 - 140 | 92 | 60 - 140 | <0.50 | ug/g | | |
| 5169353 | Methyl Isobutyl Ketone | 2017/09/20 | 84 | 60 - 140 | 93 | 60 - 130 | <0.50 | ug/g | | |
| 5169353 | Methyl t-butyl ether (MTBE) | 2017/09/20 | 86 | 60 - 140 | 89 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | Methylene Chloride(Dichloromethane) | 2017/09/20 | 87 | 60 - 140 | 92 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | o-Xylene | 2017/09/20 | 89 | 60 - 140 | 91 | 60 - 130 | <0.020 | ug/g | NC | 50 |
| 5169353 | p+m-Xylene | 2017/09/20 | 89 | 60 - 140 | 92 | 60 - 130 | <0.020 | ug/g | NC | 50 |
| 5169353 | Styrene | 2017/09/20 | 87 | 60 - 140 | 91 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | Tetrachloroethylene | 2017/09/20 | 88 | 60 - 140 | 90 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | Toluene | 2017/09/20 | 85 | 60 - 140 | 88 | 60 - 130 | <0.020 | ug/g | NC | 50 |
| 5169353 | Total Xylenes | 2017/09/20 | | | | | <0.020 | ug/g | NC | 50 |
| 5169353 | trans-1,2-Dichloroethylene | 2017/09/20 | 86 | 60 - 140 | 89 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | trans-1,3-Dichloropropene | 2017/09/20 | 81 | 60 - 140 | 81 | 60 - 130 | <0.040 | ug/g | | |
| 5169353 | Trichloroethylene | 2017/09/20 | 85 | 60 - 140 | 88 | 60 - 130 | <0.010 | ug/g | | |
| 5169353 | Trichlorofluoromethane (FREON 11) | 2017/09/20 | 95 | 60 - 140 | 97 | 60 - 130 | <0.050 | ug/g | | |
| 5169353 | Vinyl Chloride | 2017/09/20 | 91 | 60 - 140 | 96 | 60 - 130 | <0.020 | ug/g | | |
| 5170389 | Chromium (VI) | 2017/09/19 | 75 | 75 - 125 | 85 | 80 - 120 | <0.2 | ug/g | NC | 35 |
| 5171078 | Aroclor 1242 | 2017/09/19 | | | | | <0.010 | ug/g | NC | 50 |
| 5171078 | Aroclor 1248 | 2017/09/19 | | | | | <0.010 | ug/g | NC | 50 |
| 5171078 | Aroclor 1254 | 2017/09/19 | | | | | <0.010 | ug/g | NC | 50 |
| 5171078 | Aroclor 1260 | 2017/09/19 | 94 | 60 - 130 | 102 | 60 - 130 | <0.010 | ug/g | NC | 50 |
| 5171078 | Total PCB | 2017/09/19 | 94 | 60 - 130 | 102 | 60 - 130 | <0.010 | ug/g | NC | 50 |
| 5171130 | Moisture | 2017/09/19 | | | | | | | 1.0 | 20 |
| 5171191 | Hot Water Ext. Boron (B) | 2017/09/20 | 106 | 75 - 125 | 103 | 75 - 125 | <0.050 | ug/g | 1.1 | 40 |
| 5171386 | Acid Extractable Antimony (Sb) | 2017/09/20 | 95 | 75 - 125 | 99 | 80 - 120 | <0.20 | ug/g | 10 | 30 |



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## QUALITY ASSURANCE REPORT(CONT'D)



| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5171386 | Acid Extractable Arsenic (As) | 2017/09/20 | 102 | 75 - 125 | 102 | 80 - 120 | <1.0 | ug/g | 8.7 | 30 |
| 5171386 | Acid Extractable Barium (Ba) | 2017/09/20 | NC | 75 - 125 | 103 | 80 - 120 | <0.50 | ug/g | 3.0 | 30 |
| 5171386 | Acid Extractable Beryllium (Be) | 2017/09/20 | 95 | 75 - 125 | 95 | 80 - 120 | <0.20 | ug/g | 10 | 30 |
| 5171386 | Acid Extractable Boron (B) | 2017/09/20 | 90 | 75 - 125 | 96 | 80 - 120 | <5.0 | ug/g | NC | 30 |
| 5171386 | Acid Extractable Cadmium (Cd) | 2017/09/20 | 99 | 75 - 125 | 99 | 80 - 120 | <0.10 | ug/g | NC | 30 |
| 5171386 | Acid Extractable Chromium (Cr) | 2017/09/20 | 104 | 75 - 125 | 103 | 80 - 120 | <1.0 | ug/g | 4.4 | 30 |
| 5171386 | Acid Extractable Cobalt (Co) | 2017/09/20 | 100 | 75 - 125 | 102 | 80 - 120 | <0.10 | ug/g | 1.1 | 30 |
| 5171386 | Acid Extractable Copper (Cu) | 2017/09/20 | 103 | 75 - 125 | 104 | 80 - 120 | <0.50 | ug/g | 6.1 | 30 |
| 5171386 | Acid Extractable Lead (Pb) | 2017/09/20 | NC | 75 - 125 | 101 | 80 - 120 | <1.0 | ug/g | 8.8 | 30 |
| 5171386 | Acid Extractable Mercury (Hg) | 2017/09/20 | 98 | 75 - 125 | 102 | 80 - 120 | <0.050 | ug/g | NC | 30 |
| 5171386 | Acid Extractable Molybdenum (Mo) | 2017/09/20 | 101 | 75 - 125 | 100 | 80 - 120 | <0.50 | ug/g | 2.0 | 30 |
| 5171386 | Acid Extractable Nickel (Ni) | 2017/09/20 | 103 | 75 - 125 | 101 | 80 - 120 | <0.50 | ug/g | 0.82 | 30 |
| 5171386 | Acid Extractable Selenium (Se) | 2017/09/20 | 100 | 75 - 125 | 102 | 80 - 120 | <0.50 | ug/g | NC | 30 |
| 5171386 | Acid Extractable Silver (Ag) | 2017/09/20 | 101 | 75 - 125 | 99 | 80 - 120 | <0.20 | ug/g | NC | 30 |
| 5171386 | Acid Extractable Thallium (Tl) | 2017/09/20 | 98 | 75 - 125 | 100 | 80 - 120 | <0.050 | ug/g | 5.7 | 30 |
| 5171386 | Acid Extractable Uranium (U) | 2017/09/20 | 98 | 75 - 125 | 101 | 80 - 120 | <0.050 | ug/g | 5.4 | 30 |
| 5171386 | Acid Extractable Vanadium (V) | 2017/09/20 | NC | 75 - 125 | 104 | 80 - 120 | <5.0 | ug/g | 4.4 | 30 |
| 5171386 | Acid Extractable Zinc (Zn) | 2017/09/20 | NC | 75 - 125 | 103 | 80 - 120 | <5.0 | ug/g | 4.0 | 30 |
| 5171970 | Chromium (VI) | 2017/09/20 | 57 (1) | 75 - 125 | 84 | 80 - 120 | <0.2 | ug/g | NC | 35 |
| 5173545 | 1-Methylnaphthalene | 2017/09/21 | 99 | 50 - 130 | 105 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5173545 | 2-Methylnaphthalene | 2017/09/21 | 91 | 50 - 130 | 94 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5173545 | Acenaphthene | 2017/09/21 | 96 | 50 - 130 | 100 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5173545 | Acenaphthylene | 2017/09/21 | 92 | 50 - 130 | 93 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5173545 | Anthracene | 2017/09/21 | 86 | 50 - 130 | 92 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5173545 | Benzo(a)anthracene | 2017/09/21 | 92 | 50 - 130 | 93 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5173545 | Benzo(a)pyrene | 2017/09/21 | 93 | 50 - 130 | 95 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5173545 | Benzo(b/j)fluoranthene | 2017/09/21 | 89 | 50 - 130 | 94 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5173545 | Benzo(g,h,i)perylene | 2017/09/21 | 99 | 50 - 130 | 98 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5173545 | Benzo(k)fluoranthene | 2017/09/21 | 86 | 50 - 130 | 89 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5173545 | Chrysene | 2017/09/21 | 92 | 50 - 130 | 94 | 50 - 130 | <0.0050 | ug/g | 9.3 | 40 |
| 5173545 | Dibenz(a,h)anthracene | 2017/09/21 | 101 | 50 - 130 | 94 | 50 - 130 | <0.0050 | ug/g | NC | 40 |

Maxxam
A Bureau Veritas Group Company

Maxxam Job #: B7K2333
Report Date: 2017/09/22

## QUALITY ASSURANCE REPORT(CONT'D)

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5173545 | Fluoranthene | 2017/09/21 | 99 | 50 - 130 | 96 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5173545 | Fluorene | 2017/09/21 | 89 | 50 - 130 | 99 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5173545 | Indeno(1,2,3-cd)pyrene | 2017/09/21 | 102 | 50 - 130 | 99 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5173545 | Naphthalene | 2017/09/21 | 86 | 50 - 130 | 93 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5173545 | Phenanthrene | 2017/09/21 | 96 | 50 - 130 | 97 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5173545 | Pyrene | 2017/09/21 | 100 | 50 - 130 | 96 | 50 - 130 | <0.0050 | ug/g | 13 | 40 |
| 5173596 | F2 (C10-C16 Hydrocarbons) | 2017/09/21 | 86 | 50 - 130 | 91 | 80 - 120 | <10 | ug/g | NC | 30 |
| 5173596 | F3 (C16-C34 Hydrocarbons) | 2017/09/21 | NC | 50 - 130 | 92 | 80 - 120 | <50 | ug/g | 3.4 | 30 |
| 5173596 | F4 (C34-C50 Hydrocarbons) | 2017/09/21 | 84 | 50 - 130 | 89 | 80 - 120 | <50 | ug/g | 7.1 | 30 |
| 5174227 | Extra Silica Gel F2 (C10-C16 Hydrocarbons) | 2017/09/21 | 86 | 50 - 130 | 88 | 80 - 120 | <10 | ug/g | NC | 30 |
| 5174227 | Extra Silica Gel F3 (C16-C34 Hydrocarbons) | 2017/09/21 | NC | 50 - 130 | 94 | 80 - 120 | <50 | ug/g | 1.8 | 30 |
| 5174227 | Extra Silica Gel F4 (C34-C50 Hydrocarbons) | 2017/09/21 | NC | 50 - 130 | 90 | 80 - 120 | <50 | ug/g | NC | 30 |

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) The matrix spike recovery was below the lower control limit. This may be due in part to the reducing environment of the sample. The matrix spike was reanalyzed to confirm result.



Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Maxxam Job #: B7K2333
Report Date: 2017/09/22

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Cristina Carriere

Cristina Carriere, Scientific Service Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.maxxam.ca

15-Sep-17 10:00
Alison Cameron
B7K2333
PS4 ENV-667

Page 1 of 1

Use Only:
Bottle Order #: 621108
Project Manager: Alison Cameron
C#621108-05-01

| INVOICE TO: | | REPORT TO: | | PROJECT INFORMATION | |
|---|---|---|---|---|---|
| Company Name: | #10988 ARCADIS Canada Inc | Company Name: | | Quotation #: | B54416 |
| Attention: | Ryan Fletcher | Attention: | Ryan Fletcher | P.O. #: | |
| Address: | 329 Churchill Ave N Suite 200 Ottawa ON K1Z 5B8 | Address: | | Project: | 102153-000 |
| | | | | Project Name: | TC Iqaluit |
| Tel: | (613) 721-0555 x Fax: (613) 721-0029 x | Tel: | (613) 721-0555 x Fax: | Site #: | |
| Email: | ryan.fletcher@arcadis.com | *Email: | ryan.fletcher@arcadis.com sryan.janzen@... | Sampled By: | RF |

**MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY**

**Regulation 153 (2011)**
☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☒ Ind/Comm ☒ Coarse
☐ Table 3 ☐ Agri/Other ☐ For RSC
☐ Table ___

**Other Regulations**
☒ CCME ☐ Sanitary Sewer Bylaw
☐ Reg 558 ☐ Storm Sewer Bylaw
☐ MISA Municipality ___
☐ PWQO
☐ Other ___

**Special Instructions**
ICPMS → water please

*Include Criteria on Certificate of Analysis (Y/N)?* ___

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

**Regular (Standard) TAT:** ☒
*(will be applied if Rush TAT is not specified):*
*Standard TAT = 5-7 Working days for most tests.*
*Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.*

**Job Specific Rush TAT (if applies to entire submission)**
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

| | Sample Barcode Label | Sample (Location) Identification | Date Sampled | Time Sampled | Matrix | Field Filtered (please circle): Metals / Hg / Cr VI | CCME Petroleum Hydrocarbons Soil | PAHs | PCBs | Metals (ICPMS) | VOCs | Triple Silica Gel | | | | | # of Bottles | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | TWAI-SP1 | Sept.13/17 | 16:30 | SOIL | | X | X | X | X | X | | | | | | 8 | |
| 2 | | TWAI-SP2 | Sept.13/17 | 16:45 | SOIL | | X | X | X | X | X | | | | | | 8 | |
| 3 | | TWAI-SP3 | Sept.13/17 | 17:00 | SOIL | | X | X | X | X | X | X | | | | | 8 | * highly organic peat |
| 4 | | TWAI-SP4 | Sept.13/17 | 17:15 | SOIL | | X | X | X | X | X | | | | | | 8 | |
| 5 | | TWAI-SP5 | Sept.13/17 | 17:30 | SOIL | | X | X | X | X | X | | | | | | 8 | |
| 6 | | Dup1 | Sept.13/17 | — | SOIL | | X | X | X | X | X | | | | | | 8 | |
| 7 | | | | | SOIL | | | | | | | | | | | | | RECEIVED IN OTTAWA |
| 8 | | | | | SOIL | | | | | | | | | | | | | |
| 9 | | | | | SOIL | | | | | | | | | | | | | |
| 10 | | | | | SOIL | | | | | | | | | | | | | |

| * RELINQUISHED BY: (Signature/Print) | Date: (YY/MM/DD) | Time | RECEIVED BY: (Signature/Print) | Date: (YY/MM/DD) | Time | # jars used and not submitted |
|---|---|---|---|---|---|---|
| Sept.14/17 Ryan Fletcher | Sept.14/17 | 8 am | Mariana Vasian / Vasian | 2017/09/15 | 10:00 | |
| | | | | 2017/09/15 | 23:00 | |

**Laboratory Use Only**

| Time Sensitive | Temperature (°C) on Recei | Custody Seal | Yes | No |
|---|---|---|---|---|
| | 11, 14, 15 | Present | Y | |
| | | Intact | Y | |

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.
** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT HTTP://MAXXAM.CA/WP-CONTENT/UPLOADS/ONTARIO-COC.PDF.

SAMPLES MUST BE KEPT COOL ( < 10° C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

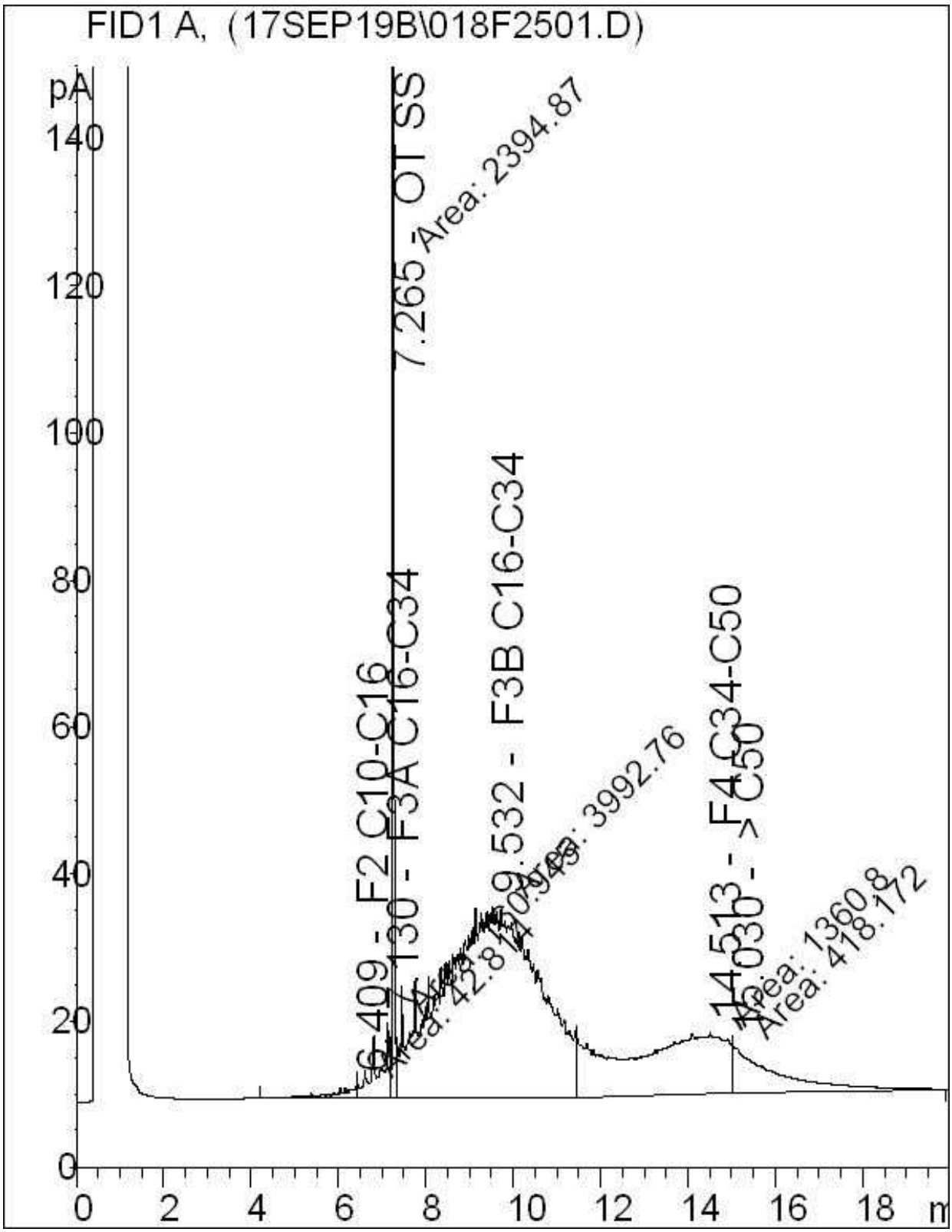
White: Maxxa Yellow: Client

11, 12, 12 8/98

Maxxam Job #: B7K2333
Report Date: 2017/09/22
Maxxam Sample: FDE618

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: TWA1-SP1

**Petroleum Hydrocarbons F2-F4 in Soil Chromatogram**

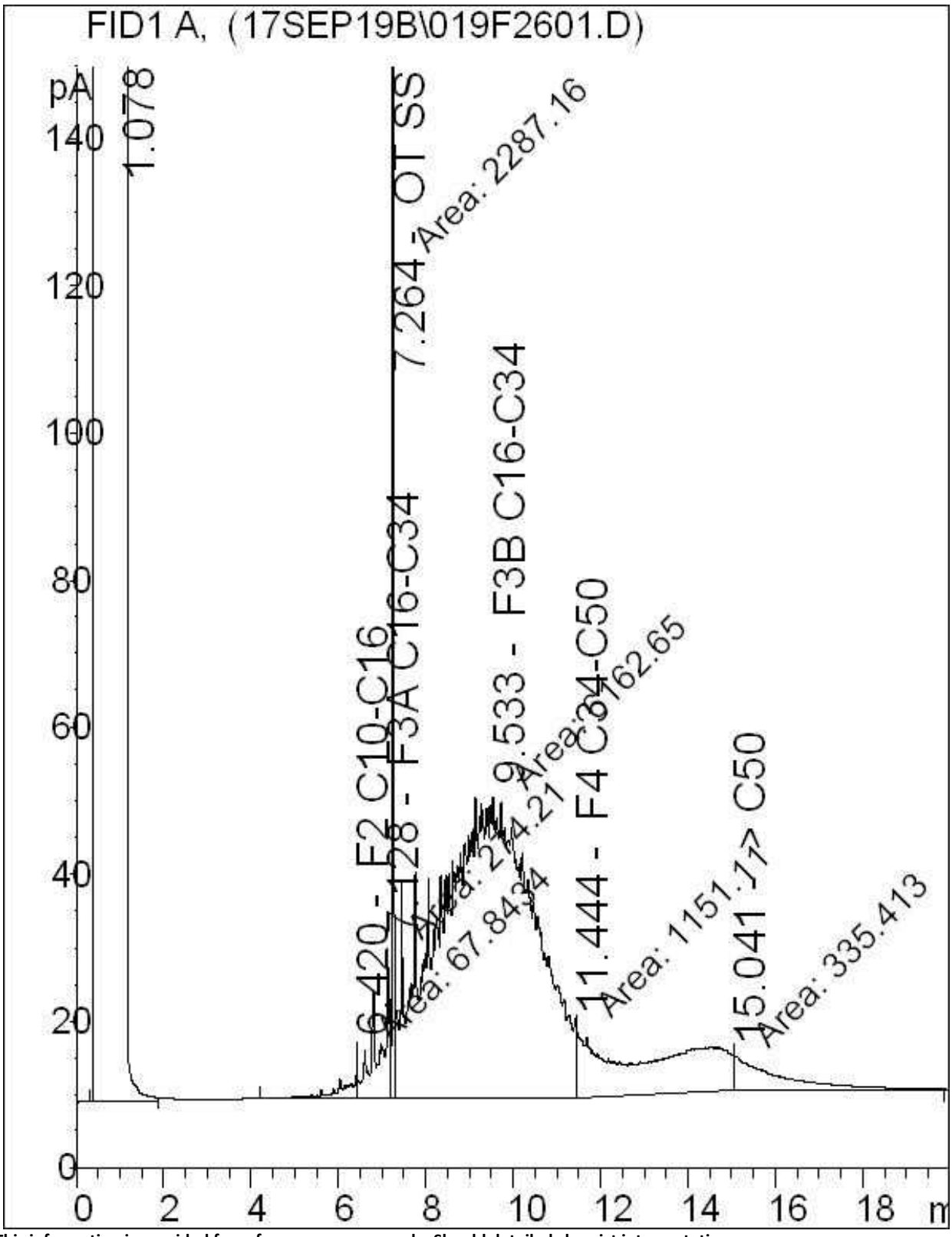



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7K2333
Report Date: 2017/09/22
Maxxam Sample: FDE619

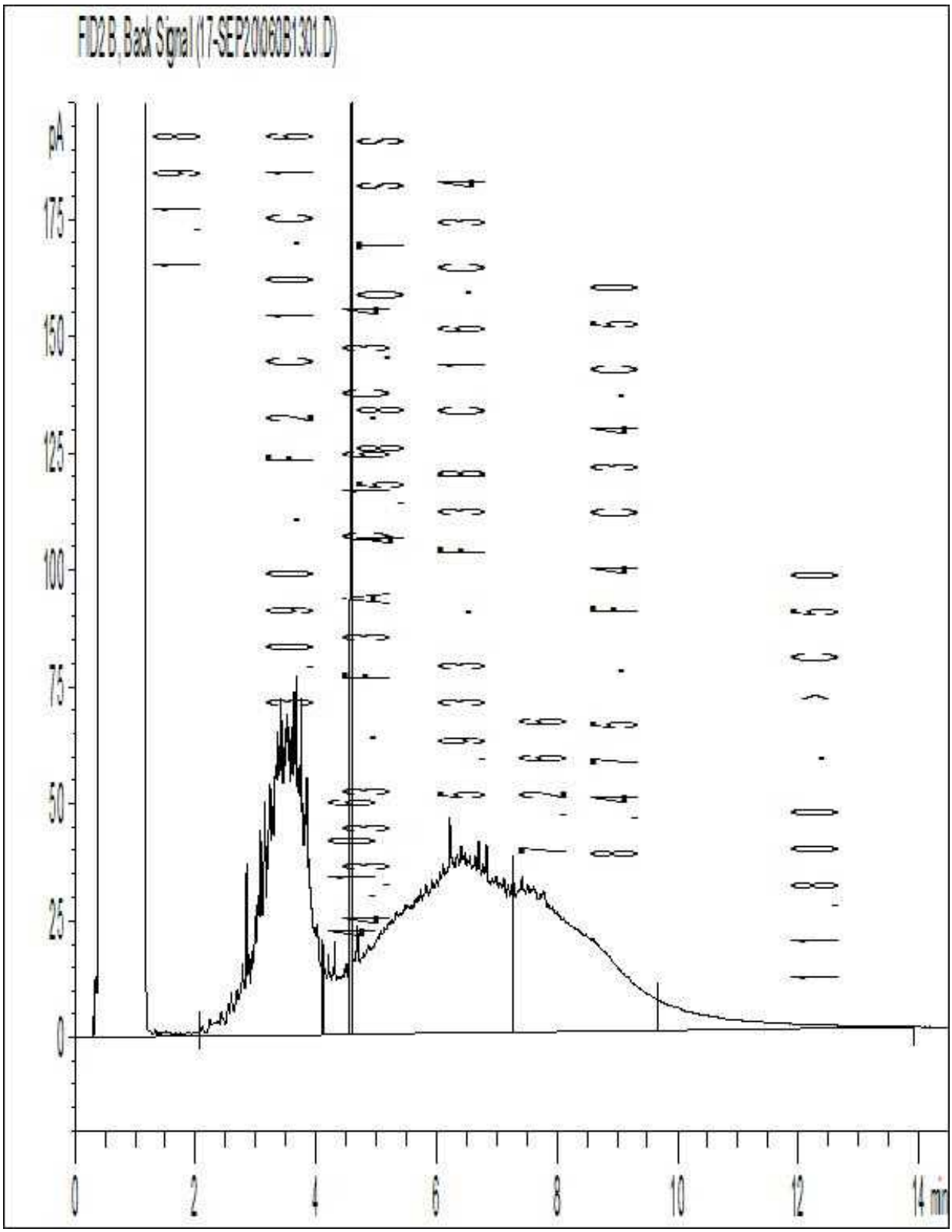
ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: TWA1-SP2

**Petroleum Hydrocarbons F2-F4 in Soil Chromatogram**




**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

**F2-F4 PHCs with extra silica gel cleanup Chromatogram**

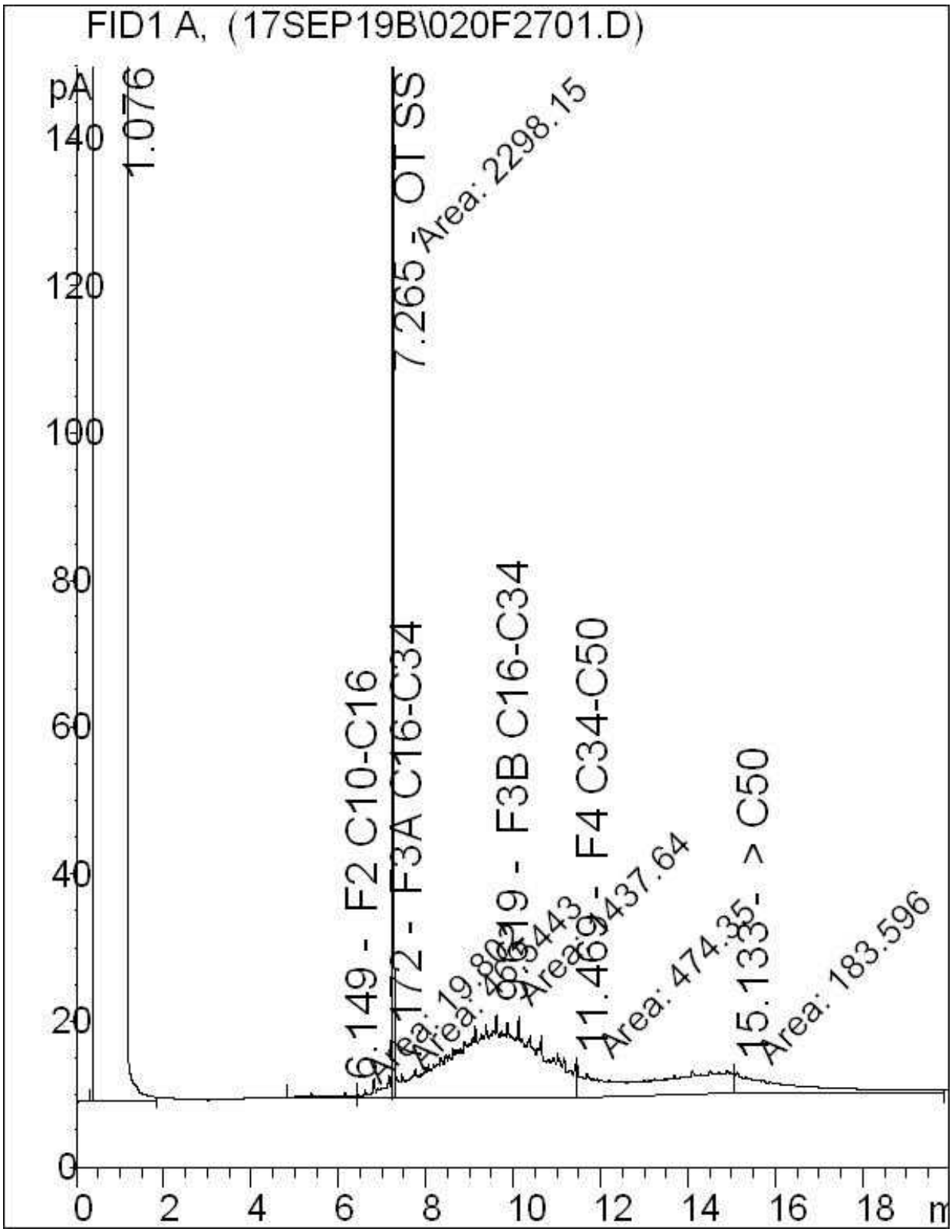



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7K2333
Report Date: 2017/09/22
Maxxam Sample: FDE621

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: TWA1-SP4

**Petroleum Hydrocarbons F2-F4 in Soil Chromatogram**

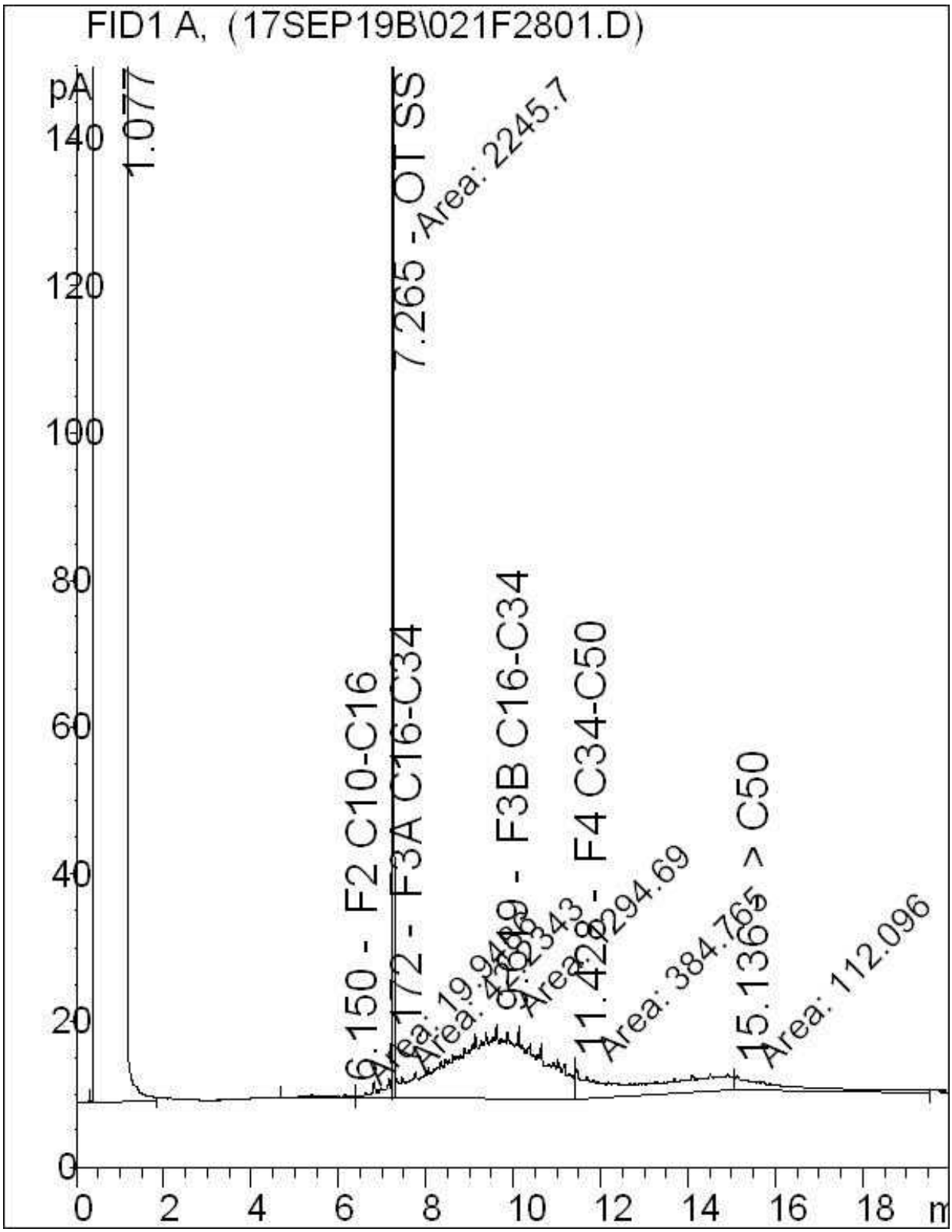



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7K2333
Report Date: 2017/09/22
Maxxam Sample: FDE621 Lab-Dup

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: TWA1-SP4

**Petroleum Hydrocarbons F2-F4 in Soil Chromatogram**

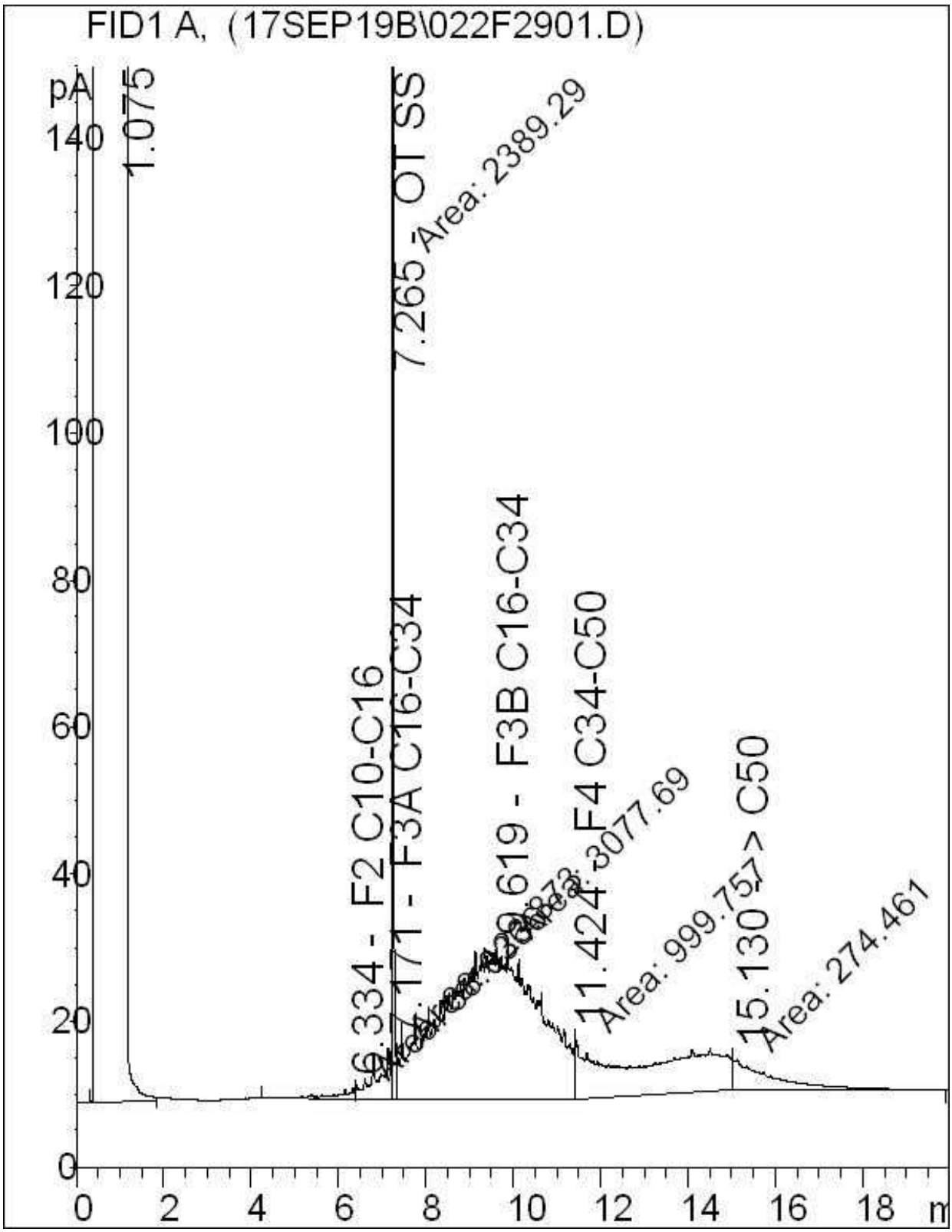



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7K2333
Report Date: 2017/09/22
Maxxam Sample: FDE622

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: TWA1-SP5

**Petroleum Hydrocarbons F2-F4 in Soil Chromatogram**

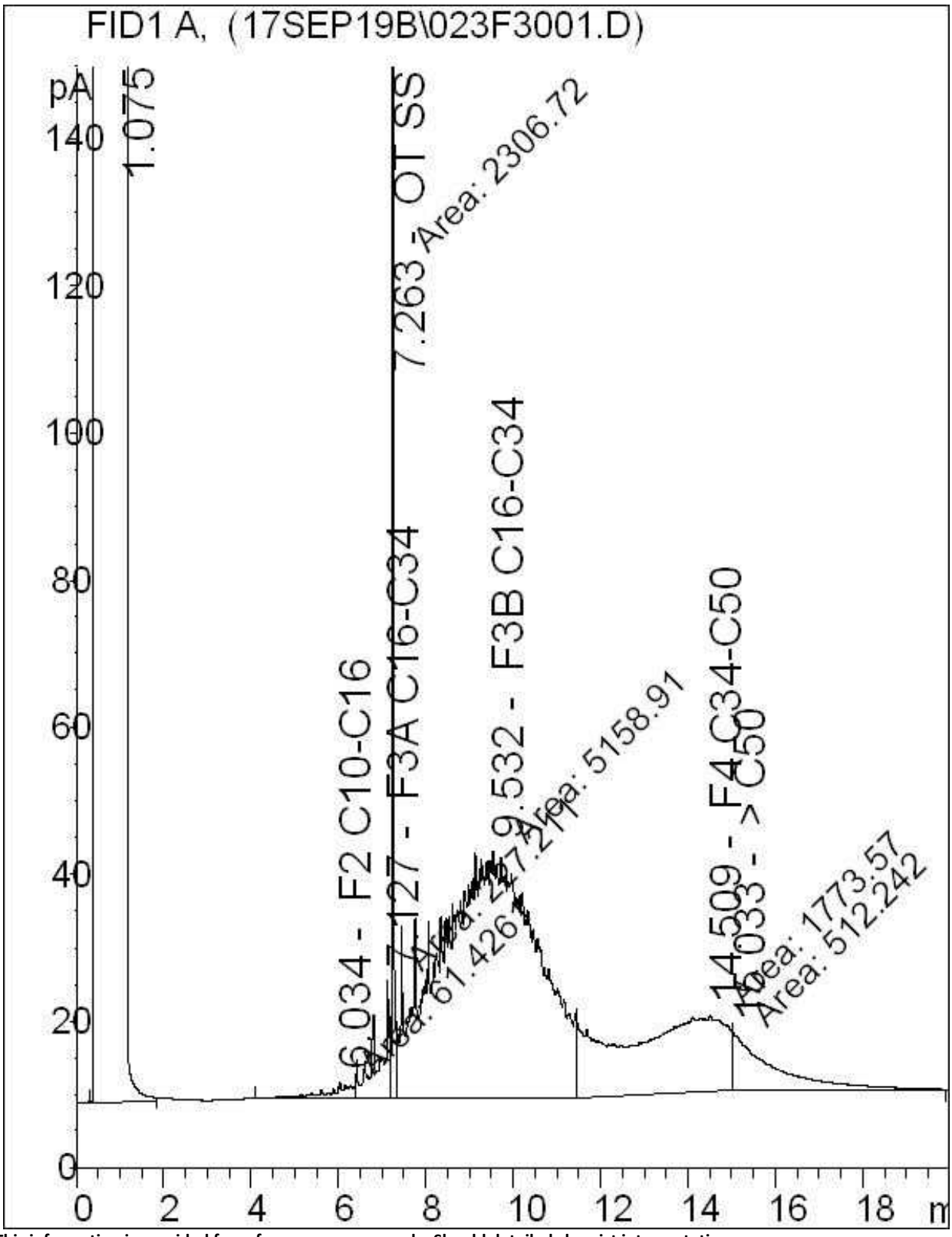



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7K2333
Report Date: 2017/09/22
Maxxam Sample: FDE623

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: DUP1

**Petroleum Hydrocarbons F2-F4 in Soil Chromatogram**




**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam
A Bureau Veritas Group Company

Your Project #: 102153-000
Site Location: TC IQALUIT
Your C.O.C. #: 629305-01-01

**Attention:Ryan Janzen**

ARCADIS Canada Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

**Report Date: 2017/10/17**
Report #: R4788013
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B7L1654**
**Received: 2017/09/27, 10:55**

Sample Matrix: Water
# Samples Received: 8

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Reference |
|---|---|---|---|---|---|
| 1,3-Dichloropropene Sum (1) | 8 | N/A | 2017/10/03 | | EPA 8260C m |
| Chloride by Automated Colourimetry (1) | 8 | N/A | 2017/09/29 | CAM SOP-00463 | EPA 325.2 m |
| Free (WAD) Cyanide (1) | 8 | N/A | 2017/10/02 | CAM SOP-00457 | OMOE E3015 m |
| Petroleum Hydro. CCME F1 & BTEX in Water | 1 | N/A | 2017/09/29 | OTT SOP-00002 | CCME CWS |
| Petroleum Hydro. CCME F1 & BTEX in Water | 3 | N/A | 2017/09/30 | OTT SOP-00002 | CCME CWS |
| Petroleum Hydro. CCME F1 & BTEX in Water | 4 | N/A | 2017/10/02 | OTT SOP-00002 | CCME CWS |
| Petroleum Hydrocarbons F2-F4 in Water (2) | 8 | 2017/09/29 | 2017/09/29 | OTT SOP-00001 | CCME Hydrocarbons |
| Fluoride (1) | 8 | 2017/09/28 | 2017/09/29 | CAM SOP-00449 | SM 22 4500-F C m |
| Mercury (low level) (1) | 8 | 2017/09/29 | 2017/10/02 | CAM SOP-00453 | EPA 7470 m |
| Total Ammonia-N (1) | 8 | N/A | 2017/10/02 | CAM SOP-00441 | EPA GS I-2522-90 m |
| Nitrate (NO3) and Nitrite (NO2) in Water (1, 3) | 1 | N/A | 2017/09/29 | CAM SOP-00440 | SM 22 4500-NO3I/NO2B |
| Nitrate (NO3) and Nitrite (NO2) in Water (1, 3) | 7 | N/A | 2017/10/02 | CAM SOP-00440 | SM 22 4500-NO3I/NO2B |
| OC Pesticides (Selected) & PCB (1, 4) | 8 | 2017/09/30 | 2017/10/01 | CAM SOP-00307 | EPA 8081A/8082B m |
| OC Pesticides Summed Parameters (1) | 8 | N/A | 2017/09/29 | CAM SOP-00307 | EPA 8081A/8082B m |
| PAH Compounds in Water by GC/MS (SIM) | 8 | 2017/09/29 | 2017/10/02 | OTT SOP-00011 | EPA 8270D/3510C m |
| pH (1) | 8 | N/A | 2017/09/29 | CAM SOP-00413 | SM 4500H+ B m |
| Sulphate by Automated Colourimetry (1) | 8 | N/A | 2017/09/29 | CAM SOP-00464 | EPA 375.4 m |
| Volatile Organic Compounds in Water (1) | 8 | N/A | 2017/10/02 | CAM SOP-00226 | EPA 8260C m |

**Remarks:**

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise

Your Project #: 102153-000
Site Location: TC IQALUIT
Your C.O.C. #: 629305-01-01

**Attention:Ryan Janzen**

ARCADIS Canada Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

**Report Date: 2017/10/17**
Report #: R4788013
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B7L1654**
**Received: 2017/09/27, 10:55**
agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Analytics Mississauga
(2) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.
(3) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.
(4) Chlordane ( Total) = Alpha Chlordane + Gamma Chlordane

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Alison Cameron, Project Manager
Email: ACameron@maxxam.ca
Phone# (613) 274-0573

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B7L1654
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## CCME PHCS IN WATER - OTTAWA (WATER)

| Maxxam ID | | FEZ992 | FEZ992 | FEZ993 | FEZ993 | FEZ994 | FEZ995 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/21 09:00 | 2017/09/21 09:00 | 2017/09/21 09:30 | 2017/09/21 09:30 | 2017/09/21 10:06 | 2017/09/21 10:30 | | |
| COC Number | | 629305-01-01 | 629305-01-01 | 629305-01-01 | 629305-01-01 | 629305-01-01 | 629305-01-01 | | |
| | **UNITS** | **LTM 1** | **LTM 1 Lab-Dup** | **LTM 2** | **LTM 2 Lab-Dup** | **LTM 3** | **LTM 4** | **RDL** | **QC Batch** |
| **BTEX & F1 Hydrocarbons** | | | | | | | | | |
| Benzene | ug/L | <0.20 | <0.20 | <0.20 | | <0.20 | <0.20 | 0.20 | 5189945 |
| Toluene | ug/L | <0.20 | <0.20 | <0.20 | | <0.20 | <0.20 | 0.20 | 5189945 |
| Ethylbenzene | ug/L | <0.20 | <0.20 | <0.20 | | <0.20 | <0.20 | 0.20 | 5189945 |
| o-Xylene | ug/L | <0.20 | <0.20 | <0.20 | | <0.20 | <0.20 | 0.20 | 5189945 |
| p+m-Xylene | ug/L | <0.40 | <0.40 | <0.40 | | <0.40 | <0.40 | 0.40 | 5189945 |
| Total Xylenes | ug/L | <0.40 | <0.40 | <0.40 | | <0.40 | <0.40 | 0.40 | 5189945 |
| F1 (C6-C10) | ug/L | <25 | <25 | <25 | | <25 | <25 | 25 | 5189945 |
| F1 (C6-C10) - BTEX | ug/L | <25 | <25 | <25 | | <25 | <25 | 25 | 5189945 |
| **F2-F4 Hydrocarbons** | | | | | | | | | |
| F2 (C10-C16 Hydrocarbons) | ug/L | <100 | | <100 | <100 | <100 | <100 | 100 | 5189015 |
| F3 (C16-C34 Hydrocarbons) | ug/L | <200 | | <200 | <200 | <200 | <200 | 200 | 5189015 |
| F4 (C34-C50 Hydrocarbons) | ug/L | <200 | | <200 | <200 | <200 | <200 | 200 | 5189015 |
| Reached Baseline at C50 | ug/L | Yes | | Yes | Yes | Yes | Yes | | 5189015 |
| **Surrogate Recovery (%)** | | | | | | | | | |
| 1,4-Difluorobenzene | % | 99 | 97 | 98 | | 96 | 96 | | 5189945 |
| 4-Bromofluorobenzene | % | 105 | 105 | 104 | | 98 | 99 | | 5189945 |
| D10-Ethylbenzene | % | 100 | 83 | 106 | | 101 | 84 | | 5189945 |
| D4-1,2-Dichloroethane | % | 103 | 99 | 101 | | 101 | 105 | | 5189945 |
| o-Terphenyl | % | 103 | | 120 | 103 | 101 | 104 | | 5189015 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B7L1654
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## CCME PHCS IN WATER - OTTAWA (WATER)

| Maxxam ID | | FEZ996 | FEZ997 | FEZ998 | FEZ999 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/21 11:00 | 2017/09/21 11:30 | 2017/09/21 12:00 | 2017/09/21 | | |
| COC Number | | 629305-01-01 | 629305-01-01 | 629305-01-01 | 629305-01-01 | | |
| | **UNITS** | **LTM 5** | **LTM 6** | **LTM 7** | **DUP 1** | **RDL** | **QC Batch** |
| **BTEX & F1 Hydrocarbons** | | | | | | | |
| Benzene | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5189945 |
| Toluene | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5189945 |
| Ethylbenzene | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5189945 |
| o-Xylene | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5189945 |
| p+m-Xylene | ug/L | <0.40 | <0.40 | <0.40 | <0.40 | 0.40 | 5189945 |
| Total Xylenes | ug/L | <0.40 | <0.40 | <0.40 | <0.40 | 0.40 | 5189945 |
| F1 (C6-C10) | ug/L | <25 | <25 | <25 | <25 | 25 | 5189945 |
| F1 (C6-C10) - BTEX | ug/L | <25 | <25 | <25 | <25 | 25 | 5189945 |
| **F2-F4 Hydrocarbons** | | | | | | | |
| F2 (C10-C16 Hydrocarbons) | ug/L | <100 | <100 | <100 | <100 | 100 | 5189015 |
| F3 (C16-C34 Hydrocarbons) | ug/L | <200 | <200 | <200 | <200 | 200 | 5189015 |
| F4 (C34-C50 Hydrocarbons) | ug/L | <200 | <200 | <200 | <200 | 200 | 5189015 |
| Reached Baseline at C50 | ug/L | Yes | Yes | Yes | Yes | | 5189015 |
| **Surrogate Recovery (%)** | | | | | | | |
| 1,4-Difluorobenzene | % | 96 | 96 | 98 | 95 | | 5189945 |
| 4-Bromofluorobenzene | % | 102 | 104 | 106 | 104 | | 5189945 |
| D10-Ethylbenzene | % | 117 | 112 | 101 | 107 | | 5189945 |
| D4-1,2-Dichloroethane | % | 99 | 101 | 101 | 100 | | 5189945 |
| o-Terphenyl | % | 89 | 107 | 91 | 111 | | 5189015 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B7L1654
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## RESULTS OF ANALYSES OF WATER

| Maxxam ID | | FEZ992 | FEZ992 | | | FEZ993 | | | FEZ994 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/21 09:00 | 2017/09/21 09:00 | | | 2017/09/21 09:30 | | | 2017/09/21 10:06 | | |
| COC Number | | 629305-01-01 | 629305-01-01 | | | 629305-01-01 | | | 629305-01-01 | | |
| | **UNITS** | **LTM 1** | **LTM 1 Lab-Dup** | **RDL** | **QC Batch** | **LTM 2** | **RDL** | **QC Batch** | **LTM 3** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | | | |
| Total Ammonia-N | mg/L | <0.050 | | 0.050 | 5191060 | <0.050 | 0.050 | 5191060 | <0.050 | 0.050 | 5191060 |
| Fluoride (F-) | mg/L | 0.23 | | 0.10 | 5187731 | 0.10 | 0.10 | 5187731 | 0.18 | 0.10 | 5187731 |
| pH | pH | 7.67 | | | 5187746 | 7.67 | | 5187746 | 7.54 | | 5187746 |
| Dissolved Sulphate (SO4) | mg/L | 480 | | 2.0 | 5187932 | 46 | 1.0 | 5188563 | 280 | 1.0 | 5188563 |
| WAD Cyanide (Free) | ug/L | <1 | | 1 | 5189918 | <1 | 1 | 5189918 | <1 | 1 | 5189918 |
| Dissolved Chloride (Cl) | mg/L | 3600 | | 50 | 5187929 | 280 | 4.0 | 5188561 | 1600 | 20 | 5188561 |
| Nitrite (N) | mg/L | <0.010 | <0.010 | 0.010 | 5187815 | <0.010 | 0.010 | 5187815 | <0.010 | 0.010 | 5189134 |
| Nitrate (N) | mg/L | 0.13 | 0.12 | 0.10 | 5187815 | <0.10 | 0.10 | 5187815 | <0.10 | 0.10 | 5189134 |
| Nitrate + Nitrite (N) | mg/L | 0.13 | 0.12 | 0.10 | 5187815 | <0.10 | 0.10 | 5187815 | <0.10 | 0.10 | 5189134 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

| Maxxam ID | | FEZ995 | | FEZ996 | | FEZ997 | FEZ998 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/21 10:30 | | 2017/09/21 11:00 | | 2017/09/21 11:30 | 2017/09/21 12:00 | | |
| COC Number | | 629305-01-01 | | 629305-01-01 | | 629305-01-01 | 629305-01-01 | | |
| | **UNITS** | **LTM 4** | **RDL** | **LTM 5** | **QC Batch** | **LTM 6** | **LTM 7** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | |
| Total Ammonia-N | mg/L | <0.050 | 0.050 | 0.050 | 5191060 | <0.050 | 0.44 | 0.050 | 5191060 |
| Fluoride (F-) | mg/L | <0.10 | 0.10 | <0.10 | 5187731 | <0.10 | <0.10 | 0.10 | 5187731 |
| pH | pH | 7.64 | | 7.61 | 5187746 | 7.63 | 7.31 | | 5187746 |
| Dissolved Sulphate (SO4) | mg/L | 39 | 1.0 | 5.1 | 5187932 | 3.5 | 5.0 | 1.0 | 5188563 |
| WAD Cyanide (Free) | ug/L | <1 | 1 | <1 | 5189918 | <1 | <1 | 1 | 5189918 |
| Dissolved Chloride (Cl) | mg/L | 240 | 3.0 | 8.1 | 5187929 | 7.7 | 5.5 | 1.0 | 5188561 |
| Nitrite (N) | mg/L | <0.010 | 0.010 | <0.010 | 5187815 | <0.010 | <0.010 | 0.010 | 5187815 |
| Nitrate (N) | mg/L | 0.31 | 0.10 | 0.35 | 5187815 | 0.11 | 0.36 | 0.10 | 5187815 |
| Nitrate + Nitrite (N) | mg/L | 0.31 | 0.10 | 0.35 | 5187815 | 0.11 | 0.36 | 0.10 | 5187815 |

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Maxxam Job #: B7L1654
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## RESULTS OF ANALYSES OF WATER

| Maxxam ID | | FEZ999 | | |
|---|---|---|---|---|
| Sampling Date | | 2017/09/21 | | |
| COC Number | | 629305-01-01 | | |
| | **UNITS** | **DUP 1** | **RDL** | **QC Batch** |
| **Inorganics** | | | | |
| Total Ammonia-N | mg/L | <0.050 | 0.050 | 5191060 |
| Fluoride (F-) | mg/L | 0.22 | 0.10 | 5187731 |
| pH | pH | 7.63 | | 5187746 |
| Dissolved Sulphate (SO4) | mg/L | 490 | 2.0 | 5187932 |
| WAD Cyanide (Free) | ug/L | <1 | 1 | 5189918 |
| Dissolved Chloride (Cl) | mg/L | 3700 | 50 | 5187929 |
| Nitrite (N) | mg/L | <0.010 | 0.010 | 5187815 |
| Nitrate (N) | mg/L | <0.10 | 0.10 | 5187815 |
| Nitrate + Nitrite (N) | mg/L | <0.10 | 0.10 | 5187815 |

RDL = Reportable Detection Limit
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Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

| Maxxam ID | | FEZ992 | FEZ993 | FEZ994 | FEZ995 | FEZ996 | FEZ997 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/21 09:00 | 2017/09/21 09:30 | 2017/09/21 10:06 | 2017/09/21 10:30 | 2017/09/21 11:00 | 2017/09/21 11:30 | | |
| COC Number | | 629305-01-01 | 629305-01-01 | 629305-01-01 | 629305-01-01 | 629305-01-01 | 629305-01-01 | | |
| | **UNITS** | **LTM 1** | **LTM 2** | **LTM 3** | **LTM 4** | **LTM 5** | **LTM 6** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | | |
| Mercury (Hg) | ug/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | 5190048 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | FEZ998 | FEZ999 | | |
|---|---|---|---|---|---|
| Sampling Date | | 2017/09/21 12:00 | 2017/09/21 | | |
| COC Number | | 629305-01-01 | 629305-01-01 | | |
| | **UNITS** | **LTM 7** | **DUP 1** | **RDL** | **QC Batch** |
| **Metals** | | | | | |
| Mercury (Hg) | ug/L | <0.01 | <0.01 | 0.01 | 5190048 |

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Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

| Maxxam ID | | FEZ992 | FEZ993 | FEZ994 | FEZ994 | FEZ995 | FEZ996 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/21 09:00 | 2017/09/21 09:30 | 2017/09/21 10:06 | 2017/09/21 10:06 | 2017/09/21 10:30 | 2017/09/21 11:00 | | |
| COC Number | | 629305-01-01 | 629305-01-01 | 629305-01-01 | 629305-01-01 | 629305-01-01 | 629305-01-01 | | |
| | **UNITS** | **LTM 1** | **LTM 2** | **LTM 3** | **LTM 3 Lab-Dup** | **LTM 4** | **LTM 5** | **RDL** | **QC Batch** |
| **Polyaromatic Hydrocarbons** | | | | | | | | | |
| Acenaphthene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Acenaphthylene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Anthracene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Benzo(a)anthracene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Benzo(a)pyrene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Benzo(b/j)fluoranthene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Benzo(g,h,i)perylene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Benzo(k)fluoranthene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Chrysene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Dibenz(a,h)anthracene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Fluoranthene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Fluorene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Indeno(1,2,3-cd)pyrene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| 1-Methylnaphthalene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| 2-Methylnaphthalene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Naphthalene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Phenanthrene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Pyrene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| **Surrogate Recovery (%)** | | | | | | | | | |
| D10-Anthracene | % | 107 | 110 | 108 | 104 | 105 | 106 | | 5189999 |
| D14-Terphenyl (FS) | % | 113 | 107 | 106 | 105 | 108 | 104 | | 5189999 |
| D8-Acenaphthylene | % | 102 | 106 | 99 | 113 | 108 | 100 | | 5189999 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B7L1654
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

| Maxxam ID | | FEZ997 | FEZ998 | FEZ999 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/21 11:30 | 2017/09/21 12:00 | 2017/09/21 | | |
| COC Number | | 629305-01-01 | 629305-01-01 | 629305-01-01 | | |
| | **UNITS** | **LTM 6** | **LTM 7** | **DUP 1** | **RDL** | **QC Batch** |
| **Polyaromatic Hydrocarbons** | | | | | | |
| Acenaphthene | ug/L | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Acenaphthylene | ug/L | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Anthracene | ug/L | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Benzo(a)anthracene | ug/L | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Benzo(a)pyrene | ug/L | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Benzo(b/j)fluoranthene | ug/L | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Benzo(g,h,i)perylene | ug/L | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Benzo(k)fluoranthene | ug/L | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Chrysene | ug/L | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Dibenz(a,h)anthracene | ug/L | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Fluoranthene | ug/L | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Fluorene | ug/L | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Indeno(1,2,3-cd)pyrene | ug/L | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| 1-Methylnaphthalene | ug/L | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| 2-Methylnaphthalene | ug/L | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Naphthalene | ug/L | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Phenanthrene | ug/L | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| Pyrene | ug/L | <0.010 | <0.010 | <0.010 | 0.010 | 5189999 |
| **Surrogate Recovery (%)** | | | | | | |
| D10-Anthracene | % | 100 | 103 | 106 | | 5189999 |
| D14-Terphenyl (FS) | % | 102 | 101 | 112 | | 5189999 |
| D8-Acenaphthylene | % | 105 | 104 | 114 | | 5189999 |

RDL = Reportable Detection Limit
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Maxxam Job #: B7L1654
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## VOLATILE ORGANICS BY GC/MS (WATER)

| Maxxam ID | | FEZ992 | FEZ993 | FEZ993 | FEZ994 | FEZ995 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/21 09:00 | 2017/09/21 09:30 | 2017/09/21 09:30 | 2017/09/21 10:06 | 2017/09/21 10:30 | | |
| COC Number | | 629305-01-01 | 629305-01-01 | 629305-01-01 | 629305-01-01 | 629305-01-01 | | |
| | **UNITS** | **LTM 1** | **LTM 2** | **LTM 2 Lab-Dup** | **LTM 3** | **LTM 4** | **RDL** | **QC Batch** |
| **Calculated Parameters** | | | | | | | | |
| 1,3-Dichloropropene (cis+trans) | ug/L | <0.28 | <0.28 | | <0.28 | <0.28 | 0.28 | 5184993 |
| **Volatile Organics** | | | | | | | | |
| Acetone (2-Propanone) | ug/L | <10 | <10 | <10 | <10 | <10 | 10 | 5187891 |
| Benzene | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| Bromodichloromethane | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| Bromoform | ug/L | <0.20 | 0.26 | 0.30 | 0.26 | <0.20 | 0.20 | 5187891 |
| Bromomethane | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5187891 |
| Carbon Tetrachloride | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| Chlorobenzene | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| Chloroform | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| Dibromochloromethane | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| 1,2-Dichlorobenzene | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| 1,3-Dichlorobenzene | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| 1,4-Dichlorobenzene | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| Dichlorodifluoromethane (FREON 12) | ug/L | <0.50 | <0.50 | <0.50 | 0.96 | <0.50 | 0.50 | 5187891 |
| 1,1-Dichloroethane | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| 1,2-Dichloroethane | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| 1,1-Dichloroethylene | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| cis-1,2-Dichloroethylene | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| trans-1,2-Dichloroethylene | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| 1,2-Dichloropropane | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| cis-1,3-Dichloropropene | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| trans-1,3-Dichloropropene | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| Ethylbenzene | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| Ethylene Dibromide | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| Hexane | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5187891 |
| Methylene Chloride(Dichloromethane) | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5187891 |
| Methyl Ethyl Ketone (2-Butanone) | ug/L | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 5.0 | 5187891 |
| Methyl Isobutyl Ketone | ug/L | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 5.0 | 5187891 |
| Methyl t-butyl ether (MTBE) | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| Styrene | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| 1,1,1,2-Tetrachloroethane | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B7L1654
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## VOLATILE ORGANICS BY GC/MS (WATER)

| Maxxam ID | | FEZ992 | FEZ993 | FEZ993 | FEZ994 | FEZ995 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/21 09:00 | 2017/09/21 09:30 | 2017/09/21 09:30 | 2017/09/21 10:06 | 2017/09/21 10:30 | | |
| COC Number | | 629305-01-01 | 629305-01-01 | 629305-01-01 | 629305-01-01 | 629305-01-01 | | |
| | **UNITS** | **LTM 1** | **LTM 2** | **LTM 2 Lab-Dup** | **LTM 3** | **LTM 4** | **RDL** | **QC Batch** |
| 1,1,2,2-Tetrachloroethane | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| Tetrachloroethylene | ug/L | 1.4 | <0.10 | <0.10 | 1.5 | <0.10 | 0.10 | 5187891 |
| Toluene | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| 1,1,1-Trichloroethane | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| 1,1,2-Trichloroethane | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| Trichloroethylene | ug/L | 0.20 | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| Trichlorofluoromethane (FREON 11) | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| Vinyl Chloride | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| p+m-Xylene | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| o-Xylene | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| Total Xylenes | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| **Surrogate Recovery (%)** | | | | | | | | |
| 4-Bromofluorobenzene | % | 101 | 98 | 99 | 100 | 99 | | 5187891 |
| D4-1,2-Dichloroethane | % | 109 | 106 | 105 | 108 | 105 | | 5187891 |
| D8-Toluene | % | 96 | 100 | 99 | 100 | 100 | | 5187891 |

RDL = Reportable Detection Limit
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Maxxam Job #: B7L1654
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## VOLATILE ORGANICS BY GC/MS (WATER)

| Maxxam ID | | FEZ996 | FEZ997 | FEZ998 | FEZ999 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/21 11:00 | 2017/09/21 11:30 | 2017/09/21 12:00 | 2017/09/21 | | |
| COC Number | | 629305-01-01 | 629305-01-01 | 629305-01-01 | 629305-01-01 | | |
| | **UNITS** | **LTM 5** | **LTM 6** | **LTM 7** | **DUP 1** | **RDL** | **QC Batch** |
| **Calculated Parameters** | | | | | | | |
| 1,3-Dichloropropene (cis+trans) | ug/L | <0.28 | <0.28 | <0.28 | <0.28 | 0.28 | 5184993 |
| **Volatile Organics** | | | | | | | |
| Acetone (2-Propanone) | ug/L | <10 | <10 | <10 | <10 | 10 | 5187891 |
| Benzene | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| Bromodichloromethane | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| Bromoform | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| Bromomethane | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5187891 |
| Carbon Tetrachloride | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| Chlorobenzene | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| Chloroform | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| Dibromochloromethane | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| 1,2-Dichlorobenzene | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| 1,3-Dichlorobenzene | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| 1,4-Dichlorobenzene | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| Dichlorodifluoromethane (FREON 12) | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5187891 |
| 1,1-Dichloroethane | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| 1,2-Dichloroethane | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| 1,1-Dichloroethylene | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| cis-1,2-Dichloroethylene | ug/L | <0.10 | <0.10 | 0.68 | <0.10 | 0.10 | 5187891 |
| trans-1,2-Dichloroethylene | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| 1,2-Dichloropropane | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| cis-1,3-Dichloropropene | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| trans-1,3-Dichloropropene | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| Ethylbenzene | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| Ethylene Dibromide | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| Hexane | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5187891 |
| Methylene Chloride(Dichloromethane) | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5187891 |
| Methyl Ethyl Ketone (2-Butanone) | ug/L | <5.0 | <5.0 | <5.0 | <5.0 | 5.0 | 5187891 |
| Methyl Isobutyl Ketone | ug/L | <5.0 | <5.0 | <5.0 | <5.0 | 5.0 | 5187891 |
| Methyl t-butyl ether (MTBE) | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| Styrene | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| 1,1,1,2-Tetrachloroethane | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B7L1654
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## VOLATILE ORGANICS BY GC/MS (WATER)

| Maxxam ID | | FEZ996 | FEZ997 | FEZ998 | FEZ999 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/21 11:00 | 2017/09/21 11:30 | 2017/09/21 12:00 | 2017/09/21 | | |
| COC Number | | 629305-01-01 | 629305-01-01 | 629305-01-01 | 629305-01-01 | | |
| | **UNITS** | **LTM 5** | **LTM 6** | **LTM 7** | **DUP 1** | **RDL** | **QC Batch** |
| 1,1,2,2-Tetrachloroethane | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| Tetrachloroethylene | ug/L | <0.10 | <0.10 | <0.10 | 2.1 | 0.10 | 5187891 |
| Toluene | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| 1,1,1-Trichloroethane | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| 1,1,2-Trichloroethane | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| Trichloroethylene | ug/L | 0.15 | 0.14 | 5.1 | 0.30 | 0.10 | 5187891 |
| Trichlorofluoromethane (FREON 11) | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| Vinyl Chloride | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5187891 |
| p+m-Xylene | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| o-Xylene | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| Total Xylenes | ug/L | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5187891 |
| **Surrogate Recovery (%)** | | | | | | | |
| 4-Bromofluorobenzene | % | 98 | 98 | 99 | 98 | | 5187891 |
| D4-1,2-Dichloroethane | % | 103 | 104 | 106 | 109 | | 5187891 |
| D8-Toluene | % | 100 | 99 | 100 | 97 | | 5187891 |

RDL = Reportable Detection Limit
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Maxxam Job #: B7L1654
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## ORGANOCHLORINATED PESTICIDES BY GC-ECD (WATER)

| Maxxam ID | | FEZ992 | FEZ993 | FEZ993 | FEZ994 | FEZ995 | FEZ996 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/21 09:00 | 2017/09/21 09:30 | 2017/09/21 09:30 | 2017/09/21 10:06 | 2017/09/21 10:30 | 2017/09/21 11:00 | | |
| COC Number | | 629305-01-01 | 629305-01-01 | 629305-01-01 | 629305-01-01 | 629305-01-01 | 629305-01-01 | | |
| | **UNITS** | **LTM 1** | **LTM 2** | **LTM 2 Lab-Dup** | **LTM 3** | **LTM 4** | **LTM 5** | **RDL** | **QC Batch** |
| **Calculated Parameters** | | | | | | | | | |
| Aldrin + Dieldrin | ug/L | <0.005 | <0.005 | | <0.005 | <0.005 | <0.005 | 0.005 | 5184593 |
| Chlordane (Total) | ug/L | <0.005 | <0.005 | | <0.005 | <0.005 | <0.005 | 0.005 | 5184593 |
| DDT+ Metabolites | ug/L | <0.005 | <0.005 | | <0.005 | <0.005 | <0.005 | 0.005 | 5184593 |
| Heptachlor + Heptachlor epoxide | ug/L | <0.005 | <0.005 | | <0.005 | <0.005 | <0.005 | 0.005 | 5184593 |
| o,p-DDD + p,p-DDD | ug/L | <0.005 | <0.005 | | <0.005 | <0.005 | <0.005 | 0.005 | 5184593 |
| o,p-DDE + p,p-DDE | ug/L | <0.005 | <0.005 | | <0.005 | <0.005 | <0.005 | 0.005 | 5184593 |
| o,p-DDT + p,p-DDT | ug/L | <0.005 | <0.005 | | <0.005 | <0.005 | <0.005 | 0.005 | 5184593 |
| Total Endosulfan | ug/L | <0.005 | <0.005 | | <0.005 | <0.005 | <0.005 | 0.005 | 5184593 |
| Total PCB | ug/L | <0.05 | <0.05 | | <0.05 | <0.05 | <0.05 | 0.05 | 5184593 |
| **Pesticides & Herbicides** | | | | | | | | | |
| Aldrin | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Dieldrin | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| a-Chlordane | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| g-Chlordane | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| o,p-DDD | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| p,p-DDD | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| o,p-DDE | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| p,p-DDE | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| o,p-DDT | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| p,p-DDT | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Lindane | ug/L | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | 0.003 | 5191176 |
| Endosulfan I (alpha) | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Endosulfan II (beta) | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Endrin | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Heptachlor | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Heptachlor epoxide | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Hexachlorobenzene | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Methoxychlor | ug/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | 5191176 |
| Aroclor 1016 | ug/L | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.05 | 5191176 |
| Aroclor 1221 | ug/L | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.05 | 5191176 |
| Aroclor 1232 | ug/L | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.05 | 5191176 |
| Aroclor 1242 | ug/L | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.05 | 5191176 |

RDL = Reportable Detection Limit
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Maxxam Job #: B7L1654
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## ORGANOCHLORINATED PESTICIDES BY GC-ECD (WATER)

| Maxxam ID | | FEZ992 | FEZ993 | FEZ993 | FEZ994 | FEZ995 | FEZ996 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/21 09:00 | 2017/09/21 09:30 | 2017/09/21 09:30 | 2017/09/21 10:06 | 2017/09/21 10:30 | 2017/09/21 11:00 | | |
| COC Number | | 629305-01-01 | 629305-01-01 | 629305-01-01 | 629305-01-01 | 629305-01-01 | 629305-01-01 | | |
| | **UNITS** | **LTM 1** | **LTM 2** | **LTM 2 Lab-Dup** | **LTM 3** | **LTM 4** | **LTM 5** | **RDL** | **QC Batch** |
| Aroclor 1248 | ug/L | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.05 | 5191176 |
| Aroclor 1254 | ug/L | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.05 | 5191176 |
| Aroclor 1260 | ug/L | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.05 | 5191176 |
| alpha-BHC | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| beta-BHC | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| delta-BHC | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Endosulfan sulfate | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Endrin aldehyde | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Endrin ketone | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Mirex | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Octachlorostyrene | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Oxychlordane | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Toxaphene | ug/L | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | 0.2 | 5191176 |
| **Surrogate Recovery (%)** | | | | | | | | | |
| 2,4,5,6-Tetrachloro-m-xylene | % | 82 | 80 | 69 | 76 | 78 | 70 | | 5191176 |
| Decachlorobiphenyl | % | 105 | 98 | 88 | 104 | 104 | 95 | | 5191176 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Maxxam Job #: B7L1654
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## ORGANOCHLORINATED PESTICIDES BY GC-ECD (WATER)

| Maxxam ID | | FEZ997 | FEZ998 | FEZ999 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/21 11:30 | 2017/09/21 12:00 | 2017/09/21 | | |
| COC Number | | 629305-01-01 | 629305-01-01 | 629305-01-01 | | |
| | **UNITS** | **LTM 6** | **LTM 7** | **DUP 1** | **RDL** | **QC Batch** |
| **Calculated Parameters** | | | | | | |
| Aldrin + Dieldrin | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5184593 |
| Chlordane (Total) | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5184593 |
| DDT+ Metabolites | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5184593 |
| Heptachlor + Heptachlor epoxide | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5184593 |
| o,p-DDD + p,p-DDD | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5184593 |
| o,p-DDE + p,p-DDE | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5184593 |
| o,p-DDT + p,p-DDT | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5184593 |
| Total Endosulfan | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5184593 |
| Total PCB | ug/L | <0.05 | <0.05 | <0.05 | 0.05 | 5184593 |
| **Pesticides & Herbicides** | | | | | | |
| Aldrin | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Dieldrin | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| a-Chlordane | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| g-Chlordane | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| o,p-DDD | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| p,p-DDD | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| o,p-DDE | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| p,p-DDE | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| o,p-DDT | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| p,p-DDT | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Lindane | ug/L | <0.003 | <0.003 | <0.003 | 0.003 | 5191176 |
| Endosulfan I (alpha) | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Endosulfan II (beta) | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Endrin | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Heptachlor | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Heptachlor epoxide | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Hexachlorobenzene | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Methoxychlor | ug/L | <0.01 | <0.01 | <0.01 | 0.01 | 5191176 |
| Aroclor 1016 | ug/L | <0.05 | <0.05 | <0.05 | 0.05 | 5191176 |
| Aroclor 1221 | ug/L | <0.05 | <0.05 | <0.05 | 0.05 | 5191176 |
| Aroclor 1232 | ug/L | <0.05 | <0.05 | <0.05 | 0.05 | 5191176 |
| Aroclor 1242 | ug/L | <0.05 | <0.05 | <0.05 | 0.05 | 5191176 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7L1654
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## ORGANOCHLORINATED PESTICIDES BY GC-ECD (WATER)

| Maxxam ID | | FEZ997 | FEZ998 | FEZ999 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/21 11:30 | 2017/09/21 12:00 | 2017/09/21 | | |
| COC Number | | 629305-01-01 | 629305-01-01 | 629305-01-01 | | |
| | **UNITS** | **LTM 6** | **LTM 7** | **DUP 1** | **RDL** | **QC Batch** |
| Aroclor 1248 | ug/L | <0.05 | <0.05 | <0.05 | 0.05 | 5191176 |
| Aroclor 1254 | ug/L | <0.05 | <0.05 | <0.05 | 0.05 | 5191176 |
| Aroclor 1260 | ug/L | <0.05 | <0.05 | <0.05 | 0.05 | 5191176 |
| alpha-BHC | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| beta-BHC | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| delta-BHC | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Endosulfan sulfate | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Endrin aldehyde | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Endrin ketone | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Mirex | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Octachlorostyrene | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Oxychlordane | ug/L | <0.005 | <0.005 | <0.005 | 0.005 | 5191176 |
| Toxaphene | ug/L | <0.2 | <0.2 | <0.2 | 0.2 | 5191176 |
| **Surrogate Recovery (%)** | | | | | | |
| 2,4,5,6-Tetrachloro-m-xylene | % | 77 | 69 | 81 | | 5191176 |
| Decachlorobiphenyl | % | 101 | 94 | 102 | | 5191176 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7L1654
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** FEZ992
**Sample ID:** LTM 1
**Matrix:** Water

**Collected:** 2017/09/21
**Shipped:**
**Received:** 2017/09/27

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| 1,3-Dichloropropene Sum | CALC | 5184993 | N/A | 2017/10/03 | Automated Statchk |
| Chloride by Automated Colourimetry | KONE | 5187929 | N/A | 2017/09/29 | Deonarine Ramnarine |
| Free (WAD) Cyanide | SKAL/CN | 5189918 | N/A | 2017/10/02 | Louise Harding |
| Petroleum Hydro. CCME F1 & BTEX in Water | HSGC/MSFD | 5189945 | N/A | 2017/09/29 | Lyndsey Hart |
| Petroleum Hydrocarbons F2-F4 in Water | GC/FID | 5189015 | 2017/09/29 | 2017/09/29 | Arezoo Habibagahi |
| Fluoride | ISE | 5187731 | 2017/09/28 | 2017/09/29 | Surinder Rai |
| Mercury (low level) | CV/AA | 5190048 | 2017/09/29 | 2017/10/02 | Ron Morrison |
| Total Ammonia-N | LACH/NH4 | 5191060 | N/A | 2017/10/02 | Charles Opoku-Ware |
| Nitrate (NO3) and Nitrite (NO2) in Water | LACH | 5187815 | N/A | 2017/10/02 | Chandra Nandlal |
| OC Pesticides (Selected) & PCB | GC/ECD | 5191176 | 2017/09/30 | 2017/10/01 | Mahmudul Khan |
| OC Pesticides Summed Parameters | CALC | 5184593 | N/A | 2017/09/29 | Automated Statchk |
| PAH Compounds in Water by GC/MS (SIM) | GC/MS | 5189999 | 2017/09/29 | 2017/10/02 | Liliana Gaburici |
| pH | AT | 5187746 | N/A | 2017/09/29 | Surinder Rai |
| Sulphate by Automated Colourimetry | KONE | 5187932 | N/A | 2017/09/29 | Deonarine Ramnarine |
| Volatile Organic Compounds in Water | P&T/MS | 5187891 | N/A | 2017/10/02 | Dina Wang |

**Maxxam ID:** FEZ992 Dup
**Sample ID:** LTM 1
**Matrix:** Water

**Collected:** 2017/09/21
**Shipped:**
**Received:** 2017/09/27

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Petroleum Hydro. CCME F1 & BTEX in Water | HSGC/MSFD | 5189945 | N/A | 2017/09/29 | Lyndsey Hart |
| Nitrate (NO3) and Nitrite (NO2) in Water | LACH | 5187815 | N/A | 2017/10/02 | Chandra Nandlal |

**Maxxam ID:** FEZ993
**Sample ID:** LTM 2
**Matrix:** Water

**Collected:** 2017/09/21
**Shipped:**
**Received:** 2017/09/27

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| 1,3-Dichloropropene Sum | CALC | 5184993 | N/A | 2017/10/03 | Automated Statchk |
| Chloride by Automated Colourimetry | KONE | 5188561 | N/A | 2017/09/29 | Deonarine Ramnarine |
| Free (WAD) Cyanide | SKAL/CN | 5189918 | N/A | 2017/10/02 | Louise Harding |
| Petroleum Hydro. CCME F1 & BTEX in Water | HSGC/MSFD | 5189945 | N/A | 2017/09/30 | Lyndsey Hart |
| Petroleum Hydrocarbons F2-F4 in Water | GC/FID | 5189015 | 2017/09/29 | 2017/09/29 | Arezoo Habibagahi |
| Fluoride | ISE | 5187731 | 2017/09/28 | 2017/09/29 | Surinder Rai |
| Mercury (low level) | CV/AA | 5190048 | 2017/09/29 | 2017/10/02 | Ron Morrison |
| Total Ammonia-N | LACH/NH4 | 5191060 | N/A | 2017/10/02 | Charles Opoku-Ware |
| Nitrate (NO3) and Nitrite (NO2) in Water | LACH | 5187815 | N/A | 2017/10/02 | Chandra Nandlal |
| OC Pesticides (Selected) & PCB | GC/ECD | 5191176 | 2017/09/30 | 2017/10/01 | Mahmudul Khan |
| OC Pesticides Summed Parameters | CALC | 5184593 | N/A | 2017/09/29 | Automated Statchk |
| PAH Compounds in Water by GC/MS (SIM) | GC/MS | 5189999 | 2017/09/29 | 2017/10/02 | Liliana Gaburici |
| pH | AT | 5187746 | N/A | 2017/09/29 | Surinder Rai |
| Sulphate by Automated Colourimetry | KONE | 5188563 | N/A | 2017/09/29 | Alina Dobreanu |
| Volatile Organic Compounds in Water | P&T/MS | 5187891 | N/A | 2017/10/02 | Dina Wang |



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Maxxam Job #: B7L1654
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** FEZ993 Dup
**Sample ID:** LTM 2
**Matrix:** Water

**Collected:** 2017/09/21
**Shipped:**
**Received:** 2017/09/27

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Petroleum Hydrocarbons F2-F4 in Water | GC/FID | 5189015 | 2017/09/29 | 2017/09/29 | Arezoo Habibagahi |
| OC Pesticides (Selected) & PCB | GC/ECD | 5191176 | 2017/09/30 | 2017/10/01 | Mahmudul Khan |
| Volatile Organic Compounds in Water | P&T/MS | 5187891 | N/A | 2017/10/02 | Dina Wang |

**Maxxam ID:** FEZ994
**Sample ID:** LTM 3
**Matrix:** Water

**Collected:** 2017/09/21
**Shipped:**
**Received:** 2017/09/27

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| 1,3-Dichloropropene Sum | CALC | 5184993 | N/A | 2017/10/03 | Automated Statchk |
| Chloride by Automated Colourimetry | KONE | 5188561 | N/A | 2017/09/29 | Deonarine Ramnarine |
| Free (WAD) Cyanide | SKAL/CN | 5189918 | N/A | 2017/10/02 | Louise Harding |
| Petroleum Hydro. CCME F1 & BTEX in Water | HSGC/MSFD | 5189945 | N/A | 2017/09/30 | Lyndsey Hart |
| Petroleum Hydrocarbons F2-F4 in Water | GC/FID | 5189015 | 2017/09/29 | 2017/09/29 | Arezoo Habibagahi |
| Fluoride | ISE | 5187731 | 2017/09/28 | 2017/09/29 | Surinder Rai |
| Mercury (low level) | CV/AA | 5190048 | 2017/09/29 | 2017/10/02 | Ron Morrison |
| Total Ammonia-N | LACH/NH4 | 5191060 | N/A | 2017/10/02 | Charles Opoku-Ware |
| Nitrate (NO3) and Nitrite (NO2) in Water | LACH | 5189134 | N/A | 2017/09/29 | Amanpreet Sappal |
| OC Pesticides (Selected) & PCB | GC/ECD | 5191176 | 2017/09/30 | 2017/10/01 | Mahmudul Khan |
| OC Pesticides Summed Parameters | CALC | 5184593 | N/A | 2017/09/29 | Automated Statchk |
| PAH Compounds in Water by GC/MS (SIM) | GC/MS | 5189999 | 2017/09/29 | 2017/10/02 | Liliana Gaburici |
| pH | AT | 5187746 | N/A | 2017/09/29 | Surinder Rai |
| Sulphate by Automated Colourimetry | KONE | 5188563 | N/A | 2017/09/29 | Alina Dobreanu |
| Volatile Organic Compounds in Water | P&T/MS | 5187891 | N/A | 2017/10/02 | Dina Wang |

**Maxxam ID:** FEZ994 Dup
**Sample ID:** LTM 3
**Matrix:** Water

**Collected:** 2017/09/21
**Shipped:**
**Received:** 2017/09/27

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| PAH Compounds in Water by GC/MS (SIM) | GC/MS | 5189999 | 2017/09/29 | 2017/10/02 | Liliana Gaburici |

**Maxxam ID:** FEZ995
**Sample ID:** LTM 4
**Matrix:** Water

**Collected:** 2017/09/21
**Shipped:**
**Received:** 2017/09/27

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| 1,3-Dichloropropene Sum | CALC | 5184993 | N/A | 2017/10/03 | Automated Statchk |
| Chloride by Automated Colourimetry | KONE | 5187929 | N/A | 2017/09/29 | Deonarine Ramnarine |
| Free (WAD) Cyanide | SKAL/CN | 5189918 | N/A | 2017/10/02 | Louise Harding |
| Petroleum Hydro. CCME F1 & BTEX in Water | HSGC/MSFD | 5189945 | N/A | 2017/09/30 | Lyndsey Hart |
| Petroleum Hydrocarbons F2-F4 in Water | GC/FID | 5189015 | 2017/09/29 | 2017/09/29 | Arezoo Habibagahi |
| Fluoride | ISE | 5187731 | 2017/09/28 | 2017/09/29 | Surinder Rai |
| Mercury (low level) | CV/AA | 5190048 | 2017/09/29 | 2017/10/02 | Ron Morrison |

Maxxam Job #: B7L1654
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** FEZ995
**Sample ID:** LTM 4
**Matrix:** Water

**Collected:** 2017/09/21
**Shipped:**
**Received:** 2017/09/27

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Total Ammonia-N | LACH/NH4 | 5191060 | N/A | 2017/10/02 | Charles Opoku-Ware |
| Nitrate (NO3) and Nitrite (NO2) in Water | LACH | 5187815 | N/A | 2017/10/02 | Chandra Nandlal |
| OC Pesticides (Selected) & PCB | GC/ECD | 5191176 | 2017/09/30 | 2017/10/01 | Mahmudul Khan |
| OC Pesticides Summed Parameters | CALC | 5184593 | N/A | 2017/09/29 | Automated Statchk |
| PAH Compounds in Water by GC/MS (SIM) | GC/MS | 5189999 | 2017/09/29 | 2017/10/02 | Liliana Gaburici |
| pH | AT | 5187746 | N/A | 2017/09/29 | Surinder Rai |
| Sulphate by Automated Colourimetry | KONE | 5187932 | N/A | 2017/09/29 | Deonarine Ramnarine |
| Volatile Organic Compounds in Water | P&T/MS | 5187891 | N/A | 2017/10/02 | Dina Wang |

**Maxxam ID:** FEZ996
**Sample ID:** LTM 5
**Matrix:** Water

**Collected:** 2017/09/21
**Shipped:**
**Received:** 2017/09/27

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| 1,3-Dichloropropene Sum | CALC | 5184993 | N/A | 2017/10/03 | Automated Statchk |
| Chloride by Automated Colourimetry | KONE | 5187929 | N/A | 2017/09/29 | Deonarine Ramnarine |
| Free (WAD) Cyanide | SKAL/CN | 5189918 | N/A | 2017/10/02 | Louise Harding |
| Petroleum Hydro. CCME F1 & BTEX in Water | HSGC/MSFD | 5189945 | N/A | 2017/10/02 | Lyndsey Hart |
| Petroleum Hydrocarbons F2-F4 in Water | GC/FID | 5189015 | 2017/09/29 | 2017/09/29 | Arezoo Habibagahi |
| Fluoride | ISE | 5187731 | 2017/09/28 | 2017/09/29 | Surinder Rai |
| Mercury (low level) | CV/AA | 5190048 | 2017/09/29 | 2017/10/02 | Ron Morrison |
| Total Ammonia-N | LACH/NH4 | 5191060 | N/A | 2017/10/02 | Charles Opoku-Ware |
| Nitrate (NO3) and Nitrite (NO2) in Water | LACH | 5187815 | N/A | 2017/10/02 | Chandra Nandlal |
| OC Pesticides (Selected) & PCB | GC/ECD | 5191176 | 2017/09/30 | 2017/10/01 | Mahmudul Khan |
| OC Pesticides Summed Parameters | CALC | 5184593 | N/A | 2017/09/29 | Automated Statchk |
| PAH Compounds in Water by GC/MS (SIM) | GC/MS | 5189999 | 2017/09/29 | 2017/10/02 | Liliana Gaburici |
| pH | AT | 5187746 | N/A | 2017/09/29 | Surinder Rai |
| Sulphate by Automated Colourimetry | KONE | 5187932 | N/A | 2017/09/29 | Deonarine Ramnarine |
| Volatile Organic Compounds in Water | P&T/MS | 5187891 | N/A | 2017/10/02 | Dina Wang |

**Maxxam ID:** FEZ997
**Sample ID:** LTM 6
**Matrix:** Water

**Collected:** 2017/09/21
**Shipped:**
**Received:** 2017/09/27

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| 1,3-Dichloropropene Sum | CALC | 5184993 | N/A | 2017/10/03 | Automated Statchk |
| Chloride by Automated Colourimetry | KONE | 5188561 | N/A | 2017/09/29 | Deonarine Ramnarine |
| Free (WAD) Cyanide | SKAL/CN | 5189918 | N/A | 2017/10/02 | Louise Harding |
| Petroleum Hydro. CCME F1 & BTEX in Water | HSGC/MSFD | 5189945 | N/A | 2017/10/02 | Lyndsey Hart |
| Petroleum Hydrocarbons F2-F4 in Water | GC/FID | 5189015 | 2017/09/29 | 2017/09/29 | Arezoo Habibagahi |
| Fluoride | ISE | 5187731 | 2017/09/28 | 2017/09/29 | Surinder Rai |
| Mercury (low level) | CV/AA | 5190048 | 2017/09/29 | 2017/10/02 | Ron Morrison |
| Total Ammonia-N | LACH/NH4 | 5191060 | N/A | 2017/10/02 | Charles Opoku-Ware |
| Nitrate (NO3) and Nitrite (NO2) in Water | LACH | 5187815 | N/A | 2017/10/02 | Chandra Nandlal |



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Maxxam Job #: B7L1654
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** FEZ997
**Sample ID:** LTM 6
**Matrix:** Water

**Collected:** 2017/09/21
**Shipped:**
**Received:** 2017/09/27

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| OC Pesticides (Selected) & PCB | GC/ECD | 5191176 | 2017/09/30 | 2017/10/01 | Mahmudul Khan |
| OC Pesticides Summed Parameters | CALC | 5184593 | N/A | 2017/09/29 | Automated Statchk |
| PAH Compounds in Water by GC/MS (SIM) | GC/MS | 5189999 | 2017/09/29 | 2017/10/02 | Liliana Gaburici |
| pH | AT | 5187746 | N/A | 2017/09/29 | Surinder Rai |
| Sulphate by Automated Colourimetry | KONE | 5188563 | N/A | 2017/09/29 | Alina Dobreanu |
| Volatile Organic Compounds in Water | P&T/MS | 5187891 | N/A | 2017/10/02 | Dina Wang |

**Maxxam ID:** FEZ998
**Sample ID:** LTM 7
**Matrix:** Water

**Collected:** 2017/09/21
**Shipped:**
**Received:** 2017/09/27

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| 1,3-Dichloropropene Sum | CALC | 5184993 | N/A | 2017/10/03 | Automated Statchk |
| Chloride by Automated Colourimetry | KONE | 5188561 | N/A | 2017/09/29 | Deonarine Ramnarine |
| Free (WAD) Cyanide | SKAL/CN | 5189918 | N/A | 2017/10/02 | Louise Harding |
| Petroleum Hydro. CCME F1 & BTEX in Water | HSGC/MSFD | 5189945 | N/A | 2017/10/02 | Lyndsey Hart |
| Petroleum Hydrocarbons F2-F4 in Water | GC/FID | 5189015 | 2017/09/29 | 2017/09/29 | Arezoo Habibagahi |
| Fluoride | ISE | 5187731 | 2017/09/28 | 2017/09/29 | Surinder Rai |
| Mercury (low level) | CV/AA | 5190048 | 2017/09/29 | 2017/10/02 | Ron Morrison |
| Total Ammonia-N | LACH/NH4 | 5191060 | N/A | 2017/10/02 | Charles Opoku-Ware |
| Nitrate (NO3) and Nitrite (NO2) in Water | LACH | 5187815 | N/A | 2017/10/02 | Chandra Nandlal |
| OC Pesticides (Selected) & PCB | GC/ECD | 5191176 | 2017/09/30 | 2017/10/01 | Mahmudul Khan |
| OC Pesticides Summed Parameters | CALC | 5184593 | N/A | 2017/09/29 | Automated Statchk |
| PAH Compounds in Water by GC/MS (SIM) | GC/MS | 5189999 | 2017/09/29 | 2017/10/02 | Liliana Gaburici |
| pH | AT | 5187746 | N/A | 2017/09/29 | Surinder Rai |
| Sulphate by Automated Colourimetry | KONE | 5188563 | N/A | 2017/09/29 | Alina Dobreanu |
| Volatile Organic Compounds in Water | P&T/MS | 5187891 | N/A | 2017/10/02 | Dina Wang |

**Maxxam ID:** FEZ999
**Sample ID:** DUP 1
**Matrix:** Water

**Collected:** 2017/09/21
**Shipped:**
**Received:** 2017/09/27

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| 1,3-Dichloropropene Sum | CALC | 5184993 | N/A | 2017/10/03 | Automated Statchk |
| Chloride by Automated Colourimetry | KONE | 5187929 | N/A | 2017/09/29 | Deonarine Ramnarine |
| Free (WAD) Cyanide | SKAL/CN | 5189918 | N/A | 2017/10/02 | Louise Harding |
| Petroleum Hydro. CCME F1 & BTEX in Water | HSGC/MSFD | 5189945 | N/A | 2017/10/02 | Lyndsey Hart |
| Petroleum Hydrocarbons F2-F4 in Water | GC/FID | 5189015 | 2017/09/29 | 2017/09/29 | Arezoo Habibagahi |
| Fluoride | ISE | 5187731 | 2017/09/28 | 2017/09/29 | Surinder Rai |
| Mercury (low level) | CV/AA | 5190048 | 2017/09/29 | 2017/10/02 | Ron Morrison |
| Total Ammonia-N | LACH/NH4 | 5191060 | N/A | 2017/10/02 | Charles Opoku-Ware |
| Nitrate (NO3) and Nitrite (NO2) in Water | LACH | 5187815 | N/A | 2017/10/02 | Chandra Nandlal |
| OC Pesticides (Selected) & PCB | GC/ECD | 5191176 | 2017/09/30 | 2017/10/01 | Mahmudul Khan |
| OC Pesticides Summed Parameters | CALC | 5184593 | N/A | 2017/09/29 | Automated Statchk |



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Maxxam Job #: B7L1654
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** FEZ999
**Sample ID:** DUP 1
**Matrix:** Water

**Collected:** 2017/09/21
**Shipped:**
**Received:** 2017/09/27

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| PAH Compounds in Water by GC/MS (SIM) | GC/MS | 5189999 | 2017/09/29 | 2017/10/02 | Liliana Gaburici |
| pH | AT | 5187746 | N/A | 2017/09/29 | Surinder Rai |
| Sulphate by Automated Colourimetry | KONE | 5187932 | N/A | 2017/09/29 | Deonarine Ramnarine |
| Volatile Organic Compounds in Water | P&T/MS | 5187891 | N/A | 2017/10/02 | Dina Wang |



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Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

| | |
|---|---|
| Package 1 | 12.0°C |
| Package 2 | 15.3°C |
| Package 3 | 14.3°C |
| Package 4 | 13.0°C |

Cooler custody seal was present and intact.

**Results relate only to the items tested.**



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Maxxam Job #: B7L1654
Report Date: 2017/10/17

## QUALITY ASSURANCE REPORT

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5187891 | 4-Bromofluorobenzene | 2017/10/02 | 102 | 70 - 130 | 101 | 70 - 130 | 96 | % | | |
| 5187891 | D4-1,2-Dichloroethane | 2017/10/02 | 103 | 70 - 130 | 105 | 70 - 130 | 104 | % | | |
| 5187891 | D8-Toluene | 2017/10/02 | 102 | 70 - 130 | 102 | 70 - 130 | 100 | % | | |
| 5189015 | o-Terphenyl | 2017/09/29 | 92 | 30 - 130 | 109 | 30 - 130 | 102 | % | | |
| 5189945 | 1,4-Difluorobenzene | 2017/09/29 | 95 | 70 - 130 | 112 | 70 - 130 | 94 | % | | |
| 5189945 | 4-Bromofluorobenzene | 2017/09/29 | 104 | 70 - 130 | 121 | 70 - 130 | 97 | % | | |
| 5189945 | D10-Ethylbenzene | 2017/09/29 | 120 | 70 - 130 | 106 | 70 - 130 | 94 | % | | |
| 5189945 | D4-1,2-Dichloroethane | 2017/09/29 | 93 | 70 - 130 | 120 | 70 - 130 | 104 | % | | |
| 5189999 | D10-Anthracene | 2017/10/02 | 107 | 50 - 130 | 108 | 50 - 130 | 109 | % | | |
| 5189999 | D14-Terphenyl (FS) | 2017/10/02 | 104 | 50 - 130 | 107 | 50 - 130 | 107 | % | | |
| 5189999 | D8-Acenaphthylene | 2017/10/02 | 101 | 50 - 130 | 104 | 50 - 130 | 109 | % | | |
| 5191176 | 2,4,5,6-Tetrachloro-m-xylene | 2017/10/01 | 88 | 50 - 130 | 86 | 50 - 130 | 81 | % | | |
| 5191176 | Decachlorobiphenyl | 2017/10/01 | 112 | 50 - 130 | 112 | 50 - 130 | 107 | % | | |
| 5187731 | Fluoride (F-) | 2017/09/29 | 109 | 80 - 120 | 99 | 80 - 120 | <0.10 | mg/L | 7.1 | 20 |
| 5187746 | pH | 2017/09/29 | | | 101 | 98 - 103 | | | 0.53 | N/A |
| 5187815 | Nitrate (N) | 2017/10/02 | 94 | 80 - 120 | 92 | 80 - 120 | <0.10 | mg/L | 7.8 | 20 |
| 5187815 | Nitrite (N) | 2017/10/02 | 101 | 80 - 120 | 101 | 80 - 120 | <0.010 | mg/L | NC | 20 |
| 5187891 | 1,1,1,2-Tetrachloroethane | 2017/10/02 | 109 | 70 - 130 | 109 | 70 - 130 | <0.20 | ug/L | NC | 30 |
| 5187891 | 1,1,1-Trichloroethane | 2017/10/02 | 97 | 70 - 130 | 99 | 70 - 130 | <0.10 | ug/L | NC | 30 |
| 5187891 | 1,1,2,2-Tetrachloroethane | 2017/10/02 | 107 | 70 - 130 | 111 | 70 - 130 | <0.20 | ug/L | NC | 30 |
| 5187891 | 1,1,2-Trichloroethane | 2017/10/02 | 100 | 70 - 130 | 103 | 70 - 130 | <0.20 | ug/L | NC | 30 |
| 5187891 | 1,1-Dichloroethane | 2017/10/02 | 104 | 70 - 130 | 103 | 70 - 130 | <0.10 | ug/L | NC | 30 |
| 5187891 | 1,1-Dichloroethylene | 2017/10/02 | 108 | 70 - 130 | 107 | 70 - 130 | <0.10 | ug/L | NC | 30 |
| 5187891 | 1,2-Dichlorobenzene | 2017/10/02 | 97 | 70 - 130 | 100 | 70 - 130 | <0.20 | ug/L | NC | 30 |
| 5187891 | 1,2-Dichloroethane | 2017/10/02 | 101 | 70 - 130 | 102 | 70 - 130 | <0.20 | ug/L | NC | 30 |
| 5187891 | 1,2-Dichloropropane | 2017/10/02 | 97 | 70 - 130 | 97 | 70 - 130 | <0.10 | ug/L | NC | 30 |
| 5187891 | 1,3-Dichlorobenzene | 2017/10/02 | 100 | 70 - 130 | 102 | 70 - 130 | <0.20 | ug/L | NC | 30 |
| 5187891 | 1,4-Dichlorobenzene | 2017/10/02 | 99 | 70 - 130 | 101 | 70 - 130 | <0.20 | ug/L | NC | 30 |
| 5187891 | Acetone (2-Propanone) | 2017/10/02 | 97 | 60 - 140 | 100 | 60 - 140 | <10 | ug/L | NC | 30 |
| 5187891 | Benzene | 2017/10/02 | 101 | 70 - 130 | 101 | 70 - 130 | <0.10 | ug/L | NC | 30 |
| 5187891 | Bromodichloromethane | 2017/10/02 | 100 | 70 - 130 | 102 | 70 - 130 | <0.10 | ug/L | NC | 30 |



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## QUALITY ASSURANCE REPORT(CONT'D)



| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5187891 | Bromoform | 2017/10/02 | 106 | 70 - 130 | 110 | 70 - 130 | <0.20 | ug/L | 13 | 30 |
| 5187891 | Bromomethane | 2017/10/02 | 100 | 60 - 140 | 96 | 60 - 140 | <0.50 | ug/L | NC | 30 |
| 5187891 | Carbon Tetrachloride | 2017/10/02 | 98 | 70 - 130 | 98 | 70 - 130 | <0.10 | ug/L | NC | 30 |
| 5187891 | Chlorobenzene | 2017/10/02 | 100 | 70 - 130 | 100 | 70 - 130 | <0.10 | ug/L | NC | 30 |
| 5187891 | Chloroform | 2017/10/02 | 100 | 70 - 130 | 100 | 70 - 130 | <0.10 | ug/L | NC | 30 |
| 5187891 | cis-1,2-Dichloroethylene | 2017/10/02 | 99 | 70 - 130 | 98 | 70 - 130 | <0.10 | ug/L | NC | 30 |
| 5187891 | cis-1,3-Dichloropropene | 2017/10/02 | 98 | 70 - 130 | 98 | 70 - 130 | <0.20 | ug/L | NC | 30 |
| 5187891 | Dibromochloromethane | 2017/10/02 | 105 | 70 - 130 | 107 | 70 - 130 | <0.20 | ug/L | NC | 30 |
| 5187891 | Dichlorodifluoromethane (FREON 12) | 2017/10/02 | 93 | 60 - 140 | 97 | 60 - 140 | <0.50 | ug/L | NC | 30 |
| 5187891 | Ethylbenzene | 2017/10/02 | 100 | 70 - 130 | 101 | 70 - 130 | <0.10 | ug/L | NC | 30 |
| 5187891 | Ethylene Dibromide | 2017/10/02 | 103 | 70 - 130 | 105 | 70 - 130 | <0.20 | ug/L | NC | 30 |
| 5187891 | Hexane | 2017/10/02 | 109 | 70 - 130 | 116 | 70 - 130 | <0.50 | ug/L | NC | 30 |
| 5187891 | Methyl Ethyl Ketone (2-Butanone) | 2017/10/02 | 97 | 60 - 140 | 100 | 60 - 140 | <5.0 | ug/L | NC | 30 |
| 5187891 | Methyl Isobutyl Ketone | 2017/10/02 | 107 | 70 - 130 | 100 | 70 - 130 | <5.0 | ug/L | NC | 30 |
| 5187891 | Methyl t-butyl ether (MTBE) | 2017/10/02 | 90 | 70 - 130 | 89 | 70 - 130 | <0.20 | ug/L | NC | 30 |
| 5187891 | Methylene Chloride(Dichloromethane) | 2017/10/02 | 90 | 70 - 130 | 92 | 70 - 130 | <0.50 | ug/L | NC | 30 |
| 5187891 | o-Xylene | 2017/10/02 | 101 | 70 - 130 | 101 | 70 - 130 | <0.10 | ug/L | NC | 30 |
| 5187891 | p+m-Xylene | 2017/10/02 | 104 | 70 - 130 | 104 | 70 - 130 | <0.10 | ug/L | NC | 30 |
| 5187891 | Styrene | 2017/10/02 | 102 | 70 - 130 | 103 | 70 - 130 | <0.20 | ug/L | NC | 30 |
| 5187891 | Tetrachloroethylene | 2017/10/02 | 93 | 70 - 130 | 96 | 70 - 130 | <0.10 | ug/L | NC | 30 |
| 5187891 | Toluene | 2017/10/02 | 99 | 70 - 130 | 99 | 70 - 130 | <0.20 | ug/L | NC | 30 |
| 5187891 | Total Xylenes | 2017/10/02 | | | | | <0.10 | ug/L | NC | 30 |
| 5187891 | trans-1,2-Dichloroethylene | 2017/10/02 | 102 | 70 - 130 | 100 | 70 - 130 | <0.10 | ug/L | NC | 30 |
| 5187891 | trans-1,3-Dichloropropene | 2017/10/02 | 105 | 70 - 130 | 105 | 70 - 130 | <0.20 | ug/L | NC | 30 |
| 5187891 | Trichloroethylene | 2017/10/02 | 97 | 70 - 130 | 96 | 70 - 130 | <0.10 | ug/L | NC | 30 |
| 5187891 | Trichlorofluoromethane (FREON 11) | 2017/10/02 | 105 | 70 - 130 | 107 | 70 - 130 | <0.20 | ug/L | NC | 30 |
| 5187891 | Vinyl Chloride | 2017/10/02 | 107 | 70 - 130 | 105 | 70 - 130 | <0.20 | ug/L | NC | 30 |
| 5187929 | Dissolved Chloride (Cl) | 2017/09/29 | 115 | 80 - 120 | 105 | 80 - 120 | <1.0 | mg/L | NC | 20 |
| 5187932 | Dissolved Sulphate (SO4) | 2017/09/29 | 109 | 75 - 125 | 99 | 80 - 120 | <1.0 | mg/L | 13 | 20 |
| 5188561 | Dissolved Chloride (Cl) | 2017/09/29 | 110 | 80 - 120 | 102 | 80 - 120 | <1.0 | mg/L | 5.5 | 20 |
| 5188563 | Dissolved Sulphate (SO4) | 2017/09/29 | 104 | 75 - 125 | 95 | 80 - 120 | <1.0 | mg/L | 2.5 | 20 |

Maxxam Job #: B7L1654
Report Date: 2017/10/17

## QUALITY ASSURANCE REPORT(CONT'D)

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5189015 | F2 (C10-C16 Hydrocarbons) | 2017/09/29 | 89 | 50 - 130 | 83 | 80 - 120 | <100 | ug/L | NC | 50 |
| 5189015 | F3 (C16-C34 Hydrocarbons) | 2017/09/29 | 89 | 50 - 130 | 83 | 80 - 120 | <200 | ug/L | NC | 50 |
| 5189015 | F4 (C34-C50 Hydrocarbons) | 2017/09/29 | 89 | 50 - 130 | 83 | 80 - 120 | <200 | ug/L | NC | 50 |
| 5189134 | Nitrate (N) | 2017/09/29 | NC | 80 - 120 | 97 | 80 - 120 | <0.10 | mg/L | 2.1 | 20 |
| 5189134 | Nitrite (N) | 2017/09/29 | 100 | 80 - 120 | 101 | 80 - 120 | <0.010 | mg/L | 5.5 | 20 |
| 5189918 | WAD Cyanide (Free) | 2017/10/02 | 95 | 80 - 120 | 93 | 80 - 120 | <1 | ug/L | NC | 20 |
| 5189945 | Benzene | 2017/09/29 | 95 | 70 - 130 | 87 | 70 - 130 | <0.20 | ug/L | NC | 40 |
| 5189945 | Ethylbenzene | 2017/09/29 | 93 | 70 - 130 | 93 | 70 - 130 | <0.20 | ug/L | NC | 40 |
| 5189945 | F1 (C6-C10) - BTEX | 2017/09/29 | | | | | <25 | ug/L | NC | 40 |
| 5189945 | F1 (C6-C10) | 2017/09/29 | 97 | 70 - 130 | 93 | 70 - 130 | <25 | ug/L | NC | 40 |
| 5189945 | o-Xylene | 2017/09/29 | 93 | 70 - 130 | 93 | 70 - 130 | <0.20 | ug/L | NC | 40 |
| 5189945 | p+m-Xylene | 2017/09/29 | 95 | 70 - 130 | 93 | 70 - 130 | <0.40 | ug/L | NC | 40 |
| 5189945 | Toluene | 2017/09/29 | 87 | 70 - 130 | 93 | 70 - 130 | <0.20 | ug/L | NC | 40 |
| 5189945 | Total Xylenes | 2017/09/29 | | | | | <0.40 | ug/L | NC | 40 |
| 5189999 | 1-Methylnaphthalene | 2017/10/02 | 109 | 50 - 130 | 86 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5189999 | 2-Methylnaphthalene | 2017/10/02 | 104 | 50 - 130 | 83 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5189999 | Acenaphthene | 2017/10/02 | 110 | 50 - 130 | 94 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5189999 | Acenaphthylene | 2017/10/02 | 96 | 50 - 130 | 80 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5189999 | Anthracene | 2017/10/02 | 105 | 50 - 130 | 92 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5189999 | Benzo(a)anthracene | 2017/10/02 | 115 | 50 - 130 | 102 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5189999 | Benzo(a)pyrene | 2017/10/02 | 100 | 50 - 130 | 97 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5189999 | Benzo(b/j)fluoranthene | 2017/10/02 | 101 | 50 - 130 | 92 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5189999 | Benzo(g,h,i)perylene | 2017/10/02 | 73 | 50 - 130 | 77 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5189999 | Benzo(k)fluoranthene | 2017/10/02 | 101 | 50 - 130 | 98 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5189999 | Chrysene | 2017/10/02 | 102 | 50 - 130 | 88 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5189999 | Dibenz(a,h)anthracene | 2017/10/02 | 55 | 50 - 130 | 52 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5189999 | Fluoranthene | 2017/10/02 | 107 | 50 - 130 | 95 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5189999 | Fluorene | 2017/10/02 | 112 | 50 - 130 | 94 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5189999 | Indeno(1,2,3-cd)pyrene | 2017/10/02 | 98 | 50 - 130 | 85 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5189999 | Naphthalene | 2017/10/02 | 85 | 50 - 130 | 71 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5189999 | Phenanthrene | 2017/10/02 | 101 | 50 - 130 | 87 | 50 - 130 | <0.010 | ug/L | NC | 30 |



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Maxxam Job #: B7L1654
Report Date: 2017/10/17

## QUALITY ASSURANCE REPORT(CONT'D)

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5189999 | Pyrene | 2017/10/02 | 97 | 50 - 130 | 87 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5190048 | Mercury (Hg) | 2017/10/02 | 105 | 75 - 125 | 106 | 80 - 120 | <0.01 | ug/L | NC | 20 |
| 5191060 | Total Ammonia-N | 2017/10/02 | 99 | 80 - 120 | 96 | 85 - 115 | <0.050 | mg/L | NC | 20 |
| 5191176 | a-Chlordane | 2017/10/01 | 96 | 50 - 130 | 108 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5191176 | Aldrin | 2017/10/01 | 105 | 50 - 130 | 104 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5191176 | alpha-BHC | 2017/10/01 | 87 | 30 - 130 | 100 | 30 - 130 | <0.005 | ug/L | NC | 40 |
| 5191176 | Aroclor 1016 | 2017/10/01 | | | | | <0.05 | ug/L | NC | 30 |
| 5191176 | Aroclor 1221 | 2017/10/01 | | | | | <0.05 | ug/L | NC | 30 |
| 5191176 | Aroclor 1232 | 2017/10/01 | | | | | <0.05 | ug/L | NC | 30 |
| 5191176 | Aroclor 1242 | 2017/10/01 | | | | | <0.05 | ug/L | NC | 30 |
| 5191176 | Aroclor 1248 | 2017/10/01 | | | | | <0.05 | ug/L | NC | 30 |
| 5191176 | Aroclor 1254 | 2017/10/01 | | | | | <0.05 | ug/L | NC | 30 |
| 5191176 | Aroclor 1260 | 2017/10/01 | | | | | <0.05 | ug/L | NC | 30 |
| 5191176 | beta-BHC | 2017/10/01 | 82 | 30 - 130 | 93 | 30 - 130 | <0.005 | ug/L | NC | 40 |
| 5191176 | delta-BHC | 2017/10/01 | 84 | 30 - 130 | 95 | 30 - 130 | <0.005 | ug/L | NC | 40 |
| 5191176 | Dieldrin | 2017/10/01 | 109 | 50 - 130 | 119 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5191176 | Endosulfan I (alpha) | 2017/10/01 | 83 | 50 - 130 | 101 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5191176 | Endosulfan II (beta) | 2017/10/01 | 88 | 50 - 130 | 96 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5191176 | Endosulfan sulfate | 2017/10/01 | 98 | 30 - 130 | 106 | 30 - 130 | <0.005 | ug/L | NC | 40 |
| 5191176 | Endrin aldehyde | 2017/10/01 | 94 | 30 - 130 | 101 | 30 - 130 | <0.005 | ug/L | NC | 40 |
| 5191176 | Endrin ketone | 2017/10/01 | 99 | 30 - 130 | 108 | 30 - 130 | <0.005 | ug/L | NC | 40 |
| 5191176 | Endrin | 2017/10/01 | 97 | 50 - 130 | 105 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5191176 | g-Chlordane | 2017/10/01 | 97 | 50 - 130 | 98 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5191176 | Heptachlor epoxide | 2017/10/01 | 96 | 50 - 130 | 104 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5191176 | Heptachlor | 2017/10/01 | 90 | 50 - 130 | 96 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5191176 | Hexachlorobenzene | 2017/10/01 | 94 | 50 - 130 | 98 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5191176 | Lindane | 2017/10/01 | 87 | 50 - 130 | 97 | 50 - 130 | <0.003 | ug/L | NC | 30 |
| 5191176 | Methoxychlor | 2017/10/01 | 104 | 50 - 130 | 114 | 50 - 130 | <0.01 | ug/L | NC | 30 |
| 5191176 | Mirex | 2017/10/01 | 95 | 30 - 130 | 92 | 30 - 130 | <0.005 | ug/L | NC | 40 |
| 5191176 | o,p-DDD | 2017/10/01 | 102 | 50 - 130 | 112 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5191176 | o,p-DDE | 2017/10/01 | 99 | 50 - 130 | 107 | 50 - 130 | <0.005 | ug/L | NC | 30 |



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## QUALITY ASSURANCE REPORT(CONT'D)



| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5191176 | o,p-DDT | 2017/10/01 | 96 | 50 - 130 | 102 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5191176 | Octachlorostyrene | 2017/10/01 | 95 | 30 - 130 | 97 | 30 - 130 | <0.005 | ug/L | NC | 40 |
| 5191176 | Oxychlordane | 2017/10/01 | 86 | 30 - 130 | 91 | 30 - 130 | <0.005 | ug/L | NC | 30 |
| 5191176 | p,p-DDD | 2017/10/01 | 108 | 50 - 130 | 110 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5191176 | p,p-DDE | 2017/10/01 | 99 | 50 - 130 | 112 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5191176 | p,p-DDT | 2017/10/01 | 113 | 50 - 130 | 118 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5191176 | Toxaphene | 2017/10/01 | | | | | <0.2 | ug/L | NC | 40 |

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



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Maxxam Job #: B7L1654
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Steve Roberts, Ottawa Lab Manager

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Maxxam
A Bureau Veritas Group Company

Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.maxxam.ca

# CHAIN OF CUSTODY RECORD

Page 1 of 1

| INVOICE TO: | | REPORT TO: | | PROJECT INFORMATION: | | Laboratory Use Only: | |
|---|---|---|---|---|---|---|---|
| Company Name: | #10988 ARCADIS Canada Inc | Company Name: | | Quotation #: | B54416 | Maxxam Job #: | Bottle Order #: |
| Attention: | Invoices Attention | Attention: | Ryan Janzen / Ryan Fletcher | P.O. #: | | | 629305 |
| Address: | 329 Churchill Ave N Suite 200<br>Ottawa ON K1Z 5B8 | Address: | | Project: | 102153-000 | COC #: | Project Manager: |
| Tel: | (613) 721-0555 x Fax: (613) 721-0029 x | Tel: | Fax: | Project Name: | TC Langley | C#629305-01-01 | Alison Cameron |
| Email: | invoicesottawa@arcadis.com, barb.adelman@arcadis-c | Email: | ryan.janzen@arcadis.com; ryan.fletcher@... | Site #: | | | |
| | | | | Sampled By: | RF | | |

**MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY**

**Regulation 153 (2011)**
- ☐ Table 1 ☐ Res/Park ☐ Medium/Fine
- ☐ Table 2 ☒ Ind/Comm ☐ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ For RSC
- ☐ Table ___

**Other Regulations**
- ☒ CCME ☐ Sanitary Sewer Bylaw
- ☐ Reg 558 ☐ Storm Sewer Bylaw
- ☐ MISA Municipality ___
- ☐ PWQO
- ☐ Other ___

**Special Instructions**

*Include Criteria on Certificate of Analysis (Y/N)?* ___

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

| | Sample Barcode Label | Sample (Location) Identification | Date Sampled | Time Sampled | Matrix | Field Filtered (please circle): Metals / Hg / Cr VI | CCME PHC F1-F4 & BTEX | PAH Compounds in Water by GC/MS (SIM) | Volatile Organic Compounds in Water | OC Pesticides (Selected) & PCB | Anions: Cl, F, NO2, NO3, SO4 | Cyanide, Ammonia, pH, Sulphide | Metals: low level Hg, low level total ICPMS | | | | # of Bottles | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | LTM1 | Sept.21/17 | 9:00 | SW | N | X | X | X | X | X | X | X | | | | | |
| 2 | | LTM2 | Sept.21/17 | 9:30 | SW | N | X | X | X | X | X | X | X | | | | | |
| 3 | | LTM3 | Sept.21/17 | 10:06 | SW | N | X | X | X | X | X | X | X | | | | | |
| 4 | | LTM4 | Sept.21/17 | 10:30 | SW | N | X | X | X | X | X | X | X | | | | | |
| 5 | | LTM5 | Sept.21/17 | 11:06 | SW | N | X | X | X | X | X | X | X | | | | | |
| 6 | | LTM6 | Sept.21/17 | 11:30 | SW | N | X | X | X | X | X | X | X | | | | | |
| 7 | | LTM7 | Sept.21/17 | 12:00 | SW | N | X | X | X | X | X | X | X | | | | | |
| 8 | | DUP1 | Sept.21/17 | — | SW | N | X | X | X | X | X | X | X | | | | | |
| 9 | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | |

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

**Regular (Standard) TAT:** ☒
*(will be applied if Rush TAT is not specified).*
*Standard TAT = 5-7 Working days for most tests.*
*Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.*

**Job Specific Rush TAT (if applies to entire submission)**
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

27-Sep-17 10:55
Alison Cameron
B7L1654
KIV OTT-001

RECEIVED IN OTTAWA

ON Ice

| * RELINQUISHED BY: (Signature/Print) | Date: (YY/MM/DD) | Time | RECEIVED BY: (Signature/Print) | Date: (YY/MM/DD) | Time | # jars used and not submitted |
|---|---|---|---|---|---|---|
| Ryan Fletcher | Sept.22/17 | 14h | [illegible] | 17/09/27 | 10:55 | |

| Laboratory Use Only | | | | |
|---|---|---|---|---|
| Time Sensitive | Temperature (°C) on Recei | Custody Seal | Yes | No |
| | 12, 13, 11 | Present | | |
| | | Intact | X | |

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT HTTP://MAXXAM.CA/WP-CONTENT/UPLOADS/ONTARIO-COC.PDF.

SAMPLES MUST BE KEPT COOL ( < 10° C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

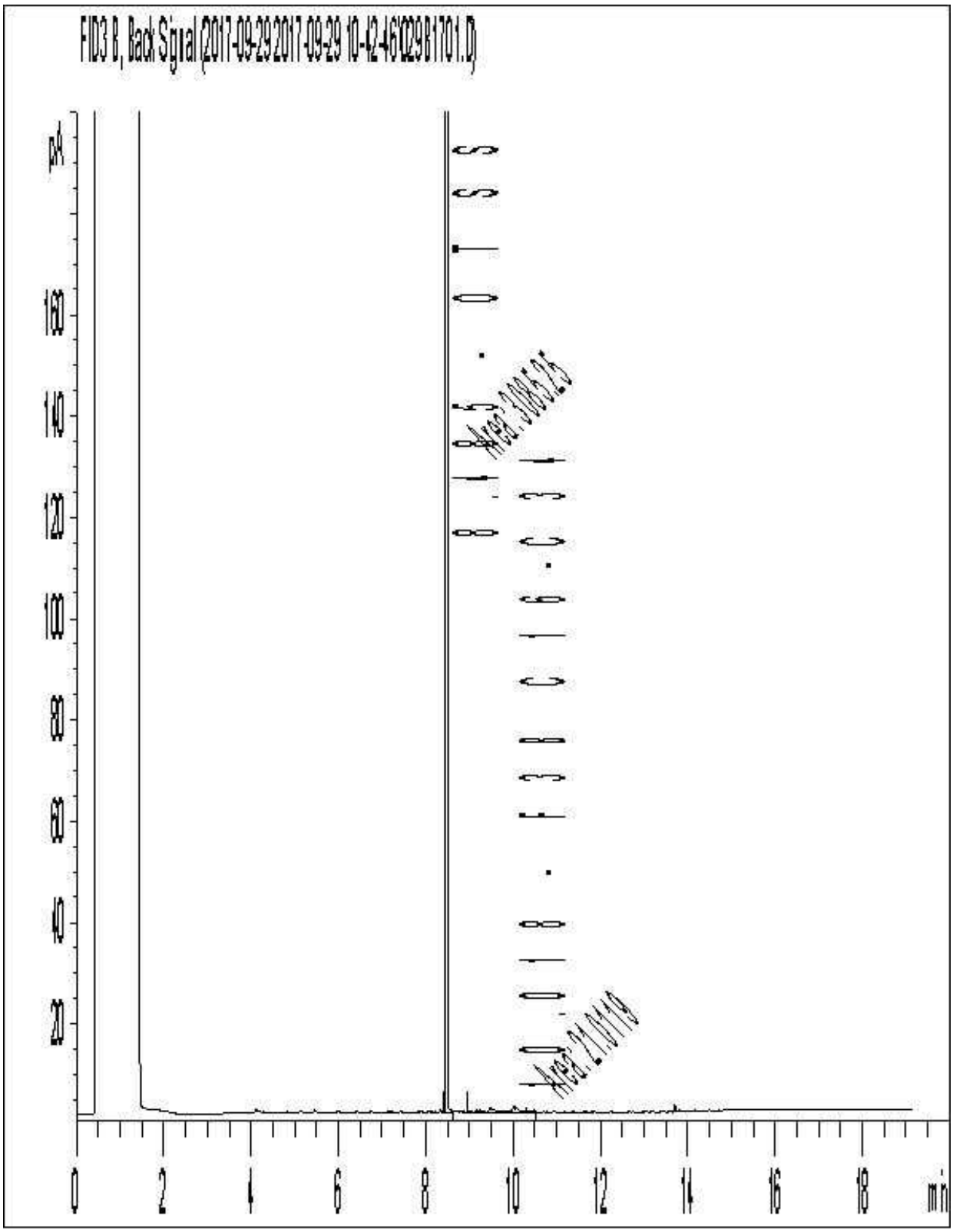
White: Maxxa Yellow: Client

15, 16, 15 | 12, 13, 14
14, 15, 14

Maxxam Job #: B7L1654
Report Date: 2017/10/17
Maxxam Sample: FEZ992

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: LTM 1

**Petroleum Hydrocarbons F2-F4 in Water Chromatogram**

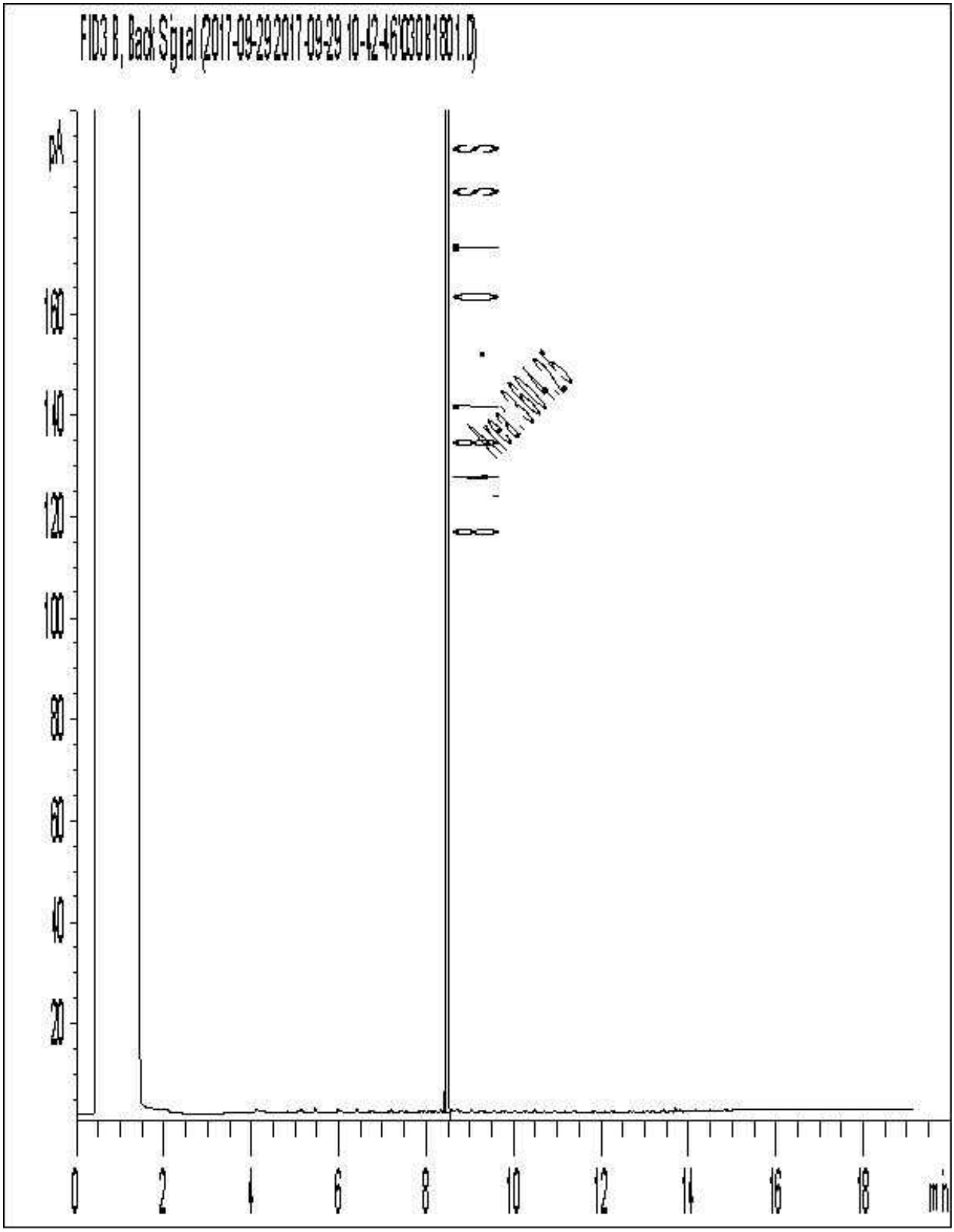



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7L1654
Report Date: 2017/10/17
Maxxam Sample: FEZ993

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: LTM 2

**Petroleum Hydrocarbons F2-F4 in Water Chromatogram**

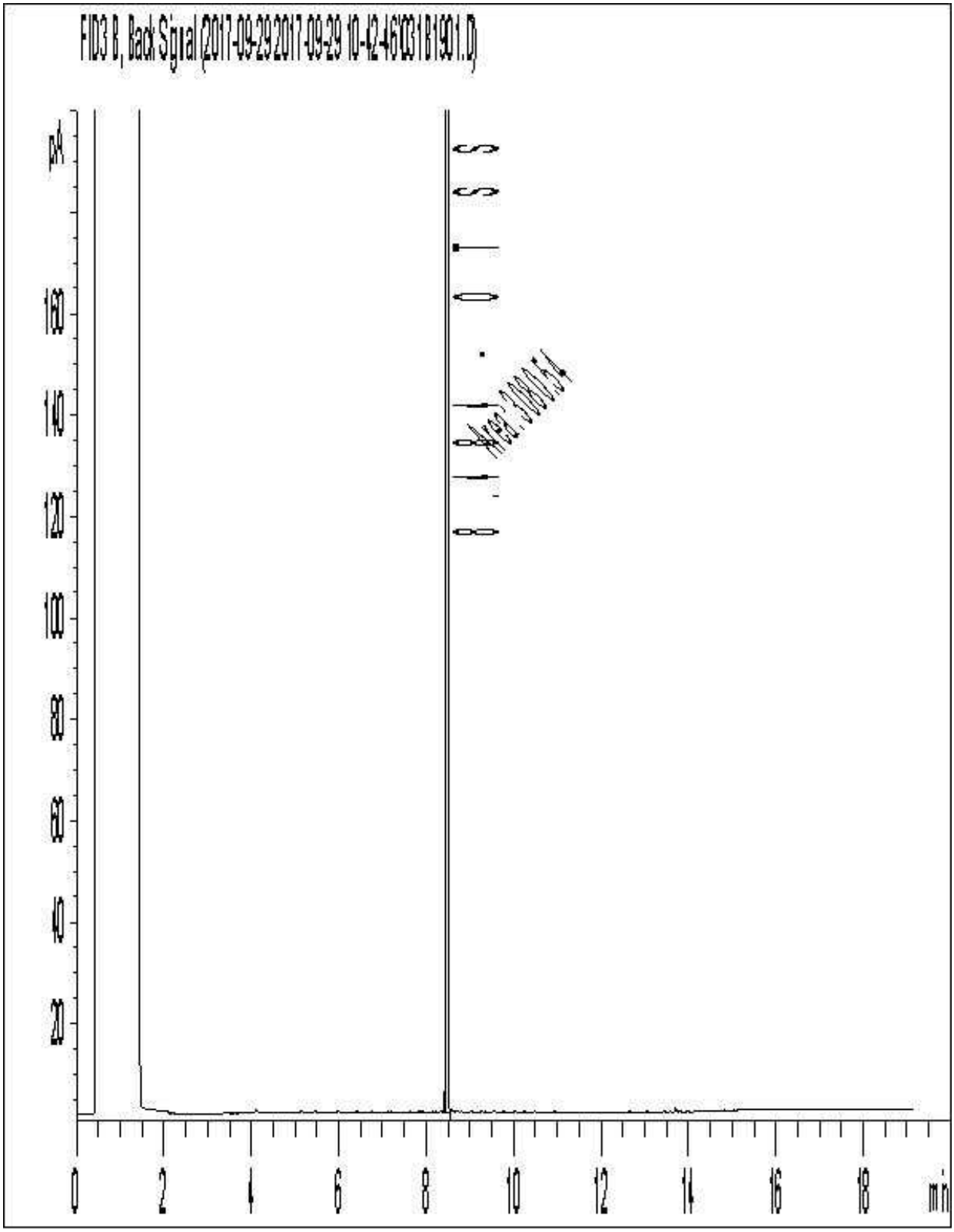



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7L1654
Report Date: 2017/10/17
Maxxam Sample: FEZ993 Lab-Dup

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: LTM 2

**Petroleum Hydrocarbons F2-F4 in Water Chromatogram**

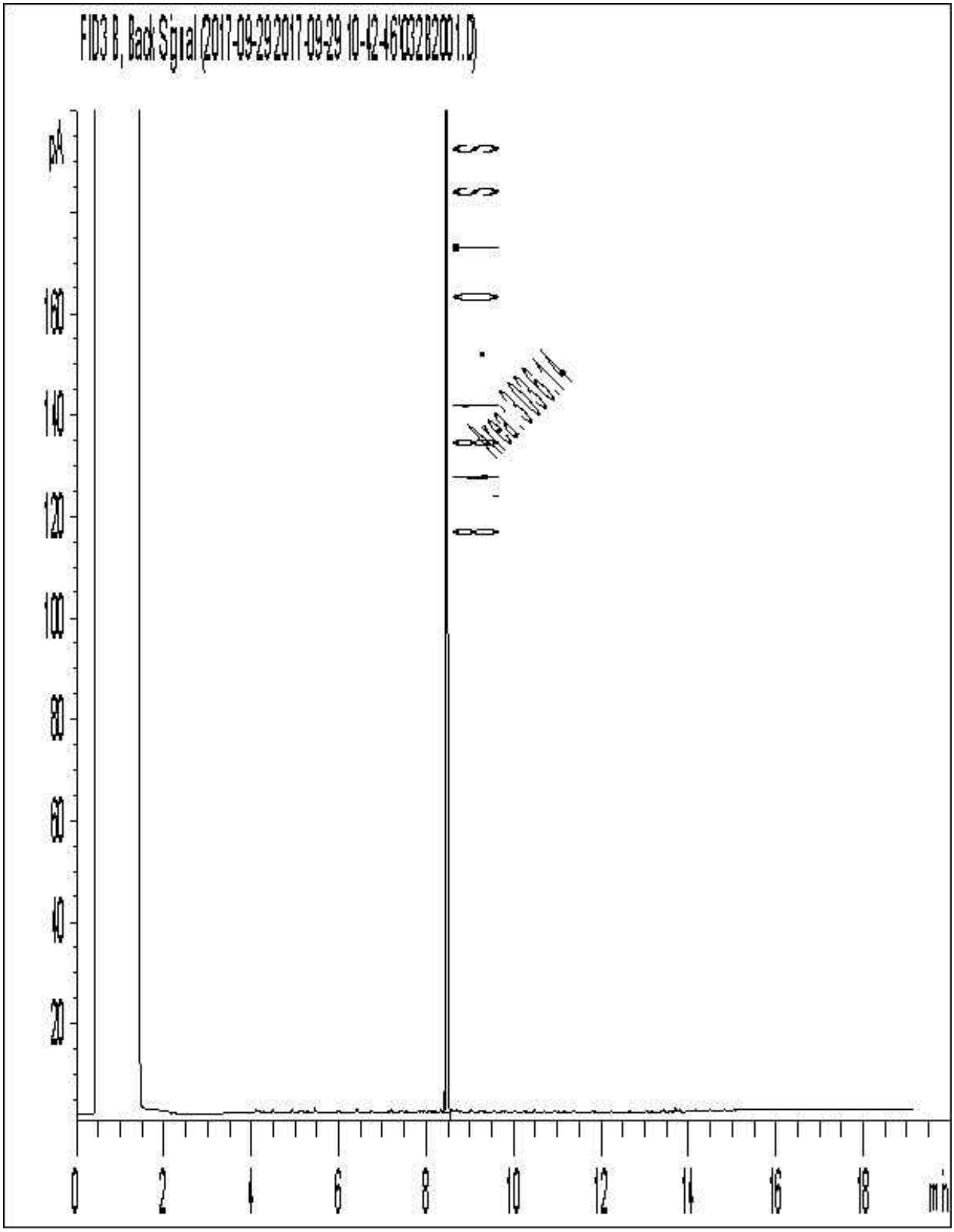



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7L1654
Report Date: 2017/10/17
Maxxam Sample: FEZ994

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: LTM 3

**Petroleum Hydrocarbons F2-F4 in Water Chromatogram**

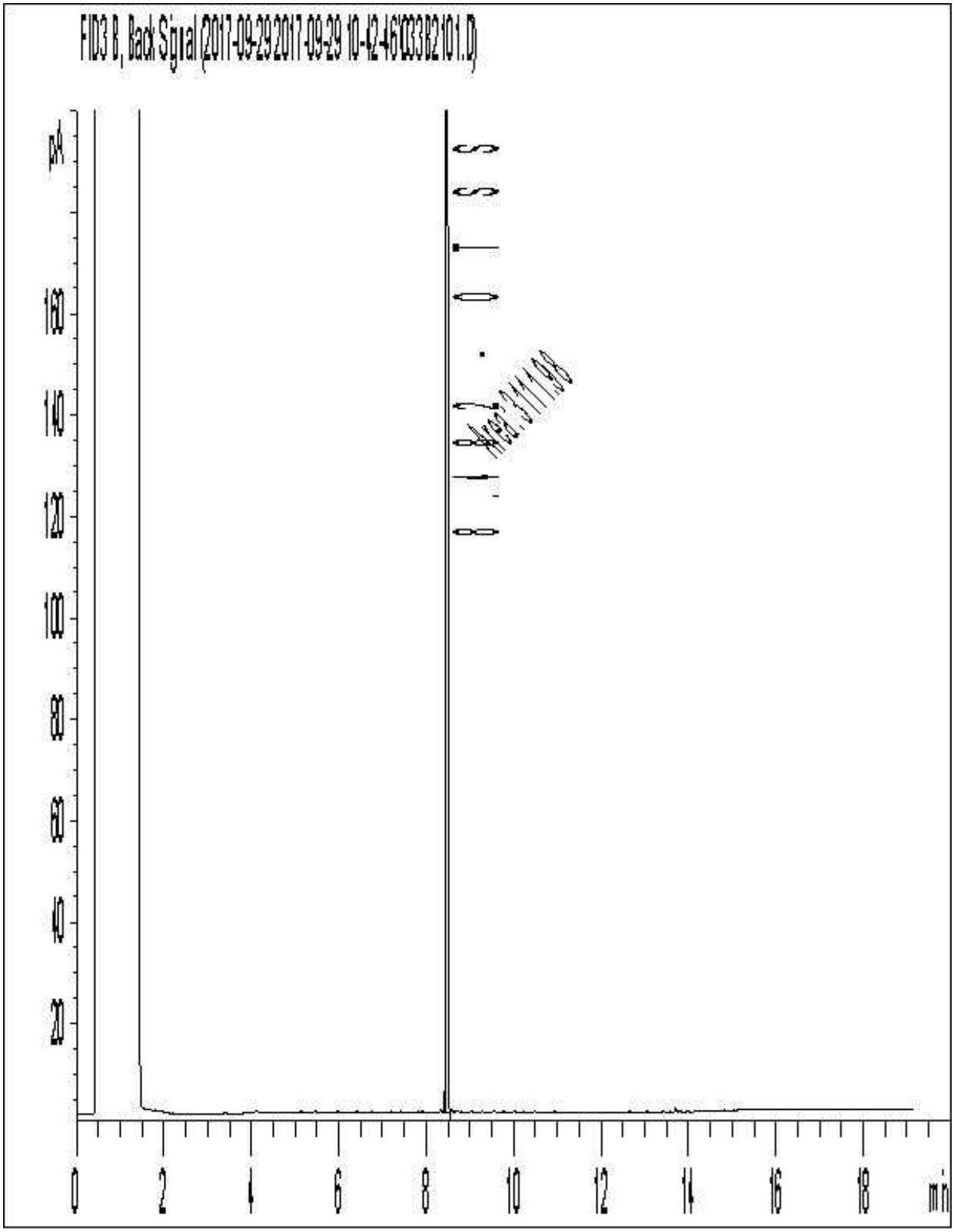



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7L1654
Report Date: 2017/10/17
Maxxam Sample: FEZ995

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: LTM 4

**Petroleum Hydrocarbons F2-F4 in Water Chromatogram**

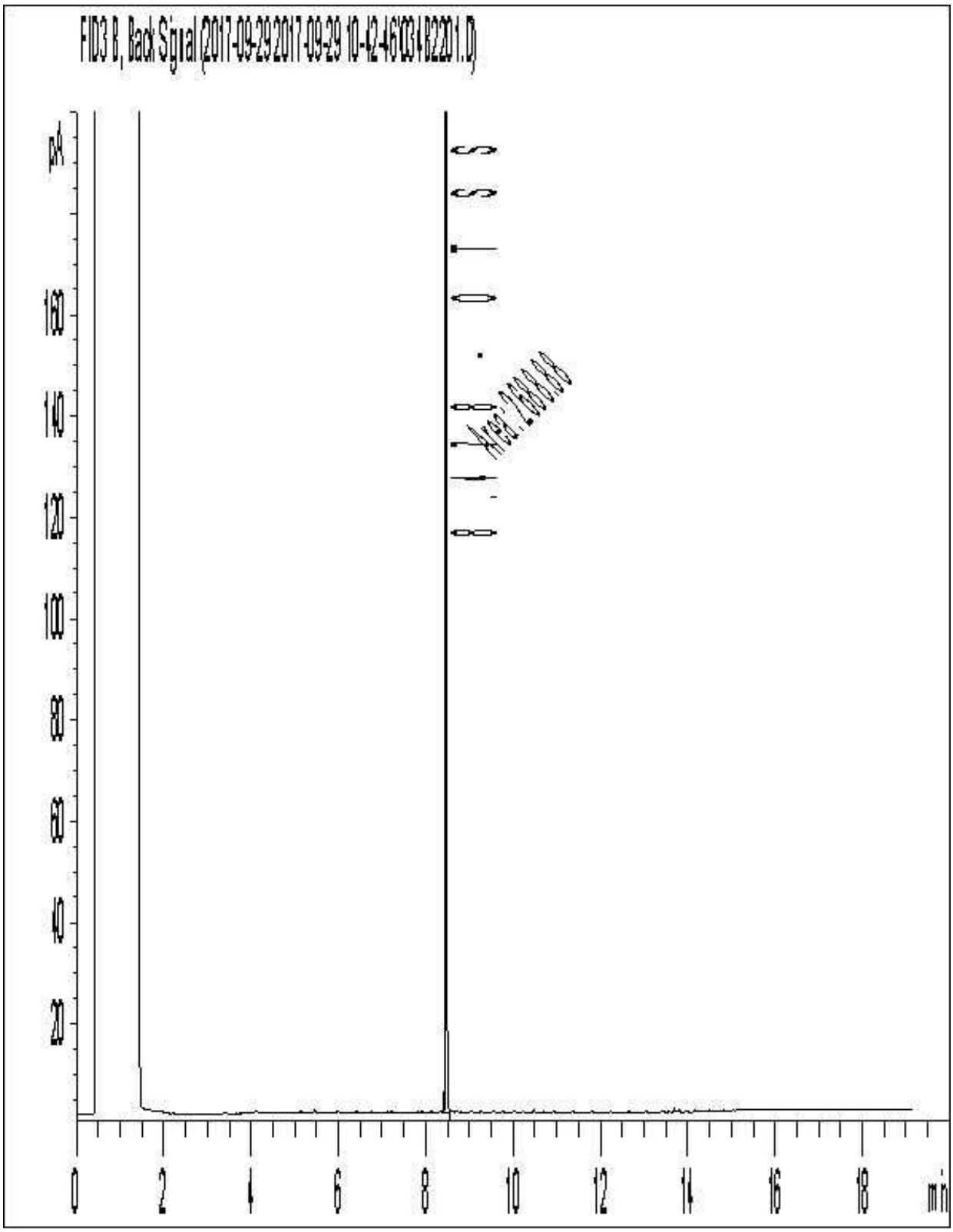



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7L1654
Report Date: 2017/10/17
Maxxam Sample: FEZ996

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: LTM 5

**Petroleum Hydrocarbons F2-F4 in Water Chromatogram**

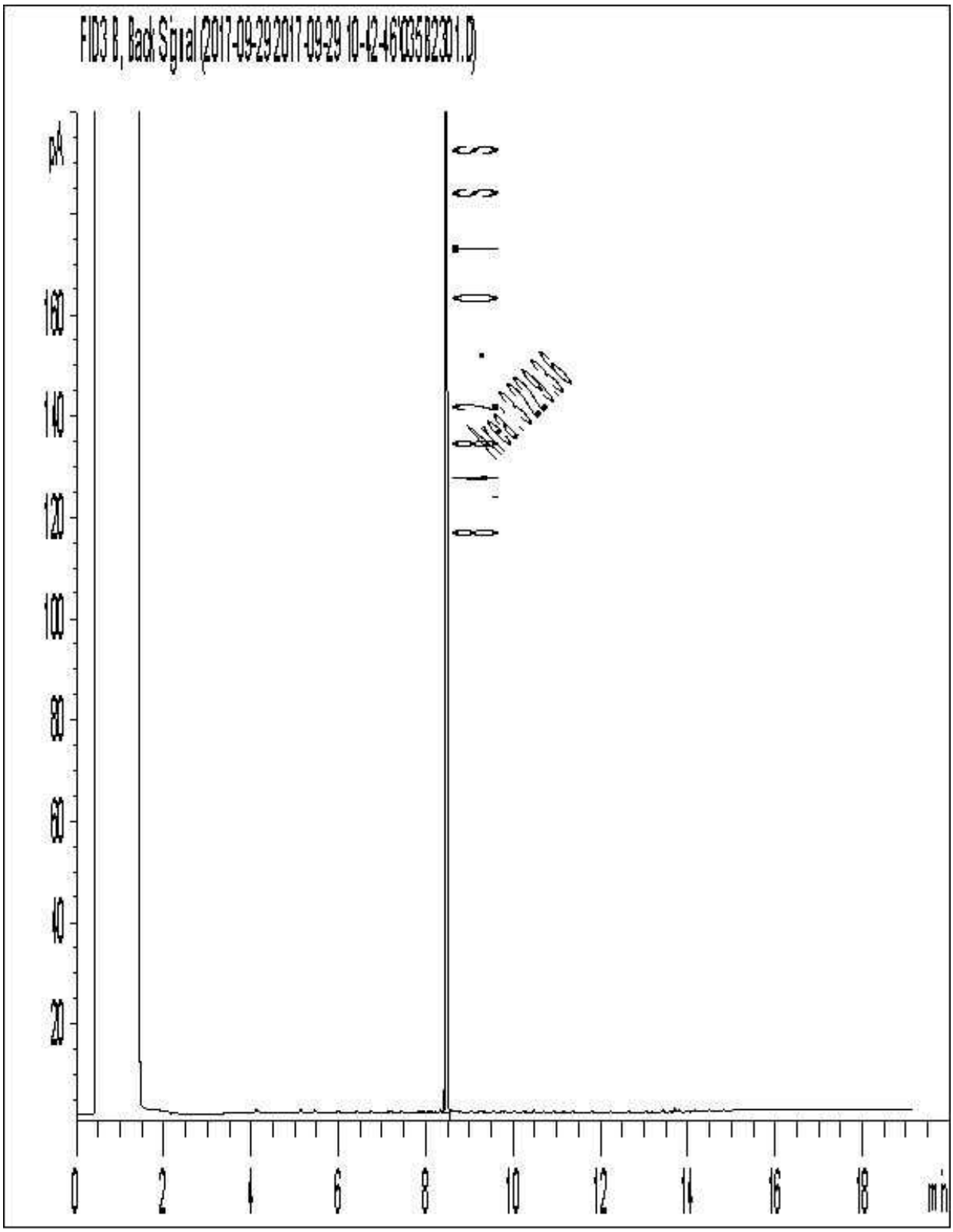



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7L1654
Report Date: 2017/10/17
Maxxam Sample: FEZ997

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: LTM 6

**Petroleum Hydrocarbons F2-F4 in Water Chromatogram**

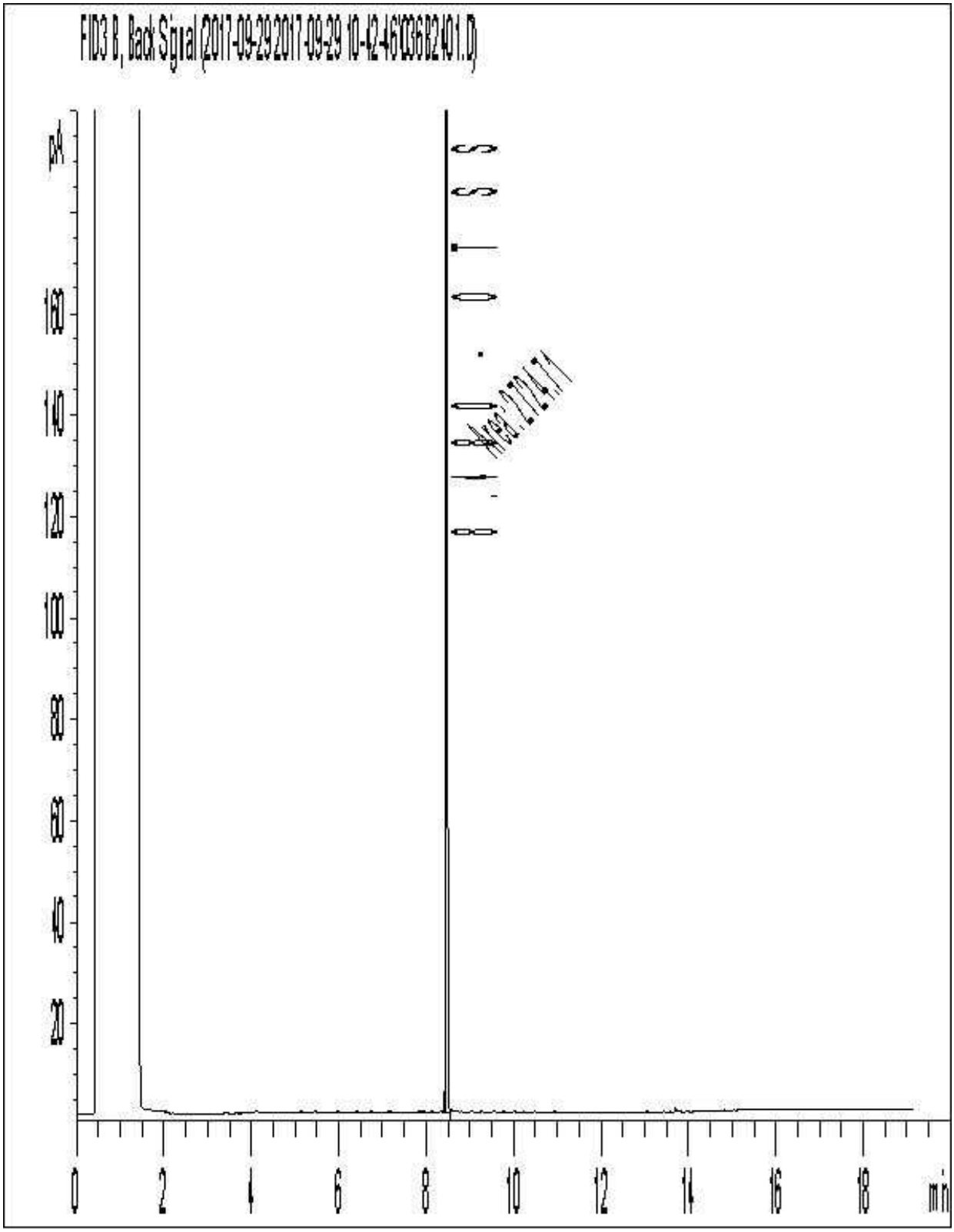



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7L1654
Report Date: 2017/10/17
Maxxam Sample: FEZ998

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: LTM 7

**Petroleum Hydrocarbons F2-F4 in Water Chromatogram**

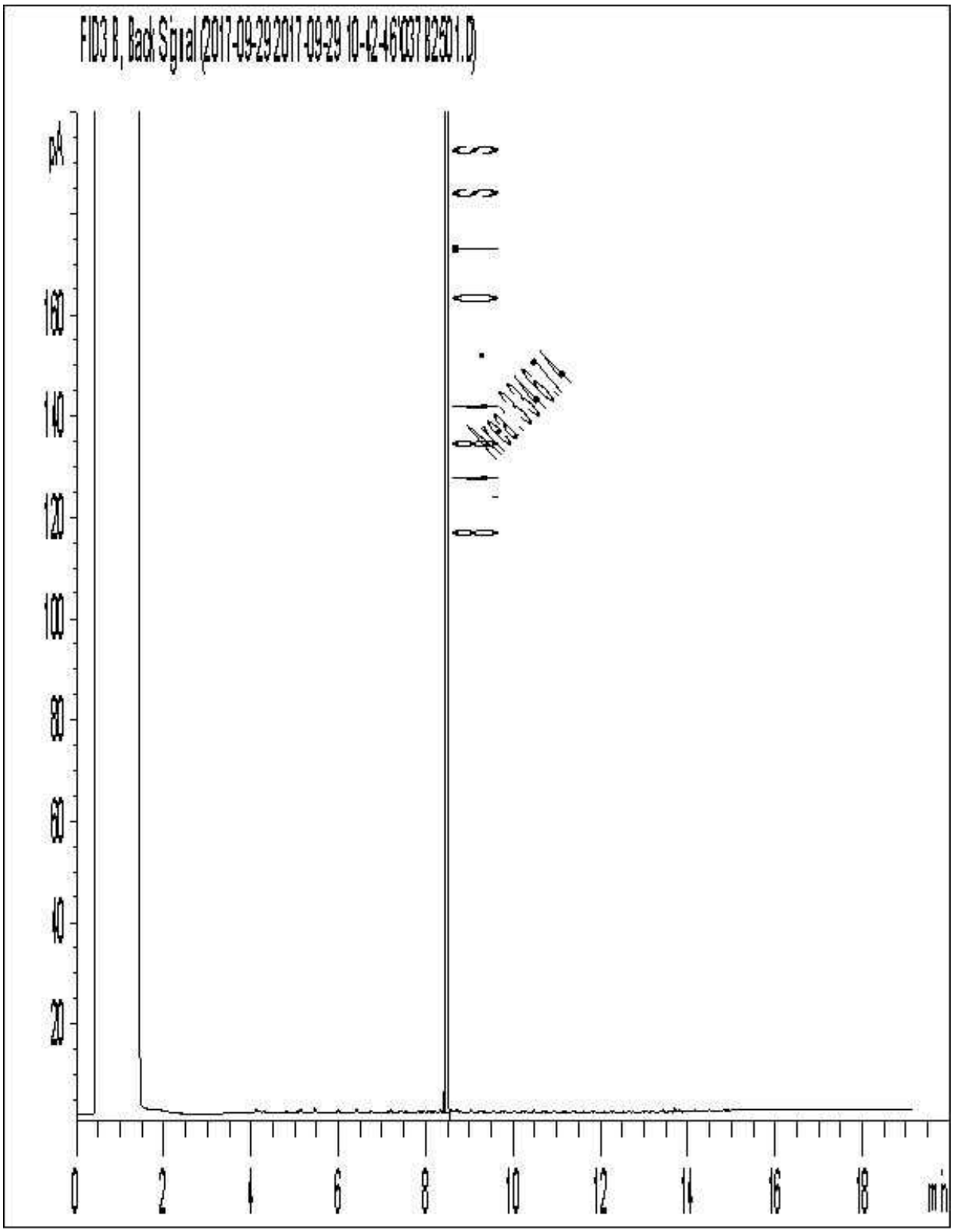



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7L1654
Report Date: 2017/10/17
Maxxam Sample: FEZ999

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: DUP 1

**Petroleum Hydrocarbons F2-F4 in Water Chromatogram**




**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam
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Your Project #: MB7L1654
Your C.O.C. #: B7L1654-M060-01-01

**Attention:SUBCONTRACTOR**

MAXXAM ANALYTICS
OTTAWA
32 COLONNADE RD N
UNIT 1000
NEPEAN, ON
CANADA K2E7J6

**Report Date: 2017/10/02**
Report #: R2452945
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B784294**
**Received: 2017/09/28, 08:51**

Sample Matrix: Water
# Samples Received: 8

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Analytical Method |
|---|---|---|---|---|---|
| Sulphide (as H2S) | 8 | N/A | 2017/09/28 | AB WI-00065 | Auto Calc |
| Sulphide | 8 | N/A | 2017/09/28 | AB SOP-00080 | SM 22 4500 S2-A D F |

**Remarks:**

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.



Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Your Project #: MB7L1654
Your C.O.C. #: B7L1654-M060-01-01

**Attention:SUBCONTRACTOR**

MAXXAM ANALYTICS
OTTAWA
32 COLONNADE RD N
UNIT 1000
NEPEAN, ON
CANADA K2E7J6

**Report Date: 2017/10/02**
Report #: R2452945
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B784294**
**Received: 2017/09/28, 08:51**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Joyce Kimani, Project Manager Assistant
Email: JKimani@maxxam.ca
Phone# (403)735-2287
==========
This report has been generated and distributed using a secure automated process.
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Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B784294
Report Date: 2017/10/02

MAXXAM ANALYTICS
Client Project #: MB7L1654
Sampler Initials: RF

## RESULTS OF CHEMICAL ANALYSES OF WATER

| Maxxam ID | | SB5498 | SB5499 | SB5500 | SB5501 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/21 09:00 | 2017/09/21 09:30 | 2017/09/21 10:06 | 2017/09/21 10:30 | | |
| COC Number | | B7L1654-M060-01-01 | B7L1654-M060-01-01 | B7L1654-M060-01-01 | B7L1654-M060-01-01 | | |
| | UNITS | LTM 1 (FEZ992) | LTM 2 (FEZ993) | LTM 3 (FEZ994) | LTM 4 (FEZ995) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Sulphide (as H2S) | mg/L | 0.013 | <0.0020 | <0.0020 | <0.0020 | 0.0020 | 8773989 |
| **Anions** | | | | | | | |
| Total Sulphide | mg/L | 0.013 | <0.0019 | <0.0019 | <0.0019 | 0.0019 | 8774362 |
| RDL = Reportable Detection Limit | | | | | | | |

| Maxxam ID | | SB5502 | SB5503 | SB5504 | SB5505 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/21 11:00 | 2017/09/21 11:30 | 2017/09/21 12:00 | 2017/09/21 | | |
| COC Number | | B7L1654-M060-01-01 | B7L1654-M060-01-01 | B7L1654-M060-01-01 | B7L1654-M060-01-01 | | |
| | UNITS | LTM 5 (FEZ996) | LTM 6 (FEZ997) | LTM 7 (FEZ998) | DUP 1 (FEZ999) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Sulphide (as H2S) | mg/L | <0.0020 | <0.0020 | <0.0020 | 0.013 | 0.0020 | 8773989 |
| **Anions** | | | | | | | |
| Total Sulphide | mg/L | <0.0019 | <0.0019 | <0.0019 | 0.013 | 0.0019 | 8774362 |
| RDL = Reportable Detection Limit | | | | | | | |



Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B784294
Report Date: 2017/10/02

MAXXAM ANALYTICS
Client Project #: MB7L1654
Sampler Initials: RF

## GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

| | |
|---|---|
| Package 1 | 2.3°C |

**Results relate only to the items tested.**



Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B784294
Report Date: 2017/10/02

MAXXAM ANALYTICS
Client Project #: MB7L1654
Sampler Initials: RF

## QUALITY ASSURANCE REPORT

| QA/QC Batch | Init | QC Type | Parameter | Date Analyzed | Value | Recovery | UNITS | QC Limits |
|---|---|---|---|---|---|---|---|---|
| 8774362 | MSZ | Spiked Blank | Total Sulphide | 2017/09/28 | | 95 | % | 80 - 120 |
| 8774362 | MSZ | Method Blank | Total Sulphide | 2017/09/28 | <0.0019 | | mg/L | |
| 8774362 | MSZ | RPD | Total Sulphide | 2017/09/28 | 5.1 | | % | 20 |

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.



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Maxxam Job #: B784294
Report Date: 2017/10/02

MAXXAM ANALYTICS
Client Project #: MB7L1654
Sampler Initials: RF

## VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Harry (Peng) Liang, Senior Analyst

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Your Project #: MB7L1654
Site Location: 102153-000
Your C.O.C. #: b7l1654-m058-01-01

**Attention:Alison Cameron**

MAXXAM ANALYTICS
OTTAWA
32 COLONNADE RD N
UNIT 1000
NEPEAN, ON
CANADA K2E7J6

**Report Date: 2017/10/02**
Report #: R2453076
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B784302**
**Received: 2017/09/28, 08:25**

Sample Matrix: Water
# Samples Received: 8

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Analytical Method |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | 3 | N/A | 2017/10/01 | BBY WI-00033 | Auto Calc |
| Hardness Total (calculated as CaCO3) | 5 | N/A | 2017/10/02 | BBY WI-00033 | Auto Calc |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | 3 | 2017/09/28 | 2017/10/01 | BBY7SOP-00002 | EPA 6020B R2 m |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | 5 | 2017/09/28 | 2017/10/02 | BBY7SOP-00002 | EPA 6020B R2 m |
| Elements by CRC ICPMS (total) | 3 | 2017/09/29 | 2017/09/29 | BBY7SOP-00003, | BCLM2005,EPA6020bR2m |
| Elements by CRC ICPMS (total) | 5 | 2017/09/29 | 2017/10/01 | BBY7SOP-00003, | BCLM2005,EPA6020bR2m |

**Remarks:**

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
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Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.



Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Your Project #: MB7L1654
Site Location: 102153-000
Your C.O.C. #: b7l1654-m058-01-01

**Attention:Alison Cameron**

MAXXAM ANALYTICS
OTTAWA
32 COLONNADE RD N
UNIT 1000
NEPEAN, ON
CANADA K2E7J6

**Report Date: 2017/10/02**
Report #: R2453076
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B784302**
**Received: 2017/09/28, 08:25**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Namita Sahni, Burnaby Project Manager
Email: NSahni@maxxam.ca
Phone# (604)639-2614

==========

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Maxxam Job #: B784302
Report Date: 2017/10/02

MAXXAM ANALYTICS
Client Project #: MB7L1654
Site Location: 102153-000
Sampler Initials: RF

## CCME TOTAL METALS IN WATER (WATER)

| Maxxam ID | | SB5538 | | | SB5539 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/21 09:00 | | | 2017/09/21 09:30 | | |
| COC Number | | b7l1654-m058-01-01 | | | b7l1654-m058-01-01 | | |
| | UNITS | LTM 1 (FEZ992) | RDL | QC Batch | LTM 2 (FEZ993) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Total Hardness (CaCO3) | mg/L | 1010 | 0.50 | 8773946 | 95.7 | 0.50 | 8773946 |
| **Total Metals by ICPMS** | | | | | | | |
| Total Aluminum (Al) | ug/L | 149 | 30 | 8775927 | 62.9 | 3.0 | 8775998 |
| Total Antimony (Sb) | ug/L | <5.0 | 5.0 | 8775927 | <0.50 | 0.50 | 8775998 |
| Total Arsenic (As) | ug/L | <1.0 | 1.0 | 8775927 | <0.10 | 0.10 | 8775998 |
| Total Barium (Ba) | ug/L | <10 | 10 | 8775927 | <1.0 | 1.0 | 8775998 |
| Total Beryllium (Be) | ug/L | <1.0 | 1.0 | 8775927 | <0.10 | 0.10 | 8775998 |
| Total Bismuth (Bi) | ug/L | <10 | 10 | 8775927 | <1.0 | 1.0 | 8775998 |
| Total Boron (B) | ug/L | 797 | 500 | 8775927 | 113 | 50 | 8775998 |
| Total Cadmium (Cd) | ug/L | <0.10 | 0.10 | 8775927 | <0.010 | 0.010 | 8775998 |
| Total Chromium (Cr) | ug/L | <10 | 10 | 8775927 | <1.0 | 1.0 | 8775998 |
| Total Cobalt (Co) | ug/L | <2.0 | 2.0 | 8775927 | <0.20 | 0.20 | 8775998 |
| Total Copper (Cu) | ug/L | <5.0 | 5.0 | 8775927 | 2.75 | 0.50 | 8775998 |
| Total Iron (Fe) | ug/L | 6070 | 100 | 8775927 | 197 | 10 | 8775998 |
| Total Lead (Pb) | ug/L | <2.0 | 2.0 | 8775927 | 0.64 | 0.20 | 8775998 |
| Total Lithium (Li) | ug/L | 31 | 20 | 8775927 | 3.5 | 2.0 | 8775998 |
| Total Manganese (Mn) | ug/L | 49 | 10 | 8775927 | 9.7 | 1.0 | 8775998 |
| Total Molybdenum (Mo) | ug/L | <10 | 10 | 8775927 | <1.0 | 1.0 | 8775998 |
| Total Nickel (Ni) | ug/L | <10 | 10 | 8775927 | <1.0 | 1.0 | 8775998 |
| Total Selenium (Se) | ug/L | <1.0 | 1.0 | 8775927 | <0.10 | 0.10 | 8775998 |
| Total Silicon (Si) | ug/L | 2270 | 1000 | 8775927 | 2390 | 100 | 8775998 |
| Total Silver (Ag) | ug/L | <0.20 | 0.20 | 8775927 | <0.020 | 0.020 | 8775998 |
| Total Strontium (Sr) | ug/L | 1370 | 10 | 8775927 | 114 | 1.0 | 8775998 |
| Total Thallium (Tl) | ug/L | <0.10 | 0.10 | 8775927 | <0.010 | 0.010 | 8775998 |
| Total Tin (Sn) | ug/L | <50 | 50 | 8775927 | <5.0 | 5.0 | 8775998 |
| Total Titanium (Ti) | ug/L | <50 | 50 | 8775927 | <5.0 | 5.0 | 8775998 |
| Total Uranium (U) | ug/L | <1.0 | 1.0 | 8775927 | 0.11 | 0.10 | 8775998 |
| Total Vanadium (V) | ug/L | <50 | 50 | 8775927 | <5.0 | 5.0 | 8775998 |
| Total Zinc (Zn) | ug/L | <50 | 50 | 8775927 | <5.0 | 5.0 | 8775998 |
| Total Zirconium (Zr) | ug/L | <1.0 | 1.0 | 8775927 | <0.10 | 0.10 | 8775998 |
| Total Calcium (Ca) | mg/L | 86.1 | 0.50 | 8773980 | 11.3 | 0.050 | 8773980 |
| RDL = Reportable Detection Limit | | | | | | | |



Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B784302
Report Date: 2017/10/02

MAXXAM ANALYTICS
Client Project #: MB7L1654
Site Location: 102153-000
Sampler Initials: RF

## CCME TOTAL METALS IN WATER (WATER)

| **Maxxam ID** | | SB5538 | | | SB5539 | | |
|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2017/09/21 09:00 | | | 2017/09/21 09:30 | | |
| **COC Number** | | b7l1654-m058-01-01 | | | b7l1654-m058-01-01 | | |
| | **UNITS** | **LTM 1 (FEZ992)** | **RDL** | **QC Batch** | **LTM 2 (FEZ993)** | **RDL** | **QC Batch** |
| Total Magnesium (Mg) | mg/L | 194 | 0.50 | 8773980 | 16.4 | 0.050 | 8773980 |
| Total Potassium (K) | mg/L | 70.2 | 0.50 | 8773980 | 6.87 | 0.050 | 8773980 |
| Total Sodium (Na) | mg/L | 1570 | 0.50 | 8773980 | 147 | 0.050 | 8773980 |
| Total Sulphur (S) | mg/L | 186 | 30 | 8773980 | 19.4 | 3.0 | 8773980 |
| RDL = Reportable Detection Limit | | | | | | | |



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Report Date: 2017/10/02

MAXXAM ANALYTICS
Client Project #: MB7L1654
Site Location: 102153-000
Sampler Initials: RF

## CCME TOTAL METALS IN WATER (WATER)

| Maxxam ID | | SB5540 | | | SB5541 | | SB5542 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/21 10:06 | | | 2017/09/21 10:30 | | 2017/09/21 11:00 | | |
| COC Number | | b7l1654-m058-01-01 | | | b7l1654-m058-01-01 | | b7l1654-m058-01-01 | | |
| | UNITS | LTM 3 (FEZ994) | RDL | QC Batch | LTM 4 (FEZ995) | QC Batch | LTM 5 (FEZ996) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | | | |
| Total Hardness (CaCO3) | mg/L | 487 | 0.50 | 8773946 | 97.4 | 8773946 | 38.4 | 0.50 | 8773946 |
| **Total Metals by ICPMS** | | | | | | | | | |
| Total Aluminum (Al) | ug/L | <15 | 15 | 8775927 | 9.9 | 8775998 | 17.5 | 3.0 | 8775927 |
| Total Antimony (Sb) | ug/L | <2.5 | 2.5 | 8775927 | <0.50 | 8775998 | <0.50 | 0.50 | 8775927 |
| Total Arsenic (As) | ug/L | <0.50 | 0.50 | 8775927 | <0.10 | 8775998 | <0.10 | 0.10 | 8775927 |
| Total Barium (Ba) | ug/L | <5.0 | 5.0 | 8775927 | 2.6 | 8775998 | 3.2 | 1.0 | 8775927 |
| Total Beryllium (Be) | ug/L | <0.50 | 0.50 | 8775927 | <0.10 | 8775998 | <0.10 | 0.10 | 8775927 |
| Total Bismuth (Bi) | ug/L | <5.0 | 5.0 | 8775927 | <1.0 | 8775998 | <1.0 | 1.0 | 8775927 |
| Total Boron (B) | ug/L | 482 | 250 | 8775927 | 71 | 8775998 | <50 | 50 | 8775927 |
| Total Cadmium (Cd) | ug/L | <0.050 | 0.050 | 8775927 | 0.021 | 8775998 | 0.035 | 0.010 | 8775927 |
| Total Chromium (Cr) | ug/L | <5.0 | 5.0 | 8775927 | <1.0 | 8775998 | <1.0 | 1.0 | 8775927 |
| Total Cobalt (Co) | ug/L | <1.0 | 1.0 | 8775927 | <0.20 | 8775998 | <0.20 | 0.20 | 8775927 |
| Total Copper (Cu) | ug/L | <2.5 | 2.5 | 8775927 | 0.53 | 8775998 | 0.68 | 0.50 | 8775927 |
| Total Iron (Fe) | ug/L | 337 | 50 | 8775927 | 484 | 8775998 | 793 | 10 | 8775927 |
| Total Lead (Pb) | ug/L | <1.0 | 1.0 | 8775927 | <0.20 | 8775998 | 0.26 | 0.20 | 8775927 |
| Total Lithium (Li) | ug/L | 15 | 10 | 8775927 | 2.7 | 8775998 | <2.0 | 2.0 | 8775927 |
| Total Manganese (Mn) | ug/L | 32.6 | 5.0 | 8775927 | 35.5 | 8775998 | 47.3 | 1.0 | 8775927 |
| Total Molybdenum (Mo) | ug/L | <5.0 | 5.0 | 8775927 | <1.0 | 8775998 | <1.0 | 1.0 | 8775927 |
| Total Nickel (Ni) | ug/L | <5.0 | 5.0 | 8775927 | <1.0 | 8775998 | <1.0 | 1.0 | 8775927 |
| Total Selenium (Se) | ug/L | <0.50 | 0.50 | 8775927 | <0.10 | 8775998 | <0.10 | 0.10 | 8775927 |
| Total Silicon (Si) | ug/L | 1860 | 500 | 8775927 | 3350 | 8775998 | 3890 | 100 | 8775927 |
| Total Silver (Ag) | ug/L | <0.10 | 0.10 | 8775927 | <0.020 | 8775998 | <0.020 | 0.020 | 8775927 |
| Total Strontium (Sr) | ug/L | 640 | 5.0 | 8775927 | 109 | 8775998 | 30.1 | 1.0 | 8775927 |
| Total Thallium (Tl) | ug/L | <0.050 | 0.050 | 8775927 | <0.010 | 8775998 | <0.010 | 0.010 | 8775927 |
| Total Tin (Sn) | ug/L | <25 | 25 | 8775927 | <5.0 | 8775998 | <5.0 | 5.0 | 8775927 |
| Total Titanium (Ti) | ug/L | <25 | 25 | 8775927 | <5.0 | 8775998 | <5.0 | 5.0 | 8775927 |
| Total Uranium (U) | ug/L | <0.50 | 0.50 | 8775927 | <0.10 | 8775998 | <0.10 | 0.10 | 8775927 |
| Total Vanadium (V) | ug/L | <25 | 25 | 8775927 | <5.0 | 8775998 | <5.0 | 5.0 | 8775927 |
| Total Zinc (Zn) | ug/L | 68 | 25 | 8775927 | <5.0 | 8775998 | 5.7 | 5.0 | 8775927 |
| Total Zirconium (Zr) | ug/L | <0.50 | 0.50 | 8775927 | <0.10 | 8775998 | <0.10 | 0.10 | 8775927 |
| Total Calcium (Ca) | mg/L | 45.1 | 0.25 | 8773980 | 14.7 | 8773980 | 11.3 | 0.050 | 8773980 |

RDL = Reportable Detection Limit



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Maxxam Job #: B784302
Report Date: 2017/10/02

MAXXAM ANALYTICS
Client Project #: MB7L1654
Site Location: 102153-000
Sampler Initials: RF

## CCME TOTAL METALS IN WATER (WATER)

| Maxxam ID | | SB5540 | | | SB5541 | | SB5542 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/21 10:06 | | | 2017/09/21 10:30 | | 2017/09/21 11:00 | | |
| COC Number | | b7l1654-m058-01-01 | | | b7l1654-m058-01-01 | | b7l1654-m058-01-01 | | |
| | UNITS | LTM 3 (FEZ994) | RDL | QC Batch | LTM 4 (FEZ995) | QC Batch | LTM 5 (FEZ996) | RDL | QC Batch |
| Total Magnesium (Mg) | mg/L | 90.9 | 0.25 | 8773980 | 14.7 | 8773980 | 2.49 | 0.050 | 8773980 |
| Total Potassium (K) | mg/L | 34.3 | 0.25 | 8773980 | 5.13 | 8773980 | 0.481 | 0.050 | 8773980 |
| Total Sodium (Na) | mg/L | 764 | 0.25 | 8773980 | 122 | 8773980 | 4.22 | 0.050 | 8773980 |
| Total Sulphur (S) | mg/L | 106 | 15 | 8773980 | 14.2 | 8773980 | <3.0 | 3.0 | 8773980 |

RDL = Reportable Detection Limit



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Maxxam Job #: B784302
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MAXXAM ANALYTICS
Client Project #: MB7L1654
Site Location: 102153-000
Sampler Initials: RF

## CCME TOTAL METALS IN WATER (WATER)

| Maxxam ID | | SB5543 | | SB5544 | | SB5545 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/21 11:30 | | 2017/09/21 12:00 | | 2017/09/21 | | |
| COC Number | | b7l1654-m058-01-01 | | b7l1654-m058-01-01 | | b7l1654-m058-01-01 | | |
| | UNITS | LTM 6 (FEZ997) | QC Batch | LTM 7 (FEZ998) | RDL | DUP 1 (FEZ999) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | | |
| Total Hardness (CaCO3) | mg/L | 36.7 | 8773946 | 44.4 | 0.50 | 1080 | 0.50 | 8773946 |
| **Total Metals by ICPMS** | | | | | | | | |
| Total Aluminum (Al) | ug/L | 9.4 | 8775998 | 26.3 | 3.0 | 157 | 30 | 8775927 |
| Total Antimony (Sb) | ug/L | <0.50 | 8775998 | <0.50 | 0.50 | <5.0 | 5.0 | 8775927 |
| Total Arsenic (As) | ug/L | <0.10 | 8775998 | 0.15 | 0.10 | <1.0 | 1.0 | 8775927 |
| Total Barium (Ba) | ug/L | 3.3 | 8775998 | 6.1 | 1.0 | <10 | 10 | 8775927 |
| Total Beryllium (Be) | ug/L | <0.10 | 8775998 | <0.10 | 0.10 | <1.0 | 1.0 | 8775927 |
| Total Bismuth (Bi) | ug/L | <1.0 | 8775998 | <1.0 | 1.0 | <10 | 10 | 8775927 |
| Total Boron (B) | ug/L | <50 | 8775998 | <50 | 50 | 886 | 500 | 8775927 |
| Total Cadmium (Cd) | ug/L | 0.025 | 8775998 | <0.010 | 0.010 | <0.10 | 0.10 | 8775927 |
| Total Chromium (Cr) | ug/L | <1.0 | 8775998 | <1.0 | 1.0 | <10 | 10 | 8775927 |
| Total Cobalt (Co) | ug/L | <0.20 | 8775998 | <0.20 | 0.20 | <2.0 | 2.0 | 8775927 |
| Total Copper (Cu) | ug/L | <0.50 | 8775998 | 0.82 | 0.50 | <5.0 | 5.0 | 8775927 |
| Total Iron (Fe) | ug/L | 679 | 8775998 | 1140 | 10 | 5140 | 100 | 8775927 |
| Total Lead (Pb) | ug/L | <0.20 | 8775998 | 0.21 | 0.20 | <2.0 | 2.0 | 8775927 |
| Total Lithium (Li) | ug/L | <2.0 | 8775998 | <2.0 | 2.0 | 33 | 20 | 8775927 |
| Total Manganese (Mn) | ug/L | 32.3 | 8775998 | 53.1 | 1.0 | 27 | 10 | 8775927 |
| Total Molybdenum (Mo) | ug/L | <1.0 | 8775998 | <1.0 | 1.0 | <10 | 10 | 8775927 |
| Total Nickel (Ni) | ug/L | <1.0 | 8775998 | <1.0 | 1.0 | <10 | 10 | 8775927 |
| Total Selenium (Se) | ug/L | <0.10 | 8775998 | <0.10 | 0.10 | <1.0 | 1.0 | 8775927 |
| Total Silicon (Si) | ug/L | 3040 | 8775998 | 2460 | 100 | 2010 | 1000 | 8775927 |
| Total Silver (Ag) | ug/L | <0.020 | 8775998 | <0.020 | 0.020 | <0.20 | 0.20 | 8775927 |
| Total Strontium (Sr) | ug/L | 29.4 | 8775998 | 50.6 | 1.0 | 1450 | 10 | 8775927 |
| Total Thallium (Tl) | ug/L | <0.010 | 8775998 | <0.010 | 0.010 | <0.10 | 0.10 | 8775927 |
| Total Tin (Sn) | ug/L | <5.0 | 8775998 | <5.0 | 5.0 | <50 | 50 | 8775927 |
| Total Titanium (Ti) | ug/L | <5.0 | 8775998 | <5.0 | 5.0 | <50 | 50 | 8775927 |
| Total Uranium (U) | ug/L | <0.10 | 8775998 | <0.10 | 0.10 | <1.0 | 1.0 | 8775927 |
| Total Vanadium (V) | ug/L | <5.0 | 8775998 | <5.0 | 5.0 | <50 | 50 | 8775927 |
| Total Zinc (Zn) | ug/L | 14.4 | 8775998 | 40.8 | 5.0 | <50 | 50 | 8775927 |
| Total Zirconium (Zr) | ug/L | <0.10 | 8775998 | <0.10 | 0.10 | <1.0 | 1.0 | 8775927 |
| Total Calcium (Ca) | mg/L | 11.1 | 8773980 | 13.2 | 0.050 | 89.0 | 0.50 | 8773980 |

RDL = Reportable Detection Limit



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Maxxam Job #: B784302
Report Date: 2017/10/02

MAXXAM ANALYTICS
Client Project #: MB7L1654
Site Location: 102153-000
Sampler Initials: RF

## CCME TOTAL METALS IN WATER (WATER)

| **Maxxam ID** | | SB5543 | | SB5544 | | SB5545 | | |
|---|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2017/09/21 11:30 | | 2017/09/21 12:00 | | 2017/09/21 | | |
| **COC Number** | | b7l1654-m058-01-01 | | b7l1654-m058-01-01 | | b7l1654-m058-01-01 | | |
| | **UNITS** | **LTM 6 (FEZ997)** | **QC Batch** | **LTM 7 (FEZ998)** | **RDL** | **DUP 1 (FEZ999)** | **RDL** | **QC Batch** |
| Total Magnesium (Mg) | mg/L | 2.17 | 8773980 | 2.77 | 0.050 | 208 | 0.50 | 8773980 |
| Total Potassium (K) | mg/L | 0.454 | 8773980 | 0.770 | 0.050 | 75.1 | 0.50 | 8773980 |
| Total Sodium (Na) | mg/L | 4.03 | 8773980 | 3.79 | 0.050 | 1670 | 0.50 | 8773980 |
| Total Sulphur (S) | mg/L | <3.0 | 8773980 | <3.0 | 3.0 | 188 | 30 | 8773980 |
| RDL = Reportable Detection Limit | | | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB7L1654
Site Location: 102153-000
Sampler Initials: RF

## GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

| | |
|---|---|
| Package 1 | 6.3°C |

**CCME TOTAL METALS IN WATER (WATER) Comments**

Sample SB5538 [LTM 1 (FEZ992)] Elements by CRC ICPMS (total): RDL raised due to concentration over linear range, sample dilution required
Sample SB5540 [LTM 3 (FEZ994)] Elements by CRC ICPMS (total): RDL raised due to concentration over linear range, sample dilution required
Sample SB5545 [DUP 1 (FEZ999)] Elements by CRC ICPMS (total): RDL raised due to concentration over linear range, sample dilution required

**Results relate only to the items tested.**



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MAXXAM ANALYTICS
Client Project #: MB7L1654
Site Location: 102153-000
Sampler Initials: RF

## QUALITY ASSURANCE REPORT

| QA/QC Batch | Init | QC Type | Parameter | Date Analyzed | Value | Recovery | UNITS | QC Limits |
|---|---|---|---|---|---|---|---|---|
| 8775927 | JLP | Matrix Spike | Total Aluminum (Al) | 2017/10/01 | | 108 | % | 80 - 120 |
| | | | Total Antimony (Sb) | 2017/10/01 | | 105 | % | 80 - 120 |
| | | | Total Arsenic (As) | 2017/10/01 | | 107 | % | 80 - 120 |
| | | | Total Barium (Ba) | 2017/10/01 | | NC | % | 80 - 120 |
| | | | Total Beryllium (Be) | 2017/10/01 | | 94 | % | 80 - 120 |
| | | | Total Bismuth (Bi) | 2017/10/01 | | 91 | % | 80 - 120 |
| | | | Total Boron (B) | 2017/10/01 | | 94 | % | 80 - 120 |
| | | | Total Cadmium (Cd) | 2017/10/01 | | 99 | % | 80 - 120 |
| | | | Total Chromium (Cr) | 2017/10/01 | | 91 | % | 80 - 120 |
| | | | Total Cobalt (Co) | 2017/10/01 | | 90 | % | 80 - 120 |
| | | | Total Copper (Cu) | 2017/10/01 | | 84 | % | 80 - 120 |
| | | | Total Iron (Fe) | 2017/10/01 | | 110 | % | 80 - 120 |
| | | | Total Lead (Pb) | 2017/10/01 | | 93 | % | 80 - 120 |
| | | | Total Lithium (Li) | 2017/10/01 | | 93 | % | 80 - 120 |
| | | | Total Manganese (Mn) | 2017/10/01 | | 93 | % | 80 - 120 |
| | | | Total Molybdenum (Mo) | 2017/10/01 | | NC | % | 80 - 120 |
| | | | Total Nickel (Ni) | 2017/10/01 | | 85 | % | 80 - 120 |
| | | | Total Selenium (Se) | 2017/10/01 | | 103 | % | 80 - 120 |
| | | | Total Silver (Ag) | 2017/10/01 | | 101 | % | 80 - 120 |
| | | | Total Strontium (Sr) | 2017/10/01 | | NC | % | 80 - 120 |
| | | | Total Thallium (Tl) | 2017/10/01 | | 97 | % | 80 - 120 |
| | | | Total Tin (Sn) | 2017/10/01 | | 103 | % | 80 - 120 |
| | | | Total Titanium (Ti) | 2017/10/01 | | 99 | % | 80 - 120 |
| | | | Total Uranium (U) | 2017/10/01 | | 96 | % | 80 - 120 |
| | | | Total Vanadium (V) | 2017/10/01 | | 98 | % | 80 - 120 |
| | | | Total Zinc (Zn) | 2017/10/01 | | 90 | % | 80 - 120 |
| | | | Total Zirconium (Zr) | 2017/10/01 | | 104 | % | 80 - 120 |
| 8775927 | JLP | Spiked Blank | Total Aluminum (Al) | 2017/10/01 | | 108 | % | 80 - 120 |
| | | | Total Antimony (Sb) | 2017/10/01 | | 104 | % | 80 - 120 |
| | | | Total Arsenic (As) | 2017/10/01 | | 100 | % | 80 - 120 |
| | | | Total Barium (Ba) | 2017/10/01 | | 101 | % | 80 - 120 |
| | | | Total Beryllium (Be) | 2017/10/01 | | 96 | % | 80 - 120 |
| | | | Total Bismuth (Bi) | 2017/10/01 | | 97 | % | 80 - 120 |
| | | | Total Boron (B) | 2017/10/01 | | 98 | % | 80 - 120 |
| | | | Total Cadmium (Cd) | 2017/10/01 | | 96 | % | 80 - 120 |
| | | | Total Chromium (Cr) | 2017/10/01 | | 93 | % | 80 - 120 |
| | | | Total Cobalt (Co) | 2017/10/01 | | 94 | % | 80 - 120 |
| | | | Total Copper (Cu) | 2017/10/01 | | 92 | % | 80 - 120 |
| | | | Total Iron (Fe) | 2017/10/01 | | 102 | % | 80 - 120 |
| | | | Total Lead (Pb) | 2017/10/01 | | 95 | % | 80 - 120 |
| | | | Total Lithium (Li) | 2017/10/01 | | 95 | % | 80 - 120 |
| | | | Total Manganese (Mn) | 2017/10/01 | | 98 | % | 80 - 120 |
| | | | Total Molybdenum (Mo) | 2017/10/01 | | 95 | % | 80 - 120 |
| | | | Total Nickel (Ni) | 2017/10/01 | | 94 | % | 80 - 120 |
| | | | Total Selenium (Se) | 2017/10/01 | | 96 | % | 80 - 120 |
| | | | Total Silver (Ag) | 2017/10/01 | | 105 | % | 80 - 120 |
| | | | Total Strontium (Sr) | 2017/10/01 | | 92 | % | 80 - 120 |
| | | | Total Thallium (Tl) | 2017/10/01 | | 96 | % | 80 - 120 |
| | | | Total Tin (Sn) | 2017/10/01 | | 98 | % | 80 - 120 |
| | | | Total Titanium (Ti) | 2017/10/01 | | 92 | % | 80 - 120 |
| | | | Total Uranium (U) | 2017/10/01 | | 92 | % | 80 - 120 |
| | | | Total Vanadium (V) | 2017/10/01 | | 96 | % | 80 - 120 |



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MAXXAM ANALYTICS
Client Project #: MB7L1654
Site Location: 102153-000
Sampler Initials: RF

## QUALITY ASSURANCE REPORT(CONT'D)

| QA/QC Batch | Init | QC Type | Parameter | Date Analyzed | Value | Recovery | UNITS | QC Limits |
|---|---|---|---|---|---|---|---|---|
| | | | Total Zinc (Zn) | 2017/10/01 | | 94 | % | 80 - 120 |
| | | | Total Zirconium (Zr) | 2017/10/01 | | 95 | % | 80 - 120 |
| 8775927 | JLP | Method Blank | Total Aluminum (Al) | 2017/10/01 | <3.0 | | ug/L | |
| | | | Total Antimony (Sb) | 2017/10/01 | <0.50 | | ug/L | |
| | | | Total Arsenic (As) | 2017/10/01 | <0.10 | | ug/L | |
| | | | Total Barium (Ba) | 2017/10/01 | <1.0 | | ug/L | |
| | | | Total Beryllium (Be) | 2017/10/01 | <0.10 | | ug/L | |
| | | | Total Bismuth (Bi) | 2017/10/01 | <1.0 | | ug/L | |
| | | | Total Boron (B) | 2017/10/01 | <50 | | ug/L | |
| | | | Total Cadmium (Cd) | 2017/10/01 | <0.010 | | ug/L | |
| | | | Total Chromium (Cr) | 2017/10/01 | <1.0 | | ug/L | |
| | | | Total Cobalt (Co) | 2017/10/01 | <0.20 | | ug/L | |
| | | | Total Copper (Cu) | 2017/10/01 | <0.50 | | ug/L | |
| | | | Total Iron (Fe) | 2017/10/01 | <10 | | ug/L | |
| | | | Total Lead (Pb) | 2017/10/01 | <0.20 | | ug/L | |
| | | | Total Lithium (Li) | 2017/10/01 | <2.0 | | ug/L | |
| | | | Total Manganese (Mn) | 2017/10/01 | <1.0 | | ug/L | |
| | | | Total Molybdenum (Mo) | 2017/10/01 | <1.0 | | ug/L | |
| | | | Total Nickel (Ni) | 2017/10/01 | <1.0 | | ug/L | |
| | | | Total Selenium (Se) | 2017/10/01 | <0.10 | | ug/L | |
| | | | Total Silicon (Si) | 2017/10/01 | <100 | | ug/L | |
| | | | Total Silver (Ag) | 2017/10/01 | <0.020 | | ug/L | |
| | | | Total Strontium (Sr) | 2017/10/01 | <1.0 | | ug/L | |
| | | | Total Thallium (Tl) | 2017/10/01 | <0.010 | | ug/L | |
| | | | Total Tin (Sn) | 2017/10/01 | <5.0 | | ug/L | |
| | | | Total Titanium (Ti) | 2017/10/01 | <5.0 | | ug/L | |
| | | | Total Uranium (U) | 2017/10/01 | <0.10 | | ug/L | |
| | | | Total Vanadium (V) | 2017/10/01 | <5.0 | | ug/L | |
| | | | Total Zinc (Zn) | 2017/10/01 | <5.0 | | ug/L | |
| | | | Total Zirconium (Zr) | 2017/10/01 | <0.10 | | ug/L | |
| 8775927 | JLP | RPD | Total Aluminum (Al) | 2017/10/01 | 10 | | % | 20 |
| | | | Total Antimony (Sb) | 2017/10/01 | NC | | % | 20 |
| | | | Total Arsenic (As) | 2017/10/01 | NC | | % | 20 |
| | | | Total Barium (Ba) | 2017/10/01 | 3.2 | | % | 20 |
| | | | Total Beryllium (Be) | 2017/10/01 | NC | | % | 20 |
| | | | Total Bismuth (Bi) | 2017/10/01 | NC | | % | 20 |
| | | | Total Boron (B) | 2017/10/01 | NC | | % | 20 |
| | | | Total Cadmium (Cd) | 2017/10/01 | 2.7 | | % | 20 |
| | | | Total Chromium (Cr) | 2017/10/01 | NC | | % | 20 |
| | | | Total Cobalt (Co) | 2017/10/01 | NC | | % | 20 |
| | | | Total Copper (Cu) | 2017/10/01 | 6.8 | | % | 20 |
| | | | Total Iron (Fe) | 2017/10/01 | 2.9 | | % | 20 |
| | | | Total Lead (Pb) | 2017/10/01 | NC | | % | 20 |
| | | | Total Lithium (Li) | 2017/10/01 | 2.7 | | % | 20 |
| | | | Total Manganese (Mn) | 2017/10/01 | 3.2 | | % | 20 |
| | | | Total Molybdenum (Mo) | 2017/10/01 | 4.5 | | % | 20 |
| | | | Total Nickel (Ni) | 2017/10/01 | NC | | % | 20 |
| | | | Total Selenium (Se) | 2017/10/01 | NC | | % | 20 |
| | | | Total Silicon (Si) | 2017/10/01 | 1.8 | | % | 20 |
| | | | Total Silver (Ag) | 2017/10/01 | NC | | % | 20 |
| | | | Total Strontium (Sr) | 2017/10/01 | 5.3 | | % | 20 |
| | | | Total Thallium (Tl) | 2017/10/01 | NC | | % | 20 |



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Maxxam Job #: B784302
Report Date: 2017/10/02

MAXXAM ANALYTICS
Client Project #: MB7L1654
Site Location: 102153-000
Sampler Initials: RF

## QUALITY ASSURANCE REPORT(CONT'D)

| QA/QC Batch | Init | QC Type | Parameter | Date Analyzed | Value | Recovery | UNITS | QC Limits |
|---|---|---|---|---|---|---|---|---|
| | | | Total Tin (Sn) | 2017/10/01 | NC | | % | 20 |
| | | | Total Titanium (Ti) | 2017/10/01 | NC | | % | 20 |
| | | | Total Uranium (U) | 2017/10/01 | 2.1 | | % | 20 |
| | | | Total Vanadium (V) | 2017/10/01 | NC | | % | 20 |
| | | | Total Zinc (Zn) | 2017/10/01 | NC | | % | 20 |
| | | | Total Zirconium (Zr) | 2017/10/01 | NC | | % | 20 |
| 8775998 | JT3 | Matrix Spike | Total Aluminum (Al) | 2017/09/29 | | 105 | % | 80 - 120 |
| | | | Total Antimony (Sb) | 2017/09/29 | | 109 | % | 80 - 120 |
| | | | Total Arsenic (As) | 2017/09/29 | | 109 | % | 80 - 120 |
| | | | Total Barium (Ba) | 2017/09/29 | | NC | % | 80 - 120 |
| | | | Total Beryllium (Be) | 2017/09/29 | | 100 | % | 80 - 120 |
| | | | Total Bismuth (Bi) | 2017/09/29 | | 99 | % | 80 - 120 |
| | | | Total Boron (B) | 2017/09/29 | | 99 | % | 80 - 120 |
| | | | Total Cadmium (Cd) | 2017/09/29 | | 104 | % | 80 - 120 |
| | | | Total Chromium (Cr) | 2017/09/29 | | 98 | % | 80 - 120 |
| | | | Total Cobalt (Co) | 2017/09/29 | | 93 | % | 80 - 120 |
| | | | Total Copper (Cu) | 2017/09/29 | | 88 | % | 80 - 120 |
| | | | Total Iron (Fe) | 2017/09/29 | | 102 | % | 80 - 120 |
| | | | Total Lead (Pb) | 2017/09/29 | | 98 | % | 80 - 120 |
| | | | Total Lithium (Li) | 2017/09/29 | | 100 | % | 80 - 120 |
| | | | Total Manganese (Mn) | 2017/09/29 | | NC | % | 80 - 120 |
| | | | Total Molybdenum (Mo) | 2017/09/29 | | 117 | % | 80 - 120 |
| | | | Total Nickel (Ni) | 2017/09/29 | | 93 | % | 80 - 120 |
| | | | Total Selenium (Se) | 2017/09/29 | | 112 | % | 80 - 120 |
| | | | Total Silver (Ag) | 2017/09/29 | | 110 | % | 80 - 120 |
| | | | Total Strontium (Sr) | 2017/09/29 | | NC | % | 80 - 120 |
| | | | Total Thallium (Tl) | 2017/09/29 | | 99 | % | 80 - 120 |
| | | | Total Tin (Sn) | 2017/09/29 | | 99 | % | 80 - 120 |
| | | | Total Titanium (Ti) | 2017/09/29 | | 106 | % | 80 - 120 |
| | | | Total Uranium (U) | 2017/09/29 | | 101 | % | 80 - 120 |
| | | | Total Vanadium (V) | 2017/09/29 | | 101 | % | 80 - 120 |
| | | | Total Zinc (Zn) | 2017/09/29 | | 98 | % | 80 - 120 |
| | | | Total Zirconium (Zr) | 2017/09/29 | | 97 | % | 80 - 120 |
| 8775998 | JT3 | Spiked Blank | Total Aluminum (Al) | 2017/09/29 | | 115 | % | 80 - 120 |
| | | | Total Antimony (Sb) | 2017/09/29 | | 107 | % | 80 - 120 |
| | | | Total Arsenic (As) | 2017/09/29 | | 106 | % | 80 - 120 |
| | | | Total Barium (Ba) | 2017/09/29 | | 106 | % | 80 - 120 |
| | | | Total Beryllium (Be) | 2017/09/29 | | 99 | % | 80 - 120 |
| | | | Total Bismuth (Bi) | 2017/09/29 | | 105 | % | 80 - 120 |
| | | | Total Boron (B) | 2017/09/29 | | 110 | % | 80 - 120 |
| | | | Total Cadmium (Cd) | 2017/09/29 | | 101 | % | 80 - 120 |
| | | | Total Chromium (Cr) | 2017/09/29 | | 99 | % | 80 - 120 |
| | | | Total Cobalt (Co) | 2017/09/29 | | 96 | % | 80 - 120 |
| | | | Total Copper (Cu) | 2017/09/29 | | 97 | % | 80 - 120 |
| | | | Total Iron (Fe) | 2017/09/29 | | 113 | % | 80 - 120 |
| | | | Total Lead (Pb) | 2017/09/29 | | 102 | % | 80 - 120 |
| | | | Total Lithium (Li) | 2017/09/29 | | 96 | % | 80 - 120 |
| | | | Total Manganese (Mn) | 2017/09/29 | | 101 | % | 80 - 120 |
| | | | Total Molybdenum (Mo) | 2017/09/29 | | 104 | % | 80 - 120 |
| | | | Total Nickel (Ni) | 2017/09/29 | | 98 | % | 80 - 120 |
| | | | Total Selenium (Se) | 2017/09/29 | | 109 | % | 80 - 120 |
| | | | Total Silver (Ag) | 2017/09/29 | | 110 | % | 80 - 120 |



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Maxxam Job #: B784302
Report Date: 2017/10/02

MAXXAM ANALYTICS
Client Project #: MB7L1654
Site Location: 102153-000
Sampler Initials: RF

## QUALITY ASSURANCE REPORT(CONT'D)

| QA/QC Batch | Init | QC Type | Parameter | Date Analyzed | Value | Recovery | UNITS | QC Limits |
|---|---|---|---|---|---|---|---|---|
| | | | Total Strontium (Sr) | 2017/09/29 | | 97 | % | 80 - 120 |
| | | | Total Thallium (Tl) | 2017/09/29 | | 104 | % | 80 - 120 |
| | | | Total Tin (Sn) | 2017/09/29 | | 100 | % | 80 - 120 |
| | | | Total Titanium (Ti) | 2017/09/29 | | 105 | % | 80 - 120 |
| | | | Total Uranium (U) | 2017/09/29 | | 101 | % | 80 - 120 |
| | | | Total Vanadium (V) | 2017/09/29 | | 99 | % | 80 - 120 |
| | | | Total Zinc (Zn) | 2017/09/29 | | 101 | % | 80 - 120 |
| | | | Total Zirconium (Zr) | 2017/09/29 | | 98 | % | 80 - 120 |
| 8775998 | JT3 | Method Blank | Total Aluminum (Al) | 2017/09/29 | <3.0 | | ug/L | |
| | | | Total Antimony (Sb) | 2017/09/29 | <0.50 | | ug/L | |
| | | | Total Arsenic (As) | 2017/09/29 | <0.10 | | ug/L | |
| | | | Total Barium (Ba) | 2017/09/29 | <1.0 | | ug/L | |
| | | | Total Beryllium (Be) | 2017/09/29 | <0.10 | | ug/L | |
| | | | Total Bismuth (Bi) | 2017/09/29 | <1.0 | | ug/L | |
| | | | Total Boron (B) | 2017/09/29 | <50 | | ug/L | |
| | | | Total Cadmium (Cd) | 2017/09/29 | <0.010 | | ug/L | |
| | | | Total Chromium (Cr) | 2017/09/29 | <1.0 | | ug/L | |
| | | | Total Cobalt (Co) | 2017/09/29 | <0.20 | | ug/L | |
| | | | Total Copper (Cu) | 2017/09/29 | <0.50 | | ug/L | |
| | | | Total Iron (Fe) | 2017/09/29 | <10 | | ug/L | |
| | | | Total Lead (Pb) | 2017/09/29 | <0.20 | | ug/L | |
| | | | Total Lithium (Li) | 2017/09/29 | <2.0 | | ug/L | |
| | | | Total Manganese (Mn) | 2017/09/29 | <1.0 | | ug/L | |
| | | | Total Molybdenum (Mo) | 2017/09/29 | <1.0 | | ug/L | |
| | | | Total Nickel (Ni) | 2017/09/29 | <1.0 | | ug/L | |
| | | | Total Selenium (Se) | 2017/09/29 | <0.10 | | ug/L | |
| | | | Total Silicon (Si) | 2017/09/29 | <100 | | ug/L | |
| | | | Total Silver (Ag) | 2017/09/29 | <0.020 | | ug/L | |
| | | | Total Strontium (Sr) | 2017/09/29 | <1.0 | | ug/L | |
| | | | Total Thallium (Tl) | 2017/09/29 | <0.010 | | ug/L | |
| | | | Total Tin (Sn) | 2017/09/29 | <5.0 | | ug/L | |
| | | | Total Titanium (Ti) | 2017/09/29 | <5.0 | | ug/L | |
| | | | Total Uranium (U) | 2017/09/29 | <0.10 | | ug/L | |
| | | | Total Vanadium (V) | 2017/09/29 | <5.0 | | ug/L | |
| | | | Total Zinc (Zn) | 2017/09/29 | <5.0 | | ug/L | |
| | | | Total Zirconium (Zr) | 2017/09/29 | <0.10 | | ug/L | |
| 8775998 | JT3 | RPD | Total Aluminum (Al) | 2017/09/29 | 1.7 | | % | 20 |
| | | | Total Antimony (Sb) | 2017/09/29 | NC | | % | 20 |
| | | | Total Arsenic (As) | 2017/09/29 | 2.2 | | % | 20 |
| | | | Total Barium (Ba) | 2017/09/29 | 0.54 | | % | 20 |
| | | | Total Beryllium (Be) | 2017/09/29 | NC | | % | 20 |
| | | | Total Bismuth (Bi) | 2017/09/29 | NC | | % | 20 |
| | | | Total Boron (B) | 2017/09/29 | NC | | % | 20 |
| | | | Total Cadmium (Cd) | 2017/09/29 | 5.4 | | % | 20 |
| | | | Total Chromium (Cr) | 2017/09/29 | NC | | % | 20 |
| | | | Total Cobalt (Co) | 2017/09/29 | NC | | % | 20 |
| | | | Total Copper (Cu) | 2017/09/29 | 1.4 | | % | 20 |
| | | | Total Iron (Fe) | 2017/09/29 | 12 | | % | 20 |
| | | | Total Lead (Pb) | 2017/09/29 | NC | | % | 20 |
| | | | Total Lithium (Li) | 2017/09/29 | NC | | % | 20 |
| | | | Total Manganese (Mn) | 2017/09/29 | 2.0 | | % | 20 |
| | | | Total Molybdenum (Mo) | 2017/09/29 | 7.2 | | % | 20 |



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Maxxam Job #: B784302
Report Date: 2017/10/02

MAXXAM ANALYTICS
Client Project #: MB7L1654
Site Location: 102153-000
Sampler Initials: RF

## QUALITY ASSURANCE REPORT(CONT'D)

| QA/QC Batch | Init | QC Type | Parameter | Date Analyzed | Value | Recovery | UNITS | QC Limits |
|---|---|---|---|---|---|---|---|---|
| | | | Total Nickel (Ni) | 2017/09/29 | NC | | % | 20 |
| | | | Total Selenium (Se) | 2017/09/29 | NC | | % | 20 |
| | | | Total Silicon (Si) | 2017/09/29 | 4.5 | | % | 20 |
| | | | Total Silver (Ag) | 2017/09/29 | NC | | % | 20 |
| | | | Total Strontium (Sr) | 2017/09/29 | 1.8 | | % | 20 |
| | | | Total Thallium (Tl) | 2017/09/29 | NC | | % | 20 |
| | | | Total Tin (Sn) | 2017/09/29 | NC | | % | 20 |
| | | | Total Titanium (Ti) | 2017/09/29 | NC | | % | 20 |
| | | | Total Uranium (U) | 2017/09/29 | 0.64 | | % | 20 |
| | | | Total Vanadium (V) | 2017/09/29 | NC | | % | 20 |
| | | | Total Zinc (Zn) | 2017/09/29 | NC | | % | 20 |
| | | | Total Zirconium (Zr) | 2017/09/29 | NC | | % | 20 |

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



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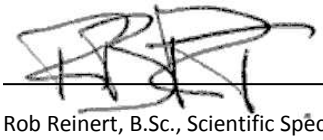
Maxxam Job #: B784302
Report Date: 2017/10/02

MAXXAM ANALYTICS
Client Project #: MB7L1654
Site Location: 102153-000
Sampler Initials: RF

## VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Rob Reinert, B.Sc., Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam
A Bureau Veritas Group Company

Your Project #: 102153-000
Site Location: TC IQALUIT
Your C.O.C. #: 621108-06-01

**Attention:Ryan Fletcher**

ARCADIS Canada Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

**Report Date: 2017/10/05**
Report #: R4763016
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B7L6328**
**Received: 2017/10/02, 15:00**

Sample Matrix: Soil
# Samples Received: 8

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Reference |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | 8 | N/A | 2017/10/04 | CAM SOP-00301 | EPA 8270D m |
| Petroleum Hydro. CCME F1 & BTEX in Soil (2) | 8 | N/A | 2017/10/05 | OTT SOP-00002 | CCME CWS |
| Petroleum Hydrocarbons F2-F4 in Soil (3) | 5 | 2017/10/03 | 2017/10/04 | OTT SOP-00001 | CCME CWS |
| Petroleum Hydrocarbons F2-F4 in Soil (3) | 3 | 2017/10/03 | 2017/10/05 | OTT SOP-00001 | CCME CWS |
| Strong Acid Leachable Metals by ICPMS (1) | 8 | 2017/10/04 | 2017/10/05 | CAM SOP-00447 | EPA 6020B m |
| Moisture | 8 | N/A | 2017/10/04 | CAM SOP-00445 | McKeague 2nd ed 1978 |
| OC Pesticides (Selected) & PCB (1, 4) | 8 | 2017/10/03 | 2017/10/04 | CAM SOP-00307 | SW846 8081, 8082 |
| OC Pesticides Summed Parameters (1) | 8 | N/A | 2017/10/04 | CAM SOP-00307 | EPA 8081/8082 m |
| PAH Compounds in Soil by GC/MS (SIM) | 8 | 2017/10/03 | 2017/10/03 | OTT SOP-00011 | EPA 8270D m |
| Volatile Organic Compounds in Soil (1) | 7 | N/A | 2017/10/03 | CAM SOP-00228 | EPA 8260 m |
| Volatile Organic Compounds in Soil (1) | 1 | N/A | 2017/10/04 | CAM SOP-00228 | EPA 8260 m |

**Remarks:**

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Your Project #: 102153-000
Site Location: TC IQALUIT
Your C.O.C. #: 621108-06-01

**Attention:Ryan Fletcher**

ARCADIS Canada Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

**Report Date: 2017/10/05**
Report #: R4763016
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B7L6328**
**Received: 2017/10/02, 15:00**

(1) This test was performed by Maxxam Analytics Mississauga
(2) No lab extraction date is given for F1BTEX & VOC samples that are field preserved with methanol. Extraction date is the date sampled unless otherwise stated.
(3) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.
(4) Chlordane ( Total) = Alpha Chlordane + Gamma Chlordane

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Alison Cameron, Project Manager
Email: ACameron@maxxam.ca
Phone# (613) 274-0573
==========
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B7L6328
Report Date: 2017/10/05

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## CCME PETROLEUM HYDROCARBONS IN SOIL (SOIL)

| Maxxam ID | | FFX936 | FFX937 | FFX938 | FFX939 | FFX940 | FFX941 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/28 10:00 | 2017/09/28 10:15 | 2017/09/28 10:30 | 2017/09/28 10:45 | 2017/09/28 11:00 | 2017/09/28 11:15 | | |
| COC Number | | 621108-06-01 | 621108-06-01 | 621108-06-01 | 621108-06-01 | 621108-06-01 | 621108-06-01 | | |
| | **UNITS** | **S01** | **S02** | **S03** | **S04** | **S05** | **S06** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | |
| Moisture | % | 28 | 21 | 25 | 10 | 34 | 46 | 0.2 | 5194340 |
| **BTEX & F1 Hydrocarbons** | | | | | | | | | |
| Benzene | ug/g | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | 0.0050 | 5196271 |
| Toluene | ug/g | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | 0.020 | 5196271 |
| Ethylbenzene | ug/g | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5196271 |
| o-Xylene | ug/g | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | 0.020 | 5196271 |
| p+m-Xylene | ug/g | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | 0.040 | 5196271 |
| Total Xylenes | ug/g | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | 0.040 | 5196271 |
| F1 (C6-C10) | ug/g | <10 | <10 | <10 | <10 | <10 | <10 | 10 | 5196271 |
| F1 (C6-C10) - BTEX | ug/g | <10 | <10 | <10 | <10 | <10 | <10 | 10 | 5196271 |
| **F2-F4 Hydrocarbons** | | | | | | | | | |
| F2 (C10-C16 Hydrocarbons) | ug/g | 56 | 33 | 19 | <10 | 30 | 53 | 10 | 5194343 |
| F3 (C16-C34 Hydrocarbons) | ug/g | 180 | 620 | 140 | <50 | 240 | 330 | 50 | 5194343 |
| F4 (C34-C50 Hydrocarbons) | ug/g | 100 | 460 | 81 | <50 | <50 | <50 | 50 | 5194343 |
| Reached Baseline at C50 | ug/g | Yes | Yes | Yes | Yes | Yes | Yes | | 5194343 |
| **Surrogate Recovery (%)** | | | | | | | | | |
| 1,4-Difluorobenzene | % | 93 | 102 | 99 | 98 | 94 | 107 | | 5196271 |
| 4-Bromofluorobenzene | % | 92 | 89 | 96 | 86 | 87 | 94 | | 5196271 |
| D10-Ethylbenzene | % | 116 | 128 | 129 | 128 | 129 | 109 | | 5196271 |
| D4-1,2-Dichloroethane | % | 120 | 123 | 127 | 113 | 124 | 117 | | 5196271 |
| o-Terphenyl | % | 78 | 95 | 81 | 88 | 92 | 90 | | 5194343 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7L6328
Report Date: 2017/10/05

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## CCME PETROLEUM HYDROCARBONS IN SOIL (SOIL)

| Maxxam ID | | FFX942 | FFX943 | | |
|---|---|---|---|---|---|
| Sampling Date | | 2017/09/28 11:30 | 2017/09/28 11:45 | | |
| COC Number | | 621108-06-01 | 621108-06-01 | | |
| | **UNITS** | **S07** | **S08** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | |
| Moisture | % | 34 | 15 | 0.2 | 5194340 |
| **BTEX & F1 Hydrocarbons** | | | | | |
| Benzene | ug/g | <0.0050 | <0.0050 | 0.0050 | 5196271 |
| Toluene | ug/g | <0.020 | <0.020 | 0.020 | 5196271 |
| Ethylbenzene | ug/g | <0.010 | <0.010 | 0.010 | 5196271 |
| o-Xylene | ug/g | <0.020 | <0.020 | 0.020 | 5196271 |
| p+m-Xylene | ug/g | <0.040 | <0.040 | 0.040 | 5196271 |
| Total Xylenes | ug/g | <0.040 | <0.040 | 0.040 | 5196271 |
| F1 (C6-C10) | ug/g | <10 | <10 | 10 | 5196271 |
| F1 (C6-C10) - BTEX | ug/g | <10 | <10 | 10 | 5196271 |
| **F2-F4 Hydrocarbons** | | | | | |
| F2 (C10-C16 Hydrocarbons) | ug/g | 18 | <10 | 10 | 5194343 |
| F3 (C16-C34 Hydrocarbons) | ug/g | 240 | 120 | 50 | 5194343 |
| F4 (C34-C50 Hydrocarbons) | ug/g | <50 | <50 | 50 | 5194343 |
| Reached Baseline at C50 | ug/g | Yes | Yes | | 5194343 |
| **Surrogate Recovery (%)** | | | | | |
| 1,4-Difluorobenzene | % | 102 | 102 | | 5196271 |
| 4-Bromofluorobenzene | % | 92 | 99 | | 5196271 |
| D10-Ethylbenzene | % | 127 | 125 | | 5196271 |
| D4-1,2-Dichloroethane | % | 124 | 123 | | 5196271 |
| o-Terphenyl | % | 90 | 89 | | 5194343 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7L6328
Report Date: 2017/10/05

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## O.REG 153 ICPMS METALS (SOIL)

| Maxxam ID | | FFX936 | FFX937 | FFX938 | FFX939 | FFX940 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/28 10:00 | 2017/09/28 10:15 | 2017/09/28 10:30 | 2017/09/28 10:45 | 2017/09/28 11:00 | | |
| COC Number | | 621108-06-01 | 621108-06-01 | 621108-06-01 | 621108-06-01 | 621108-06-01 | | |
| | **UNITS** | **S01** | **S02** | **S03** | **S04** | **S05** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | |
| Acid Extractable Antimony (Sb) | ug/g | 5.0 | 2.4 | 0.26 | <0.20 | 8.9 | 0.20 | 5196269 |
| Acid Extractable Arsenic (As) | ug/g | 2.6 | 2.6 | 1.8 | 2.3 | 1.8 | 1.0 | 5196269 |
| Acid Extractable Barium (Ba) | ug/g | 58 | 56 | 59 | 41 | 50 | 0.50 | 5196269 |
| Acid Extractable Beryllium (Be) | ug/g | 0.32 | 0.34 | 0.37 | 0.42 | 0.23 | 0.20 | 5196269 |
| Acid Extractable Boron (B) | ug/g | <5.0 | <5.0 | <5.0 | <5.0 | 6.6 | 5.0 | 5196269 |
| Acid Extractable Cadmium (Cd) | ug/g | 2.7 | 3.7 | 0.50 | 0.20 | 4.7 | 0.10 | 5196269 |
| Acid Extractable Chromium (Cr) | ug/g | 35 | 34 | 20 | 21 | 32 | 1.0 | 5196269 |
| Acid Extractable Cobalt (Co) | ug/g | 11 | 11 | 17 | 13 | 6.4 | 0.10 | 5196269 |
| Acid Extractable Copper (Cu) | ug/g | 73 | 50 | 13 | 8.3 | 62 | 0.50 | 5196269 |
| Acid Extractable Lead (Pb) | ug/g | 110 | 110 | 18 | 6.1 | 170 | 1.0 | 5196269 |
| Acid Extractable Molybdenum (Mo) | ug/g | 2.2 | 2.5 | 3.2 | 3.8 | 2.2 | 0.50 | 5196269 |
| Acid Extractable Nickel (Ni) | ug/g | 13 | 14 | 8.8 | 6.7 | 13 | 0.50 | 5196269 |
| Acid Extractable Selenium (Se) | ug/g | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5196269 |
| Acid Extractable Silver (Ag) | ug/g | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5196269 |
| Acid Extractable Thallium (Tl) | ug/g | 0.057 | <0.050 | 0.055 | 0.062 | 0.066 | 0.050 | 5196269 |
| Acid Extractable Uranium (U) | ug/g | 1.1 | 1.0 | 1.1 | 1.3 | 0.72 | 0.050 | 5196269 |
| Acid Extractable Vanadium (V) | ug/g | 40 | 44 | 38 | 45 | 41 | 5.0 | 5196269 |
| Acid Extractable Zinc (Zn) | ug/g | 160 | 180 | 120 | 100 | 150 | 5.0 | 5196269 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7L6328
Report Date: 2017/10/05

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## O.REG 153 ICPMS METALS (SOIL)

| Maxxam ID | | FFX940 | FFX941 | FFX942 | FFX943 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/28 11:00 | 2017/09/28 11:15 | 2017/09/28 11:30 | 2017/09/28 11:45 | | |
| COC Number | | 621108-06-01 | 621108-06-01 | 621108-06-01 | 621108-06-01 | | |
| | **UNITS** | **S05 Lab-Dup** | **S06** | **S07** | **S08** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | |
| Acid Extractable Antimony (Sb) | ug/g | 11 | 1.1 | 3.3 | 2.0 | 0.20 | 5196269 |
| Acid Extractable Arsenic (As) | ug/g | 1.9 | 2.2 | 2.9 | 2.4 | 1.0 | 5196269 |
| Acid Extractable Barium (Ba) | ug/g | 48 | 47 | 87 | 51 | 0.50 | 5196269 |
| Acid Extractable Beryllium (Be) | ug/g | 0.22 | 0.22 | 0.32 | 0.35 | 0.20 | 5196269 |
| Acid Extractable Boron (B) | ug/g | <5.0 | <5.0 | <5.0 | <5.0 | 5.0 | 5196269 |
| Acid Extractable Cadmium (Cd) | ug/g | 4.2 | 0.85 | 3.7 | 2.4 | 0.10 | 5196269 |
| Acid Extractable Chromium (Cr) | ug/g | 32 | 33 | 32 | 31 | 1.0 | 5196269 |
| Acid Extractable Cobalt (Co) | ug/g | 6.0 | 6.5 | 17 | 10 | 0.10 | 5196269 |
| Acid Extractable Copper (Cu) | ug/g | 61 | 260 | 36 | 440 | 0.50 | 5196269 |
| Acid Extractable Lead (Pb) | ug/g | 180 | 72 | 110 | 100 | 1.0 | 5196269 |
| Acid Extractable Molybdenum (Mo) | ug/g | 2.2 | 2.4 | 3.0 | 2.1 | 0.50 | 5196269 |
| Acid Extractable Nickel (Ni) | ug/g | 12 | 11 | 18 | 12 | 0.50 | 5196269 |
| Acid Extractable Selenium (Se) | ug/g | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5196269 |
| Acid Extractable Silver (Ag) | ug/g | <0.20 | <0.20 | <0.20 | 0.32 | 0.20 | 5196269 |
| Acid Extractable Thallium (Tl) | ug/g | 0.066 | 0.055 | 0.080 | <0.050 | 0.050 | 5196269 |
| Acid Extractable Uranium (U) | ug/g | 0.70 | 0.67 | 1.2 | 0.93 | 0.050 | 5196269 |
| Acid Extractable Vanadium (V) | ug/g | 40 | 42 | 37 | 46 | 5.0 | 5196269 |
| Acid Extractable Zinc (Zn) | ug/g | 150 | 110 | 200 | 140 | 5.0 | 5196269 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B7L6328
Report Date: 2017/10/05

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## O.REG 153 OC PESTICIDES (SOIL)

| Maxxam ID | | FFX936 | FFX937 | FFX938 | FFX939 | FFX939 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/28 10:00 | 2017/09/28 10:15 | 2017/09/28 10:30 | 2017/09/28 10:45 | 2017/09/28 10:45 | | |
| COC Number | | 621108-06-01 | 621108-06-01 | 621108-06-01 | 621108-06-01 | 621108-06-01 | | |
| | **UNITS** | **S01** | **S02** | **S03** | **S04** | **S04 Lab-Dup** | **RDL** | **QC Batch** |
| **Calculated Parameters** | | | | | | | | |
| Chlordane (Total) | ug/g | <0.010 | <0.010 | <0.010 | <0.010 | | 0.010 | 5192929 |
| o,p-DDD + p,p-DDD | ug/g | <0.010 | <0.010 | <0.010 | <0.010 | | 0.010 | 5192929 |
| o,p-DDE + p,p-DDE | ug/g | <0.010 | <0.010 | <0.010 | <0.010 | | 0.010 | 5192929 |
| o,p-DDT + p,p-DDT | ug/g | 0.077 | 0.098 | 0.020 | 0.014 | | 0.010 | 5192929 |
| Total Endosulfan | ug/g | <0.010 | <0.010 | <0.010 | <0.010 | | 0.010 | 5192929 |
| Total PCB | ug/g | 0.35 | 0.32 | 0.13 | <0.075 | | 0.075 | 5192929 |
| **Pesticides & Herbicides** | | | | | | | | |
| o,p-DDD | ug/g | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5195074 |
| p,p-DDD | ug/g | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5195074 |
| o,p-DDE | ug/g | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5195074 |
| p,p-DDE | ug/g | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5195074 |
| o,p-DDT | ug/g | 0.011 | 0.013 | <0.010 | <0.010 | <0.010 | 0.010 | 5195074 |
| p,p-DDT | ug/g | 0.066 | 0.085 | 0.020 | 0.014 | <0.010 | 0.010 | 5195074 |
| Aroclor 1242 | ug/g | <0.075 | <0.075 | <0.075 | <0.075 | <0.075 | 0.075 | 5195074 |
| Aroclor 1248 | ug/g | <0.075 | <0.075 | <0.075 | <0.075 | <0.075 | 0.075 | 5195074 |
| Aroclor 1254 | ug/g | <0.075 | <0.075 | <0.075 | <0.075 | <0.075 | 0.075 | 5195074 |
| Aroclor 1260 | ug/g | 0.35 | 0.32 | 0.13 | <0.075 | <0.075 | 0.075 | 5195074 |
| **Surrogate Recovery (%)** | | | | | | | | |
| 2,4,5,6-Tetrachloro-m-xylene | % | 98 | 102 | 87 | 97 | 102 | | 5195074 |
| Decachlorobiphenyl | % | 130 | 123 | 125 | 122 | 118 | | 5195074 |

RDL = Reportable Detection Limit
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Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B7L6328
Report Date: 2017/10/05

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## O.REG 153 OC PESTICIDES (SOIL)

| Maxxam ID | | FFX940 | | FFX941 | | FFX942 | | FFX943 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/28 11:00 | | 2017/09/28 11:15 | | 2017/09/28 11:30 | | 2017/09/28 11:45 | | |
| COC Number | | 621108-06-01 | | 621108-06-01 | | 621108-06-01 | | 621108-06-01 | | |
| | **UNITS** | **S05** | **RDL** | **S06** | **RDL** | **S07** | **RDL** | **S08** | **RDL** | **QC Batch** |
| **Calculated Parameters** | | | | | | | | | | |
| Chlordane (Total) | ug/g | <0.15 | 0.15 | <0.040 | 0.040 | <0.030 | 0.030 | <0.010 | 0.010 | 5192929 |
| o,p-DDD + p,p-DDD | ug/g | <0.20 | 0.20 | <0.045 | 0.045 | <0.030 | 0.030 | <0.010 | 0.010 | 5192929 |
| o,p-DDE + p,p-DDE | ug/g | <0.15 | 0.15 | <0.040 | 0.040 | <0.030 | 0.030 | <0.010 | 0.010 | 5192929 |
| o,p-DDT + p,p-DDT | ug/g | 0.68 | 0.15 | <0.22 | 0.22 | 0.077 | 0.030 | 0.10 | 0.010 | 5192929 |
| Total Endosulfan | ug/g | <0.15 | 0.15 | <0.040 | 0.040 | <0.030 | 0.030 | <0.010 | 0.010 | 5192929 |
| Total PCB | ug/g | 10 | 2.0 | 11 | 1.5 | 0.58 | 0.23 | 0.38 | 0.075 | 5192929 |
| **Pesticides & Herbicides** | | | | | | | | | | |
| o,p-DDD | ug/g | <0.15 | 0.15 | <0.040 | 0.040 | <0.030 | 0.030 | <0.010 | 0.010 | 5195074 |
| p,p-DDD | ug/g | <0.20 | 0.20 | <0.045 | 0.045 | <0.030 | 0.030 | <0.010 | 0.010 | 5195074 |
| o,p-DDE | ug/g | <0.15 | 0.15 | <0.040 | 0.040 | <0.030 | 0.030 | <0.010 | 0.010 | 5195074 |
| p,p-DDE | ug/g | <0.15 | 0.15 | <0.040 | 0.040 | <0.030 | 0.030 | <0.010 | 0.010 | 5195074 |
| o,p-DDT | ug/g | <0.15 | 0.15 | <0.040 | 0.040 | <0.030 | 0.030 | 0.019 | 0.010 | 5195074 |
| p,p-DDT | ug/g | 0.68 | 0.15 | <0.22 | 0.22 | 0.077 | 0.030 | 0.081 | 0.010 | 5195074 |
| Aroclor 1242 | ug/g | <2.0 | 2.0 | <1.5 | 1.5 | <0.23 | 0.23 | <0.075 | 0.075 | 5195074 |
| Aroclor 1248 | ug/g | <2.0 | 2.0 | <1.5 | 1.5 | <0.23 | 0.23 | <0.075 | 0.075 | 5195074 |
| Aroclor 1254 | ug/g | <2.0 | 2.0 | <1.5 | 1.5 | <0.23 | 0.23 | <0.075 | 0.075 | 5195074 |
| Aroclor 1260 | ug/g | 10 | 2.0 | 11 | 1.5 | 0.58 | 0.23 | 0.38 | 0.075 | 5195074 |
| **Surrogate Recovery (%)** | | | | | | | | | | |
| 2,4,5,6-Tetrachloro-m-xylene | % | 81 | | 89 | | 70 | | 82 | | 5195074 |
| Decachlorobiphenyl | % | 97 | | 112 | | 75 | | 98 | | 5195074 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7L6328
Report Date: 2017/10/05

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## O.REG 153 PAHS (SOIL)

| Maxxam ID | | FFX936 | FFX936 | FFX937 | FFX938 | FFX939 | FFX940 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/28 10:00 | 2017/09/28 10:00 | 2017/09/28 10:15 | 2017/09/28 10:30 | 2017/09/28 10:45 | 2017/09/28 11:00 | | |
| COC Number | | 621108-06-01 | 621108-06-01 | 621108-06-01 | 621108-06-01 | 621108-06-01 | 621108-06-01 | | |
| | **UNITS** | **S01** | **S01 Lab-Dup** | **S02** | **S03** | **S04** | **S05** | **RDL** | **QC Batch** |
| **Calculated Parameters** | | | | | | | | | |
| Methylnaphthalene, 2-(1-) | ug/g | <0.014 | | 0.021 | <0.014 | <0.014 | <0.014 | 0.014 | 5192931 |
| **Polyaromatic Hydrocarbons** | | | | | | | | | |
| Acenaphthene | ug/g | 0.0087 | 0.0059 | 0.030 | <0.0050 | <0.0050 | <0.0050 | 0.0050 | 5194341 |
| Acenaphthylene | ug/g | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | 0.0050 | 5194341 |
| Anthracene | ug/g | 0.0099 | 0.0059 | 0.035 | <0.0050 | <0.0050 | 0.0056 | 0.0050 | 5194341 |
| Benzo(a)anthracene | ug/g | 0.030 | 0.026 | 0.14 | <0.0050 | <0.0050 | 0.018 | 0.0050 | 5194341 |
| Benzo(a)pyrene | ug/g | 0.028 | 0.035 | 0.13 | 0.0089 | <0.0050 | 0.023 | 0.0050 | 5194341 |
| Benzo(b/j)fluoranthene | ug/g | 0.038 | 0.030 | 0.18 | <0.0050 | <0.0050 | 0.033 | 0.0050 | 5194341 |
| Benzo(g,h,i)perylene | ug/g | 0.020 | 0.027 | 0.069 | 0.0064 | <0.0050 | 0.014 | 0.0050 | 5194341 |
| Benzo(k)fluoranthene | ug/g | 0.011 | 0.011 | 0.063 | <0.0050 | <0.0050 | 0.010 | 0.0050 | 5194341 |
| Chrysene | ug/g | 0.028 | 0.024 | 0.11 | <0.0050 | <0.0050 | 0.014 | 0.0050 | 5194341 |
| Dibenz(a,h)anthracene | ug/g | <0.0050 | 0.0053 | 0.020 | <0.0050 | <0.0050 | <0.0050 | 0.0050 | 5194341 |
| Fluoranthene | ug/g | 0.077 | 0.052 | 0.25 | 0.0057 | <0.0050 | 0.033 | 0.0050 | 5194341 |
| Fluorene | ug/g | 0.0093 | 0.0066 | 0.030 | <0.0050 | <0.0050 | <0.0050 | 0.0050 | 5194341 |
| Indeno(1,2,3-cd)pyrene | ug/g | 0.022 | 0.016 | 0.085 | <0.0050 | <0.0050 | 0.014 | 0.0050 | 5194341 |
| 1-Methylnaphthalene | ug/g | <0.0050 | <0.0050 | 0.0080 | <0.0050 | <0.0050 | <0.0050 | 0.0050 | 5194341 |
| 2-Methylnaphthalene | ug/g | <0.0050 | 0.0053 | 0.013 | <0.0050 | <0.0050 | <0.0050 | 0.0050 | 5194341 |
| Naphthalene | ug/g | <0.0050 | 0.0072 | 0.035 | <0.0050 | <0.0050 | 0.0056 | 0.0050 | 5194341 |
| Phenanthrene | ug/g | 0.058 | 0.040 | 0.14 | <0.0050 | <0.0050 | 0.024 | 0.0050 | 5194341 |
| Pyrene | ug/g | 0.055 | 0.055 | 0.18 | <0.0050 | <0.0050 | 0.022 | 0.0050 | 5194341 |
| **Surrogate Recovery (%)** | | | | | | | | | |
| D10-Anthracene | % | 85 | 85 | 86 | 83 | 82 | 84 | | 5194341 |
| D14-Terphenyl (FS) | % | 95 | 92 | 93 | 89 | 81 | 92 | | 5194341 |
| D8-Acenaphthylene | % | 100 | 97 | 98 | 98 | 95 | 99 | | 5194341 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B7L6328
Report Date: 2017/10/05

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## O.REG 153 PAHS (SOIL)

| Maxxam ID | | FFX941 | FFX942 | FFX943 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/28 11:15 | 2017/09/28 11:30 | 2017/09/28 11:45 | | |
| COC Number | | 621108-06-01 | 621108-06-01 | 621108-06-01 | | |
| | **UNITS** | **S06** | **S07** | **S08** | **RDL** | **QC Batch** |
| **Calculated Parameters** | | | | | | |
| Methylnaphthalene, 2-(1-) | ug/g | 0.035 | 0.015 | <0.014 | 0.014 | 5192931 |
| **Polyaromatic Hydrocarbons** | | | | | | |
| Acenaphthene | ug/g | 0.018 | 0.010 | <0.0050 | 0.0050 | 5194341 |
| Acenaphthylene | ug/g | <0.0050 | <0.0050 | <0.0050 | 0.0050 | 5194341 |
| Anthracene | ug/g | 0.023 | 0.015 | <0.0050 | 0.0050 | 5194341 |
| Benzo(a)anthracene | ug/g | 0.065 | 0.073 | 0.017 | 0.0050 | 5194341 |
| Benzo(a)pyrene | ug/g | 0.075 | 0.063 | 0.018 | 0.0050 | 5194341 |
| Benzo(b/j)fluoranthene | ug/g | 0.093 | 0.10 | 0.029 | 0.0050 | 5194341 |
| Benzo(g,h,i)perylene | ug/g | 0.041 | 0.049 | 0.020 | 0.0050 | 5194341 |
| Benzo(k)fluoranthene | ug/g | 0.031 | 0.036 | 0.0094 | 0.0050 | 5194341 |
| Chrysene | ug/g | 0.060 | 0.057 | 0.015 | 0.0050 | 5194341 |
| Dibenz(a,h)anthracene | ug/g | 0.0083 | 0.028 | <0.0050 | 0.0050 | 5194341 |
| Fluoranthene | ug/g | 0.14 | 0.11 | 0.027 | 0.0050 | 5194341 |
| Fluorene | ug/g | 0.022 | 0.011 | <0.0050 | 0.0050 | 5194341 |
| Indeno(1,2,3-cd)pyrene | ug/g | 0.048 | 0.061 | 0.017 | 0.0050 | 5194341 |
| 1-Methylnaphthalene | ug/g | 0.017 | 0.0067 | <0.0050 | 0.0050 | 5194341 |
| 2-Methylnaphthalene | ug/g | 0.018 | 0.0087 | <0.0050 | 0.0050 | 5194341 |
| Naphthalene | ug/g | 0.017 | 0.011 | <0.0050 | 0.0050 | 5194341 |
| Phenanthrene | ug/g | 0.096 | 0.065 | 0.017 | 0.0050 | 5194341 |
| Pyrene | ug/g | 0.092 | 0.082 | 0.020 | 0.0050 | 5194341 |
| **Surrogate Recovery (%)** | | | | | | |
| D10-Anthracene | % | 87 | 85 | 79 | | 5194341 |
| D14-Terphenyl (FS) | % | 98 | 93 | 88 | | 5194341 |
| D8-Acenaphthylene | % | 102 | 97 | 93 | | 5194341 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7L6328
Report Date: 2017/10/05

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## VOLATILE ORGANICS BY GC/MS (SOIL)

| Maxxam ID | | FFX936 | FFX937 | FFX938 | FFX939 | FFX940 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/28 10:00 | 2017/09/28 10:15 | 2017/09/28 10:30 | 2017/09/28 10:45 | 2017/09/28 11:00 | | |
| COC Number | | 621108-06-01 | 621108-06-01 | 621108-06-01 | 621108-06-01 | 621108-06-01 | | |
| | **UNITS** | **S01** | **S02** | **S03** | **S04** | **S05** | **RDL** | **QC Batch** |
| **Volatile Organics** | | | | | | | | |
| Acetone (2-Propanone) | ug/g | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5192160 |
| Benzene | ug/g | <0.0060 | <0.0060 | <0.0060 | <0.0060 | <0.0060 | 0.0060 | 5192160 |
| Bromodichloromethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| Bromoform | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| Bromomethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| Carbon Tetrachloride | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| Chlorobenzene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| Chloroform | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| Dibromochloromethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| 1,2-Dichlorobenzene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| 1,3-Dichlorobenzene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| 1,4-Dichlorobenzene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| Dichlorodifluoromethane (FREON 12) | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| 1,1-Dichloroethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| 1,2-Dichloroethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| 1,1-Dichloroethylene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| cis-1,2-Dichloroethylene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| trans-1,2-Dichloroethylene | ug/g | 0.11 | 0.064 | 0.096 | <0.050 | 0.085 | 0.050 | 5192160 |
| 1,2-Dichloropropane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| cis-1,3-Dichloropropene | ug/g | <0.030 | <0.030 | <0.030 | <0.030 | <0.030 | 0.030 | 5192160 |
| trans-1,3-Dichloropropene | ug/g | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | 0.040 | 5192160 |
| Ethylbenzene | ug/g | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5192160 |
| Ethylene Dibromide | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| Hexane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| Methylene Chloride(Dichloromethane) | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| Methyl Isobutyl Ketone | ug/g | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5192160 |
| Methyl Ethyl Ketone (2-Butanone) | ug/g | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5192160 |
| Methyl t-butyl ether (MTBE) | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| Styrene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| 1,1,1,2-Tetrachloroethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| 1,1,2,2-Tetrachloroethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| Tetrachloroethylene | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| Toluene | ug/g | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | 0.020 | 5192160 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7L6328
Report Date: 2017/10/05

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## VOLATILE ORGANICS BY GC/MS (SOIL)

| Maxxam ID | | FFX936 | FFX937 | FFX938 | FFX939 | FFX940 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/28 10:00 | 2017/09/28 10:15 | 2017/09/28 10:30 | 2017/09/28 10:45 | 2017/09/28 11:00 | | |
| COC Number | | 621108-06-01 | 621108-06-01 | 621108-06-01 | 621108-06-01 | 621108-06-01 | | |
| | **UNITS** | **S01** | **S02** | **S03** | **S04** | **S05** | **RDL** | **QC Batch** |
| 1,1,1-Trichloroethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| 1,1,2-Trichloroethane | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| Trichloroethylene | ug/g | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5192160 |
| Vinyl Chloride | ug/g | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | 0.020 | 5192160 |
| p+m-Xylene | ug/g | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | 0.020 | 5192160 |
| o-Xylene | ug/g | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | 0.020 | 5192160 |
| Total Xylenes | ug/g | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | 0.020 | 5192160 |
| Trichlorofluoromethane (FREON 11) | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5192160 |
| **Surrogate Recovery (%)** | | | | | | | | |
| 4-Bromofluorobenzene | % | 99 | 99 | 98 | 99 | 97 | | 5192160 |
| D10-o-Xylene | % | 85 | 82 | 91 | 82 | 96 | | 5192160 |
| D4-1,2-Dichloroethane | % | 97 | 94 | 95 | 94 | 96 | | 5192160 |
| D8-Toluene | % | 94 | 95 | 94 | 95 | 93 | | 5192160 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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## VOLATILE ORGANICS BY GC/MS (SOIL)

| Maxxam ID | | FFX941 | | FFX942 | FFX943 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/28 11:15 | | 2017/09/28 11:30 | 2017/09/28 11:45 | | |
| COC Number | | 621108-06-01 | | 621108-06-01 | 621108-06-01 | | |
| | **UNITS** | **S06** | **RDL** | **S07** | **S08** | **RDL** | **QC Batch** |
| **Volatile Organics** | | | | | | | |
| Acetone (2-Propanone) | ug/g | <1.0 | 1.0 | <0.50 | <0.50 | 0.50 | 5192160 |
| Benzene | ug/g | <0.012 | 0.012 | <0.0060 | <0.0060 | 0.0060 | 5192160 |
| Bromodichloromethane | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| Bromoform | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| Bromomethane | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| Carbon Tetrachloride | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| Chlorobenzene | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| Chloroform | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| Dibromochloromethane | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| 1,2-Dichlorobenzene | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| 1,3-Dichlorobenzene | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| 1,4-Dichlorobenzene | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| Dichlorodifluoromethane (FREON 12) | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| 1,1-Dichloroethane | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| 1,2-Dichloroethane | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| 1,1-Dichloroethylene | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| cis-1,2-Dichloroethylene | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| trans-1,2-Dichloroethylene | ug/g | 0.10 | 0.10 | 0.11 | 0.063 | 0.050 | 5192160 |
| 1,2-Dichloropropane | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| cis-1,3-Dichloropropene | ug/g | <0.060 | 0.060 | <0.030 | <0.030 | 0.030 | 5192160 |
| trans-1,3-Dichloropropene | ug/g | <0.080 | 0.080 | <0.040 | <0.040 | 0.040 | 5192160 |
| Ethylbenzene | ug/g | <0.020 | 0.020 | <0.010 | <0.010 | 0.010 | 5192160 |
| Ethylene Dibromide | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| Hexane | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| Methylene Chloride(Dichloromethane) | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| Methyl Isobutyl Ketone | ug/g | <1.0 | 1.0 | <0.50 | <0.50 | 0.50 | 5192160 |
| Methyl Ethyl Ketone (2-Butanone) | ug/g | <1.0 | 1.0 | <0.50 | <0.50 | 0.50 | 5192160 |
| Methyl t-butyl ether (MTBE) | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| Styrene | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| 1,1,1,2-Tetrachloroethane | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| 1,1,2,2-Tetrachloroethane | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| Tetrachloroethylene | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| Toluene | ug/g | <0.040 | 0.040 | <0.020 | <0.020 | 0.020 | 5192160 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7L6328
Report Date: 2017/10/05

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## VOLATILE ORGANICS BY GC/MS (SOIL)

| Maxxam ID | | FFX941 | | FFX942 | FFX943 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/09/28 11:15 | | 2017/09/28 11:30 | 2017/09/28 11:45 | | |
| COC Number | | 621108-06-01 | | 621108-06-01 | 621108-06-01 | | |
| | **UNITS** | **S06** | **RDL** | **S07** | **S08** | **RDL** | **QC Batch** |
| 1,1,1-Trichloroethane | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| 1,1,2-Trichloroethane | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| Trichloroethylene | ug/g | <0.020 | 0.020 | <0.010 | <0.010 | 0.010 | 5192160 |
| Vinyl Chloride | ug/g | <0.040 | 0.040 | <0.020 | <0.020 | 0.020 | 5192160 |
| p+m-Xylene | ug/g | <0.040 | 0.040 | <0.020 | <0.020 | 0.020 | 5192160 |
| o-Xylene | ug/g | <0.040 | 0.040 | <0.020 | <0.020 | 0.020 | 5192160 |
| Total Xylenes | ug/g | <0.040 | 0.040 | <0.020 | <0.020 | 0.020 | 5192160 |
| Trichlorofluoromethane (FREON 11) | ug/g | <0.10 | 0.10 | <0.050 | <0.050 | 0.050 | 5192160 |
| **Surrogate Recovery (%)** | | | | | | | |
| 4-Bromofluorobenzene | % | 98 | | 97 | 96 | | 5192160 |
| D10-o-Xylene | % | 85 | | 96 | 82 | | 5192160 |
| D4-1,2-Dichloroethane | % | 95 | | 96 | 96 | | 5192160 |
| D8-Toluene | % | 94 | | 94 | 95 | | 5192160 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7L6328
Report Date: 2017/10/05

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** FFX936
**Sample ID:** S01
**Matrix:** Soil

**Collected:** 2017/09/28
**Shipped:**
**Received:** 2017/10/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | CALC | 5192931 | N/A | 2017/10/04 | Liliana Gaburici |
| Petroleum Hydro. CCME F1 & BTEX in Soil | HSGC/MSFD | 5196271 | N/A | 2017/10/05 | Lyndsey Hart |
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5194343 | 2017/10/03 | 2017/10/05 | Arezoo Habibagahi |
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5196269 | 2017/10/04 | 2017/10/05 | Daniel Teclu |
| Moisture | BAL | 5194340 | N/A | 2017/10/04 | Liliana Gaburici |
| OC Pesticides (Selected) & PCB | GC/ECD | 5195074 | 2017/10/03 | 2017/10/04 | Joy Zhang |
| OC Pesticides Summed Parameters | CALC | 5192929 | N/A | 2017/10/04 | Automated Statchk |
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5194341 | 2017/10/03 | 2017/10/03 | Liliana Gaburici |
| Volatile Organic Compounds in Soil | GC/MS | 5192160 | N/A | 2017/10/03 | Xueming Jiang |

**Maxxam ID:** FFX936 Dup
**Sample ID:** S01
**Matrix:** Soil

**Collected:** 2017/09/28
**Shipped:**
**Received:** 2017/10/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5194341 | 2017/10/03 | 2017/10/03 | Liliana Gaburici |

**Maxxam ID:** FFX937
**Sample ID:** S02
**Matrix:** Soil

**Collected:** 2017/09/28
**Shipped:**
**Received:** 2017/10/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | CALC | 5192931 | N/A | 2017/10/04 | Liliana Gaburici |
| Petroleum Hydro. CCME F1 & BTEX in Soil | HSGC/MSFD | 5196271 | N/A | 2017/10/05 | Lyndsey Hart |
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5194343 | 2017/10/03 | 2017/10/05 | Arezoo Habibagahi |
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5196269 | 2017/10/04 | 2017/10/05 | Daniel Teclu |
| Moisture | BAL | 5194340 | N/A | 2017/10/04 | Liliana Gaburici |
| OC Pesticides (Selected) & PCB | GC/ECD | 5195074 | 2017/10/03 | 2017/10/04 | Joy Zhang |
| OC Pesticides Summed Parameters | CALC | 5192929 | N/A | 2017/10/04 | Automated Statchk |
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5194341 | 2017/10/03 | 2017/10/03 | Liliana Gaburici |
| Volatile Organic Compounds in Soil | GC/MS | 5192160 | N/A | 2017/10/03 | Xueming Jiang |

**Maxxam ID:** FFX938
**Sample ID:** S03
**Matrix:** Soil

**Collected:** 2017/09/28
**Shipped:**
**Received:** 2017/10/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | CALC | 5192931 | N/A | 2017/10/04 | Liliana Gaburici |
| Petroleum Hydro. CCME F1 & BTEX in Soil | HSGC/MSFD | 5196271 | N/A | 2017/10/05 | Lyndsey Hart |
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5194343 | 2017/10/03 | 2017/10/05 | Arezoo Habibagahi |
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5196269 | 2017/10/04 | 2017/10/05 | Daniel Teclu |
| Moisture | BAL | 5194340 | N/A | 2017/10/04 | Liliana Gaburici |
| OC Pesticides (Selected) & PCB | GC/ECD | 5195074 | 2017/10/03 | 2017/10/04 | Joy Zhang |
| OC Pesticides Summed Parameters | CALC | 5192929 | N/A | 2017/10/04 | Automated Statchk |



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Maxxam Job #: B7L6328
Report Date: 2017/10/05

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** FFX938
**Sample ID:** S03
**Matrix:** Soil

**Collected:** 2017/09/28
**Shipped:**
**Received:** 2017/10/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5194341 | 2017/10/03 | 2017/10/03 | Liliana Gaburici |
| Volatile Organic Compounds in Soil | GC/MS | 5192160 | N/A | 2017/10/03 | Xueming Jiang |

**Maxxam ID:** FFX939
**Sample ID:** S04
**Matrix:** Soil

**Collected:** 2017/09/28
**Shipped:**
**Received:** 2017/10/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | CALC | 5192931 | N/A | 2017/10/04 | Liliana Gaburici |
| Petroleum Hydro. CCME F1 & BTEX in Soil | HSGC/MSFD | 5196271 | N/A | 2017/10/05 | Lyndsey Hart |
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5194343 | 2017/10/03 | 2017/10/04 | Arezoo Habibagahi |
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5196269 | 2017/10/04 | 2017/10/05 | Daniel Teclu |
| Moisture | BAL | 5194340 | N/A | 2017/10/04 | Liliana Gaburici |
| OC Pesticides (Selected) & PCB | GC/ECD | 5195074 | 2017/10/03 | 2017/10/04 | Joy Zhang |
| OC Pesticides Summed Parameters | CALC | 5192929 | N/A | 2017/10/04 | Automated Statchk |
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5194341 | 2017/10/03 | 2017/10/03 | Liliana Gaburici |
| Volatile Organic Compounds in Soil | GC/MS | 5192160 | N/A | 2017/10/03 | Xueming Jiang |

**Maxxam ID:** FFX939 Dup
**Sample ID:** S04
**Matrix:** Soil

**Collected:** 2017/09/28
**Shipped:**
**Received:** 2017/10/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| OC Pesticides (Selected) & PCB | GC/ECD | 5195074 | 2017/10/03 | 2017/10/04 | Joy Zhang |

**Maxxam ID:** FFX940
**Sample ID:** S05
**Matrix:** Soil

**Collected:** 2017/09/28
**Shipped:**
**Received:** 2017/10/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | CALC | 5192931 | N/A | 2017/10/04 | Liliana Gaburici |
| Petroleum Hydro. CCME F1 & BTEX in Soil | HSGC/MSFD | 5196271 | N/A | 2017/10/05 | Lyndsey Hart |
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5194343 | 2017/10/03 | 2017/10/04 | Arezoo Habibagahi |
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5196269 | 2017/10/04 | 2017/10/05 | Daniel Teclu |
| Moisture | BAL | 5194340 | N/A | 2017/10/04 | Liliana Gaburici |
| OC Pesticides (Selected) & PCB | GC/ECD | 5195074 | 2017/10/03 | 2017/10/04 | Joy Zhang |
| OC Pesticides Summed Parameters | CALC | 5192929 | N/A | 2017/10/04 | Automated Statchk |
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5194341 | 2017/10/03 | 2017/10/03 | Liliana Gaburici |
| Volatile Organic Compounds in Soil | GC/MS | 5192160 | N/A | 2017/10/03 | Xueming Jiang |



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Maxxam Job #: B7L6328
Report Date: 2017/10/05

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** FFX940 Dup
**Sample ID:** S05
**Matrix:** Soil

**Collected:** 2017/09/28
**Shipped:**
**Received:** 2017/10/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5196269 | 2017/10/04 | 2017/10/05 | Daniel Teclu |

**Maxxam ID:** FFX941
**Sample ID:** S06
**Matrix:** Soil

**Collected:** 2017/09/28
**Shipped:**
**Received:** 2017/10/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | CALC | 5192931 | N/A | 2017/10/04 | Liliana Gaburici |
| Petroleum Hydro. CCME F1 & BTEX in Soil | HSGC/MSFD | 5196271 | N/A | 2017/10/05 | Lyndsey Hart |
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5194343 | 2017/10/03 | 2017/10/04 | Arezoo Habibagahi |
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5196269 | 2017/10/04 | 2017/10/05 | Daniel Teclu |
| Moisture | BAL | 5194340 | N/A | 2017/10/04 | Liliana Gaburici |
| OC Pesticides (Selected) & PCB | GC/ECD | 5195074 | 2017/10/03 | 2017/10/04 | Joy Zhang |
| OC Pesticides Summed Parameters | CALC | 5192929 | N/A | 2017/10/04 | Automated Statchk |
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5194341 | 2017/10/03 | 2017/10/03 | Liliana Gaburici |
| Volatile Organic Compounds in Soil | GC/MS | 5192160 | N/A | 2017/10/03 | Xueming Jiang |

**Maxxam ID:** FFX942
**Sample ID:** S07
**Matrix:** Soil

**Collected:** 2017/09/28
**Shipped:**
**Received:** 2017/10/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | CALC | 5192931 | N/A | 2017/10/04 | Liliana Gaburici |
| Petroleum Hydro. CCME F1 & BTEX in Soil | HSGC/MSFD | 5196271 | N/A | 2017/10/05 | Lyndsey Hart |
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5194343 | 2017/10/03 | 2017/10/04 | Arezoo Habibagahi |
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5196269 | 2017/10/04 | 2017/10/05 | Daniel Teclu |
| Moisture | BAL | 5194340 | N/A | 2017/10/04 | Liliana Gaburici |
| OC Pesticides (Selected) & PCB | GC/ECD | 5195074 | 2017/10/03 | 2017/10/04 | Joy Zhang |
| OC Pesticides Summed Parameters | CALC | 5192929 | N/A | 2017/10/04 | Automated Statchk |
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5194341 | 2017/10/03 | 2017/10/03 | Liliana Gaburici |
| Volatile Organic Compounds in Soil | GC/MS | 5192160 | N/A | 2017/10/03 | Xueming Jiang |

**Maxxam ID:** FFX943
**Sample ID:** S08
**Matrix:** Soil

**Collected:** 2017/09/28
**Shipped:**
**Received:** 2017/10/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | CALC | 5192931 | N/A | 2017/10/04 | Liliana Gaburici |
| Petroleum Hydro. CCME F1 & BTEX in Soil | HSGC/MSFD | 5196271 | N/A | 2017/10/05 | Lyndsey Hart |
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5194343 | 2017/10/03 | 2017/10/04 | Arezoo Habibagahi |
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5196269 | 2017/10/04 | 2017/10/05 | Daniel Teclu |
| Moisture | BAL | 5194340 | N/A | 2017/10/04 | Liliana Gaburici |
| OC Pesticides (Selected) & PCB | GC/ECD | 5195074 | 2017/10/03 | 2017/10/04 | Joy Zhang |
| OC Pesticides Summed Parameters | CALC | 5192929 | N/A | 2017/10/04 | Automated Statchk |



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Maxxam Job #: B7L6328
Report Date: 2017/10/05

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** FFX943
**Sample ID:** S08
**Matrix:** Soil

**Collected:** 2017/09/28
**Shipped:**
**Received:** 2017/10/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5194341 | 2017/10/03 | 2017/10/03 | Liliana Gaburici |
| Volatile Organic Compounds in Soil | GC/MS | 5192160 | N/A | 2017/10/04 | Xueming Jiang |



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## GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

| | |
|---|---|
| Package 1 | 6.7°C |

OC Pesticide Analysis: Due to the sample matrix, samples required dilution. Detection limits were adjusted accordingly.

Sample FFX941 [S06] : VOC Analysis: Detection limits were raised due to high moisture content of soil provided.

**CCME PETROLEUM HYDROCARBONS IN SOIL (SOIL)**

Petroleum Hydrocarbons F2-F4 in Soil: F2-F4 Analysis: Matrix spiked recoveries were not calculated (NC) because of high concentration of target compounds in the parent sample.

**Results relate only to the items tested.**



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Maxxam Job #: B7L6328
Report Date: 2017/10/05

## QUALITY ASSURANCE REPORT

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5192160 | 4-Bromofluorobenzene | 2017/10/03 | 102 | 60 - 140 | 103 | 60 - 140 | 99 | % | | |
| 5192160 | D10-o-Xylene | 2017/10/03 | 101 | 60 - 130 | 111 | 60 - 130 | 88 | % | | |
| 5192160 | D4-1,2-Dichloroethane | 2017/10/03 | 93 | 60 - 140 | 98 | 60 - 140 | 99 | % | | |
| 5192160 | D8-Toluene | 2017/10/03 | 103 | 60 - 140 | 103 | 60 - 140 | 94 | % | | |
| 5194341 | D10-Anthracene | 2017/10/03 | 77 | 50 - 130 | 81 | 50 - 130 | 87 | % | | |
| 5194341 | D14-Terphenyl (FS) | 2017/10/03 | 86 | 50 - 130 | 80 | 50 - 130 | 82 | % | | |
| 5194341 | D8-Acenaphthylene | 2017/10/03 | 93 | 50 - 130 | 99 | 50 - 130 | 104 | % | | |
| 5194343 | o-Terphenyl | 2017/10/05 | 93 | 30 - 130 | 100 | 30 - 130 | 79 | % | | |
| 5195074 | 2,4,5,6-Tetrachloro-m-xylene | 2017/10/04 | 109 | 50 - 130 | 83 | 50 - 130 | 84 | % | | |
| 5195074 | Decachlorobiphenyl | 2017/10/04 | 116 | 50 - 130 | 97 | 50 - 130 | 70 | % | | |
| 5196271 | 1,4-Difluorobenzene | 2017/10/05 | 100 | 60 - 140 | 103 | 60 - 140 | 101 | % | | |
| 5196271 | 4-Bromofluorobenzene | 2017/10/05 | 99 | 60 - 140 | 88 | 60 - 140 | 92 | % | | |
| 5196271 | D10-Ethylbenzene | 2017/10/05 | 115 | 30 - 130 | 122 | 30 - 130 | 126 | % | | |
| 5196271 | D4-1,2-Dichloroethane | 2017/10/05 | 123 | 60 - 140 | 113 | 60 - 140 | 120 | % | | |
| 5192160 | 1,1,1,2-Tetrachloroethane | 2017/10/03 | 95 | 60 - 140 | 102 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | 1,1,1-Trichloroethane | 2017/10/03 | 89 | 60 - 140 | 95 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | 1,1,2,2-Tetrachloroethane | 2017/10/03 | 89 | 60 - 140 | 102 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | 1,1,2-Trichloroethane | 2017/10/03 | 89 | 60 - 140 | 97 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | 1,1-Dichloroethane | 2017/10/03 | 96 | 60 - 140 | 103 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | 1,1-Dichloroethylene | 2017/10/03 | 102 | 60 - 140 | 107 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | 1,2-Dichlorobenzene | 2017/10/03 | 90 | 60 - 140 | 96 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | 1,2-Dichloroethane | 2017/10/03 | 86 | 60 - 140 | 95 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | 1,2-Dichloropropane | 2017/10/03 | 88 | 60 - 140 | 96 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | 1,3-Dichlorobenzene | 2017/10/03 | 96 | 60 - 140 | 101 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | 1,4-Dichlorobenzene | 2017/10/03 | 95 | 60 - 140 | 101 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | Acetone (2-Propanone) | 2017/10/03 | 89 | 60 - 140 | 97 | 60 - 140 | <0.50 | ug/g | NC | 50 |
| 5192160 | Benzene | 2017/10/03 | 94 | 60 - 140 | 101 | 60 - 130 | <0.0060 | ug/g | NC | 50 |
| 5192160 | Bromodichloromethane | 2017/10/03 | 87 | 60 - 140 | 96 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | Bromoform | 2017/10/03 | 93 | 60 - 140 | 106 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | Bromomethane | 2017/10/03 | 89 | 60 - 140 | 99 | 60 - 140 | <0.050 | ug/g | NC | 50 |
| 5192160 | Carbon Tetrachloride | 2017/10/03 | 90 | 60 - 140 | 96 | 60 - 130 | <0.050 | ug/g | NC | 50 |



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## QUALITY ASSURANCE REPORT(CONT'D)



| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5192160 | Chlorobenzene | 2017/10/03 | 93 | 60 - 140 | 99 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | Chloroform | 2017/10/03 | 89 | 60 - 140 | 96 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | cis-1,2-Dichloroethylene | 2017/10/03 | 90 | 60 - 140 | 97 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | cis-1,3-Dichloropropene | 2017/10/03 | 84 | 60 - 140 | 99 | 60 - 130 | <0.030 | ug/g | NC | 50 |
| 5192160 | Dibromochloromethane | 2017/10/03 | 92 | 60 - 140 | 102 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | Dichlorodifluoromethane (FREON 12) | 2017/10/03 | 104 | 60 - 140 | 108 | 60 - 140 | <0.050 | ug/g | NC | 50 |
| 5192160 | Ethylbenzene | 2017/10/03 | 100 | 60 - 140 | 99 | 60 - 130 | <0.010 | ug/g | 4.4 | 50 |
| 5192160 | Ethylene Dibromide | 2017/10/03 | 93 | 60 - 140 | 102 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | Hexane | 2017/10/03 | 107 | 60 - 140 | 114 | 60 - 130 | <0.050 | ug/g | 2.0 | 50 |
| 5192160 | Methyl Ethyl Ketone (2-Butanone) | 2017/10/03 | 89 | 60 - 140 | 100 | 60 - 140 | <0.50 | ug/g | NC | 50 |
| 5192160 | Methyl Isobutyl Ketone | 2017/10/03 | 89 | 60 - 140 | 105 | 60 - 130 | <0.50 | ug/g | NC | 50 |
| 5192160 | Methyl t-butyl ether (MTBE) | 2017/10/03 | 91 | 60 - 140 | 97 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | Methylene Chloride(Dichloromethane) | 2017/10/03 | 93 | 60 - 140 | 101 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | o-Xylene | 2017/10/03 | 96 | 60 - 140 | 101 | 60 - 130 | <0.020 | ug/g | 4.9 | 50 |
| 5192160 | p+m-Xylene | 2017/10/03 | 103 | 60 - 140 | 105 | 60 - 130 | <0.020 | ug/g | 2.8 | 50 |
| 5192160 | Styrene | 2017/10/03 | 75 | 60 - 140 | 81 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | Tetrachloroethylene | 2017/10/03 | 89 | 60 - 140 | 93 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | Toluene | 2017/10/03 | 94 | 60 - 140 | 99 | 60 - 130 | <0.020 | ug/g | 2.7 | 50 |
| 5192160 | Total Xylenes | 2017/10/03 | | | | | <0.020 | ug/g | 3.2 | 50 |
| 5192160 | trans-1,2-Dichloroethylene | 2017/10/03 | 93 | 60 - 140 | 99 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | trans-1,3-Dichloropropene | 2017/10/03 | 84 | 60 - 140 | 103 | 60 - 130 | <0.040 | ug/g | NC | 50 |
| 5192160 | Trichloroethylene | 2017/10/03 | 91 | 60 - 140 | 96 | 60 - 130 | <0.010 | ug/g | NC | 50 |
| 5192160 | Trichlorofluoromethane (FREON 11) | 2017/10/03 | 93 | 60 - 140 | 98 | 60 - 130 | <0.050 | ug/g | NC | 50 |
| 5192160 | Vinyl Chloride | 2017/10/03 | 96 | 60 - 140 | 101 | 60 - 130 | <0.020 | ug/g | NC | 50 |
| 5194340 | Moisture | 2017/10/04 | | | | | | | 5.8 | 50 |
| 5194341 | 1-Methylnaphthalene | 2017/10/03 | 99 | 50 - 130 | 105 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5194341 | 2-Methylnaphthalene | 2017/10/03 | 93 | 50 - 130 | 100 | 50 - 130 | <0.0050 | ug/g | 5.3 | 40 |
| 5194341 | Acenaphthene | 2017/10/03 | 96 | 50 - 130 | 96 | 50 - 130 | <0.0050 | ug/g | 38 | 40 |
| 5194341 | Acenaphthylene | 2017/10/03 | 98 | 50 - 130 | 105 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5194341 | Anthracene | 2017/10/03 | 90 | 50 - 130 | 97 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5194341 | Benzo(a)anthracene | 2017/10/03 | 95 | 50 - 130 | 108 | 50 - 130 | <0.0050 | ug/g | 14 | 40 |

## QUALITY ASSURANCE REPORT(CONT'D)



| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5194341 | Benzo(a)pyrene | 2017/10/03 | 71 | 50 - 130 | 89 | 50 - 130 | <0.0050 | ug/g | 22 | 40 |
| 5194341 | Benzo(b/j)fluoranthene | 2017/10/03 | 77 | 50 - 130 | 88 | 50 - 130 | <0.0050 | ug/g | 24 | 40 |
| 5194341 | Benzo(g,h,i)perylene | 2017/10/03 | 67 | 50 - 130 | 88 | 50 - 130 | <0.0050 | ug/g | 30 | 40 |
| 5194341 | Benzo(k)fluoranthene | 2017/10/03 | 78 | 50 - 130 | 89 | 50 - 130 | <0.0050 | ug/g | 5.9 | 40 |
| 5194341 | Chrysene | 2017/10/03 | 90 | 50 - 130 | 105 | 50 - 130 | <0.0050 | ug/g | 14 | 40 |
| 5194341 | Dibenz(a,h)anthracene | 2017/10/03 | 56 | 50 - 130 | 84 | 50 - 130 | <0.0050 | ug/g | 5.3 | 40 |
| 5194341 | Fluoranthene | 2017/10/03 | 79 | 50 - 130 | 100 | 50 - 130 | <0.0050 | ug/g | 39 | 40 |
| 5194341 | Fluorene | 2017/10/03 | 110 | 50 - 130 | 107 | 50 - 130 | <0.0050 | ug/g | 34 | 40 |
| 5194341 | Indeno(1,2,3-cd)pyrene | 2017/10/03 | 74 | 50 - 130 | 94 | 50 - 130 | <0.0050 | ug/g | 34 | 40 |
| 5194341 | Naphthalene | 2017/10/03 | 71 | 50 - 130 | 77 | 50 - 130 | <0.0050 | ug/g | 37 | 40 |
| 5194341 | Phenanthrene | 2017/10/03 | 75 | 50 - 130 | 93 | 50 - 130 | <0.0050 | ug/g | 37 | 40 |
| 5194341 | Pyrene | 2017/10/03 | 77 | 50 - 130 | 92 | 50 - 130 | <0.0050 | ug/g | 1.1 | 40 |
| 5194343 | F2 (C10-C16 Hydrocarbons) | 2017/10/05 | NC | 50 - 130 | 111 | 80 - 120 | <10 | ug/g | 3.6 | 50 |
| 5194343 | F3 (C16-C34 Hydrocarbons) | 2017/10/05 | NC | 50 - 130 | 111 | 80 - 120 | <50 | ug/g | 8.8 | 50 |
| 5194343 | F4 (C34-C50 Hydrocarbons) | 2017/10/05 | NC | 50 - 130 | 111 | 80 - 120 | <50 | ug/g | 13 | 50 |
| 5195074 | Aroclor 1242 | 2017/10/04 | | | | | <0.015 | ug/g | NC | 40 |
| 5195074 | Aroclor 1248 | 2017/10/04 | | | | | <0.015 | ug/g | NC | 40 |
| 5195074 | Aroclor 1254 | 2017/10/04 | | | | | <0.015 | ug/g | NC | 40 |
| 5195074 | Aroclor 1260 | 2017/10/04 | | | | | <0.015 | ug/g | NC | 40 |
| 5195074 | o,p-DDD | 2017/10/04 | 114 | 50 - 130 | 110 | 50 - 130 | <0.0020 | ug/g | NC | 40 |
| 5195074 | o,p-DDE | 2017/10/04 | 122 | 50 - 130 | 89 | 50 - 130 | <0.0020 | ug/g | NC | 40 |
| 5195074 | o,p-DDT | 2017/10/04 | 74 | 50 - 130 | 109 | 50 - 130 | <0.0020 | ug/g | NC | 40 |
| 5195074 | p,p-DDD | 2017/10/04 | 103 | 50 - 130 | 128 | 50 - 130 | <0.0020 | ug/g | NC | 40 |
| 5195074 | p,p-DDE | 2017/10/04 | 126 | 50 - 130 | 111 | 50 - 130 | <0.0020 | ug/g | NC | 40 |
| 5195074 | p,p-DDT | 2017/10/04 | NC | 50 - 130 | 116 | 50 - 130 | <0.0020 | ug/g | 30 | 40 |
| 5196269 | Acid Extractable Antimony (Sb) | 2017/10/05 | 95 | 75 - 125 | 99 | 80 - 120 | <0.20 | ug/g | 16 | 30 |
| 5196269 | Acid Extractable Arsenic (As) | 2017/10/05 | 100 | 75 - 125 | 103 | 80 - 120 | <1.0 | ug/g | 3.3 | 30 |
| 5196269 | Acid Extractable Barium (Ba) | 2017/10/05 | NC | 75 - 125 | 103 | 80 - 120 | <0.50 | ug/g | 3.5 | 30 |
| 5196269 | Acid Extractable Beryllium (Be) | 2017/10/05 | 99 | 75 - 125 | 100 | 80 - 120 | <0.20 | ug/g | 3.3 | 30 |
| 5196269 | Acid Extractable Boron (B) | 2017/10/05 | 91 | 75 - 125 | 98 | 80 - 120 | <5.0 | ug/g | 27 | 30 |
| 5196269 | Acid Extractable Cadmium (Cd) | 2017/10/05 | 99 | 75 - 125 | 98 | 80 - 120 | <0.10 | ug/g | 12 | 30 |



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Maxxam Job #: B7L6328
Report Date: 2017/10/05

## QUALITY ASSURANCE REPORT(CONT'D)

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5196269 | Acid Extractable Chromium (Cr) | 2017/10/05 | NC | 75 - 125 | 102 | 80 - 120 | <1.0 | ug/g | 0.44 | 30 |
| 5196269 | Acid Extractable Cobalt (Co) | 2017/10/05 | 102 | 75 - 125 | 101 | 80 - 120 | <0.10 | ug/g | 7.1 | 30 |
| 5196269 | Acid Extractable Copper (Cu) | 2017/10/05 | NC | 75 - 125 | 102 | 80 - 120 | <0.50 | ug/g | 2.3 | 30 |
| 5196269 | Acid Extractable Lead (Pb) | 2017/10/05 | NC | 75 - 125 | 100 | 80 - 120 | <1.0 | ug/g | 4.0 | 30 |
| 5196269 | Acid Extractable Molybdenum (Mo) | 2017/10/05 | 100 | 75 - 125 | 98 | 80 - 120 | <0.50 | ug/g | 1.5 | 30 |
| 5196269 | Acid Extractable Nickel (Ni) | 2017/10/05 | 102 | 75 - 125 | 104 | 80 - 120 | <0.50 | ug/g | 6.0 | 30 |
| 5196269 | Acid Extractable Selenium (Se) | 2017/10/05 | 103 | 75 - 125 | 105 | 80 - 120 | <0.50 | ug/g | NC | 30 |
| 5196269 | Acid Extractable Silver (Ag) | 2017/10/05 | 97 | 75 - 125 | 97 | 80 - 120 | <0.20 | ug/g | NC | 30 |
| 5196269 | Acid Extractable Thallium (Tl) | 2017/10/05 | 102 | 75 - 125 | 98 | 80 - 120 | <0.050 | ug/g | 0.37 | 30 |
| 5196269 | Acid Extractable Uranium (U) | 2017/10/05 | 109 | 75 - 125 | 103 | 80 - 120 | <0.050 | ug/g | 3.4 | 30 |
| 5196269 | Acid Extractable Vanadium (V) | 2017/10/05 | NC | 75 - 125 | 99 | 80 - 120 | <5.0 | ug/g | 4.4 | 30 |
| 5196269 | Acid Extractable Zinc (Zn) | 2017/10/05 | NC | 75 - 125 | 104 | 80 - 120 | <5.0 | ug/g | 0.12 | 30 |
| 5196271 | Benzene | 2017/10/05 | 97 | 60 - 140 | 105 | 60 - 140 | <0.0050 | ug/g | NC | 50 |
| 5196271 | Ethylbenzene | 2017/10/05 | 110 | 60 - 140 | 107 | 60 - 140 | <0.010 | ug/g | NC | 50 |
| 5196271 | F1 (C6-C10) - BTEX | 2017/10/05 | | | | | <10 | ug/g | NC | 50 |
| 5196271 | F1 (C6-C10) | 2017/10/05 | 86 | 60 - 140 | 94 | 80 - 120 | <10 | ug/g | NC | 50 |
| 5196271 | o-Xylene | 2017/10/05 | 108 | 60 - 140 | 105 | 60 - 140 | <0.020 | ug/g | NC | 50 |
| 5196271 | p+m-Xylene | 2017/10/05 | 109 | 60 - 140 | 108 | 60 - 140 | <0.040 | ug/g | NC | 50 |
| 5196271 | Toluene | 2017/10/05 | 102 | 60 - 140 | 100 | 60 - 140 | <0.020 | ug/g | NC | 50 |
| 5196271 | Total Xylenes | 2017/10/05 | | | | | <0.040 | ug/g | NC | 50 |

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



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Report Date: 2017/10/05

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Cristina Carriere, Scientific Service Specialist

Paul Rubinato, Analyst, Maxxam Analytics

Steve Roberts, Ottawa Lab Manager

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



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Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.maxxam.ca

# CHAIN OF CUSTODY RECORD

Page 1 of 1

| INVOICE TO: | | REPORT TO: | | PROJECT INFORMATION: | | Laboratory Use Only: | |
|---|---|---|---|---|---|---|---|
| Company Name: | #10988 ARCADIS Canada Inc | Company Name: | | Quotation #: | B54416 | Maxxam Job #: | Bottle Order #: 621108 |
| Attention: | Ryan Fletcher | Attention: | Ryan Fletcher | P.O. #: | | | |
| Address: | 329 Churchill Ave N Suite 200<br>Ottawa ON K1Z 5B8 | Address: | | Project: | 102153-000 | | |
| Tel: | (613) 721-0555 x Fax: (613) 721-0029 x | Tel: | (613) 721-0555 x Fax: | Project Name: | TC Iqaluit | COC #: C#621108-06-01 | Project Manager: Alison Cameron |
| Email: | ryan.fletcher@arcadis.com; ryan.janzen@... | Email: | ryan.fletcher@arcadis.com; ryan.janzen@... | Site #: | | | |
| | | | | Sampled By: | RF | | |

**MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY**

**Regulation 153 (2011)**
- ☐ Table 1 ☐ Res/Park ☐ Medium/Fine
- ☐ Table 2 ☒ Ind/Comm ☒ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ For RSC
- ☐ Table ___

**Other Regulations**
- ☒ CCME ☐ Sanitary Sewer Bylaw
- ☐ Reg 558. ☐ Storm Sewer Bylaw
- ☐ MISA Municipality ___
- ☐ PWQO
- ☐ Other ___

**Special Instructions**
ICPMS (full package) Pesticides (DDT, DDE, DDD)

*Include Criteria on Certificate of Analysis (Y/N)?* ___

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

**Regular (Standard) TAT:** ☐
*(will be applied if Rush TAT is not specified):*
*Standard TAT = 5-7 Working days for most tests,.*
*Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.*

**Job Specific Rush TAT (if applies to entire submission)** ☒
Date Required: ___ Time Required: 72hr
Rush Confirmation Number: C60928-02 *(call lab for #)*

| | Sample Barcode Label | Sample (Location) Identification | Date Sampled | Time Sampled | Matrix | Field Filtered (please circle): Metals / Hg / Cr VI | CCME Petroleum Hydrocarbons Soil | ICPMS | PCB | PAH | VOC | Pesticides | # of Bottles | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | SO1 | Sept. 29/17 | 10:00 | SOIL | NA | X | X | X | X | X | X | 9 | -16 empty jars for analysis only (120's) |
| 2 | | SO2 | | 10:15 | SOIL | | X | X | X | X | X | X | 9 | |
| 3 | | SO3 | | 10:30 | SOIL | | X | X | X | X | X | X | 9 | -4 empty 250mL jars |
| 4 | | SO4 | | 10:45 | SOIL | | X | X | X | X | X | X | 9 | -16 unused vials |
| 5 | | SO5 | | 11:00 | SOIL | | X | X | X | X | X | X | 9 | |
| 6 | | SO6 | | 11:15 | SOIL | | X | X | X | X | X | X | 9 | |
| 7 | | SO7 | | 11:30 | SOIL | | X | X | X | X | X | X | 9 | |
| 8 | | SO8 | ↓ | 11:45 | SOIL | ↓ | X | X | X | X | X | X | 9 | RECEIVED IN OTTAWA |
| 9 | | | | | SOIL | | | | | | | | | |
| 10 | | | | | SOIL | | | | | | | | | |

| * RELINQUISHED BY: (Signature/Print) | Date: (YY/MM/DD) | Time | RECEIVED BY: (Signature/Print) | Date: (YY/MM/DD) | Time | # jars used and not submitted | Laboratory Use Only: Time Sensitive | Temperature (°C) on Recei | Custody Seal | Yes | No |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ryan Fletcher | Sept. 29/17 | 9 am | [illegible] | 2017/10/02 | 15:00 | | | 7.1, 7.6 | Present | | |
| | | | | | | | | | Intact | X | |

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS C... S AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILAB...

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURA... N OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMA... OADS/ONTARIO-COC.PDF.

SAMPLES MUST BE KEPT COOL ( < 10° C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

White: Maxxa Yellow: Client

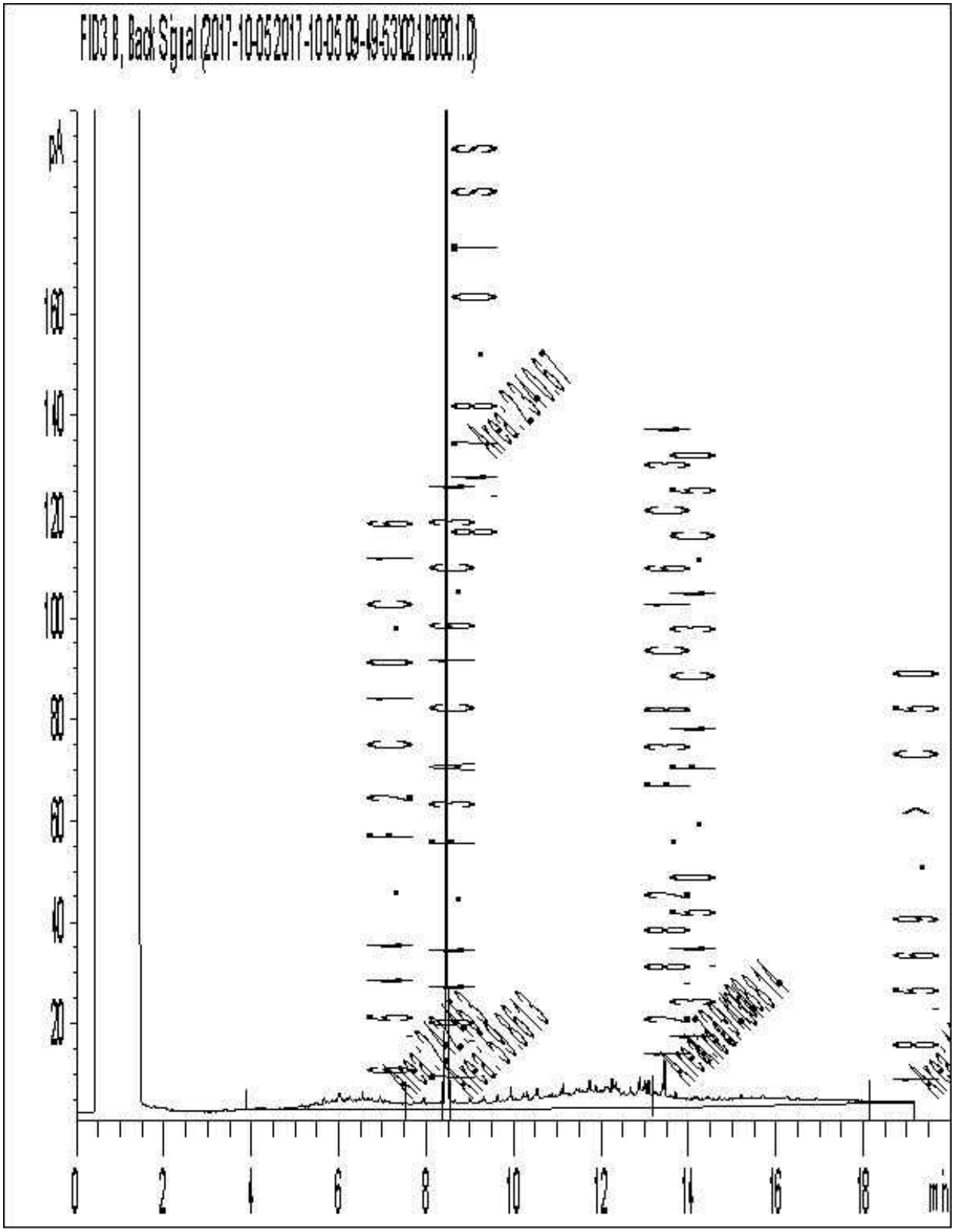
02-Oct-17 15:00
Alison Cameron
B7L6328
KIV OTT 001

Maxxam Analytics International Corporation o/a Maxxam Analytics

Maxxam Job #: B7L6328
Report Date: 2017/10/05
Maxxam Sample: FFX936

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: S01

**Petroleum Hydrocarbons F2-F4 in Soil Chromatogram**

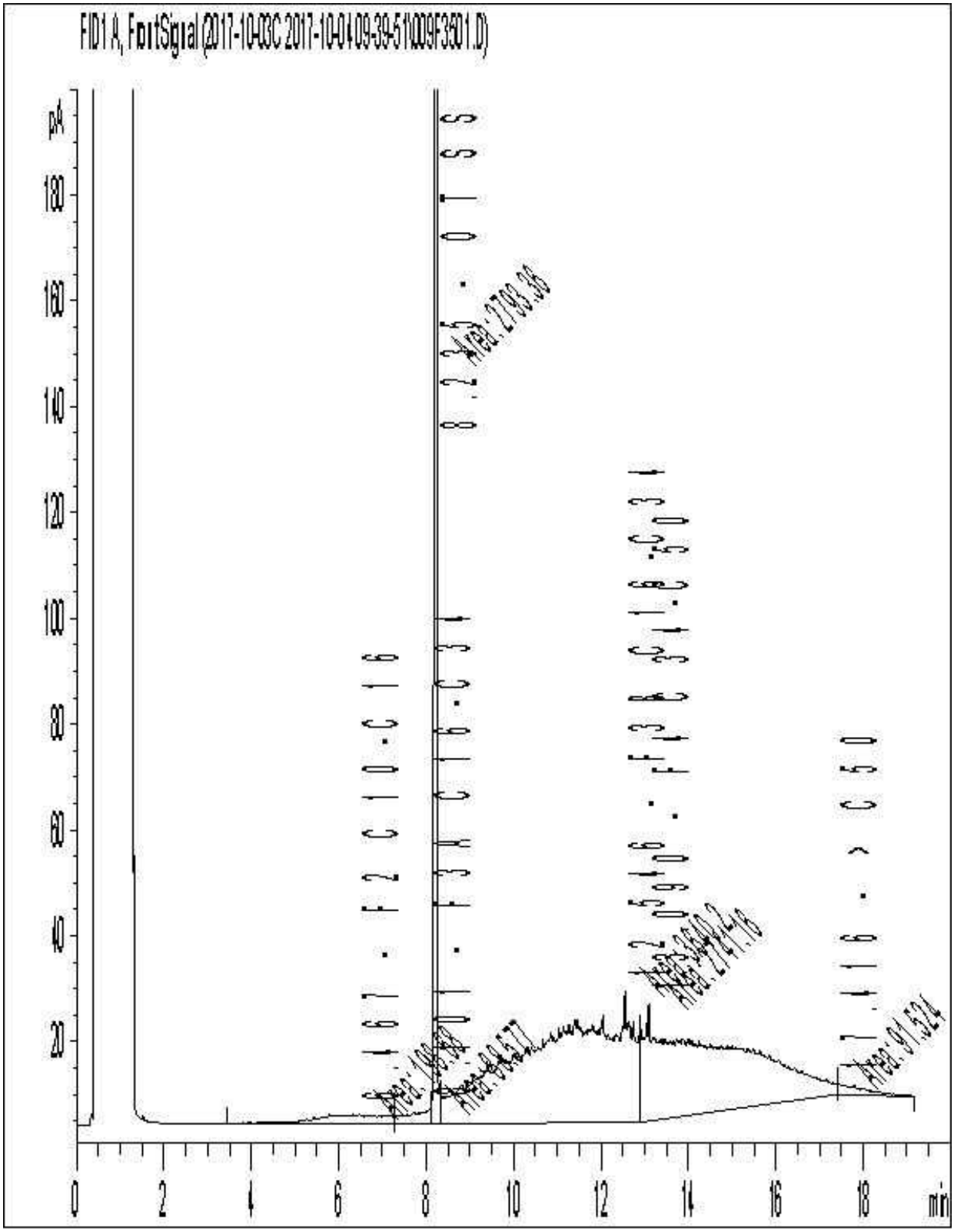



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7L6328
Report Date: 2017/10/05
Maxxam Sample: FFX937

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: S02

**Petroleum Hydrocarbons F2-F4 in Soil Chromatogram**

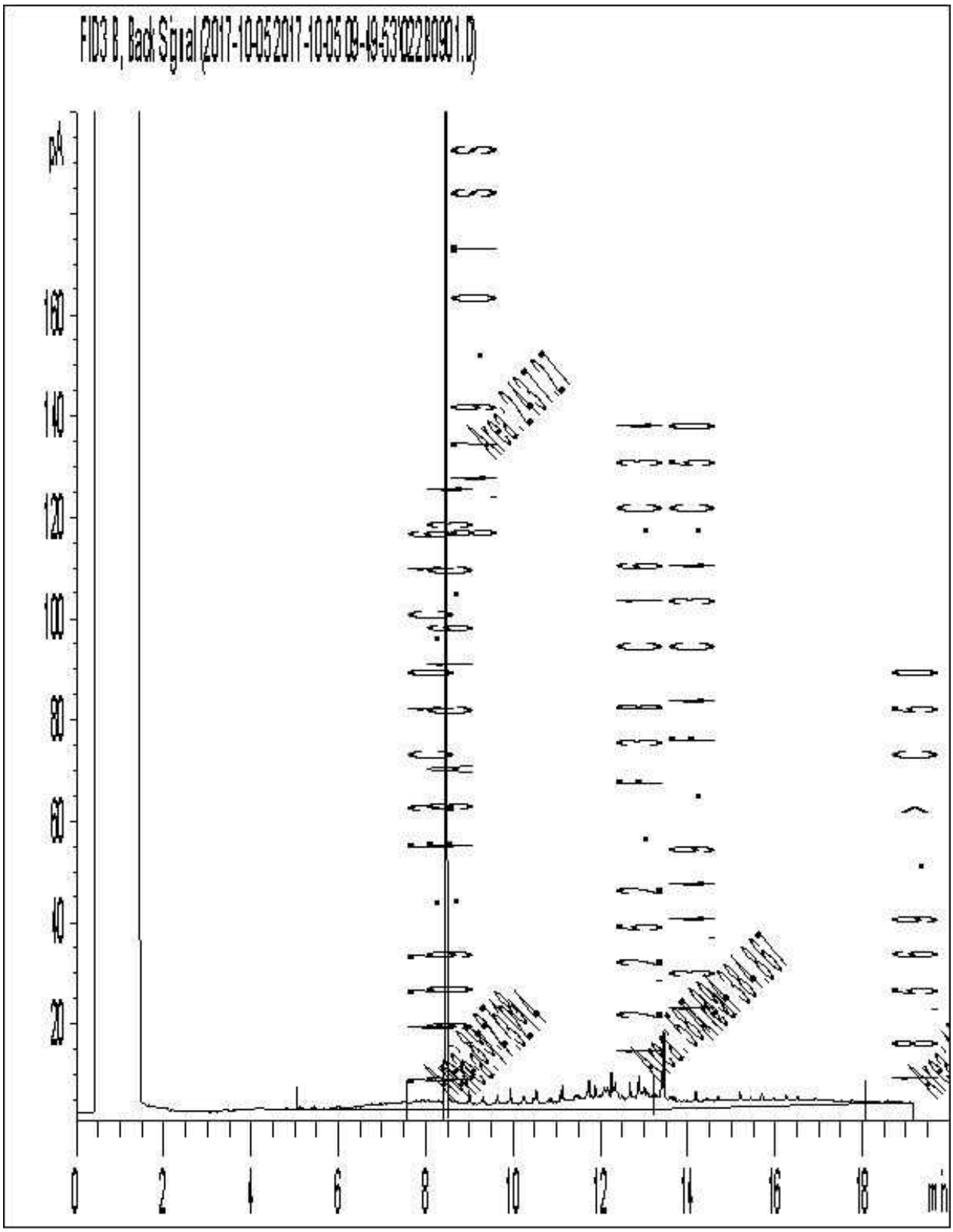



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7L6328
Report Date: 2017/10/05
Maxxam Sample: FFX938

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: S03

**Petroleum Hydrocarbons F2-F4 in Soil Chromatogram**

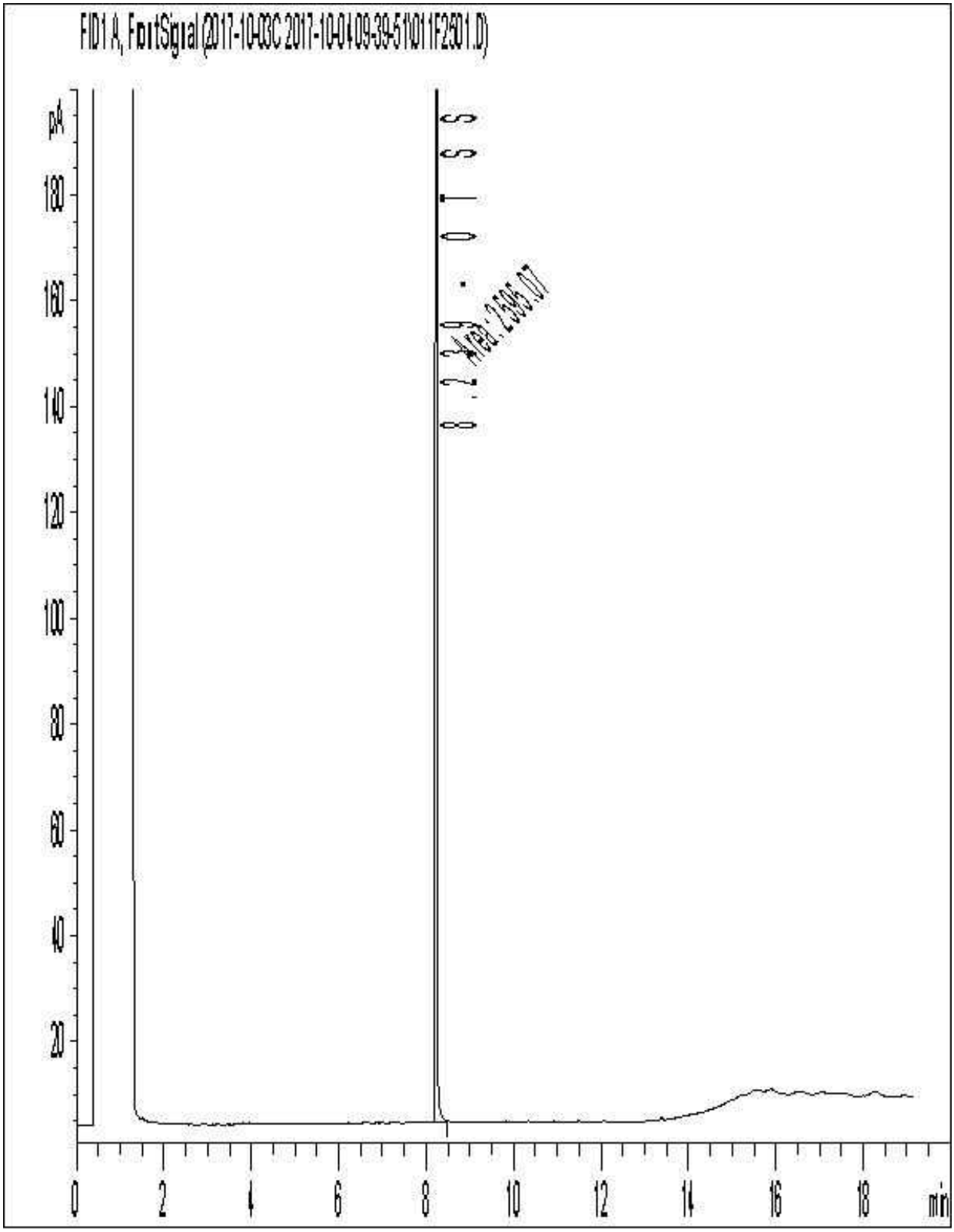



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7L6328
Report Date: 2017/10/05
Maxxam Sample: FFX939

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: S04

**Petroleum Hydrocarbons F2-F4 in Soil Chromatogram**

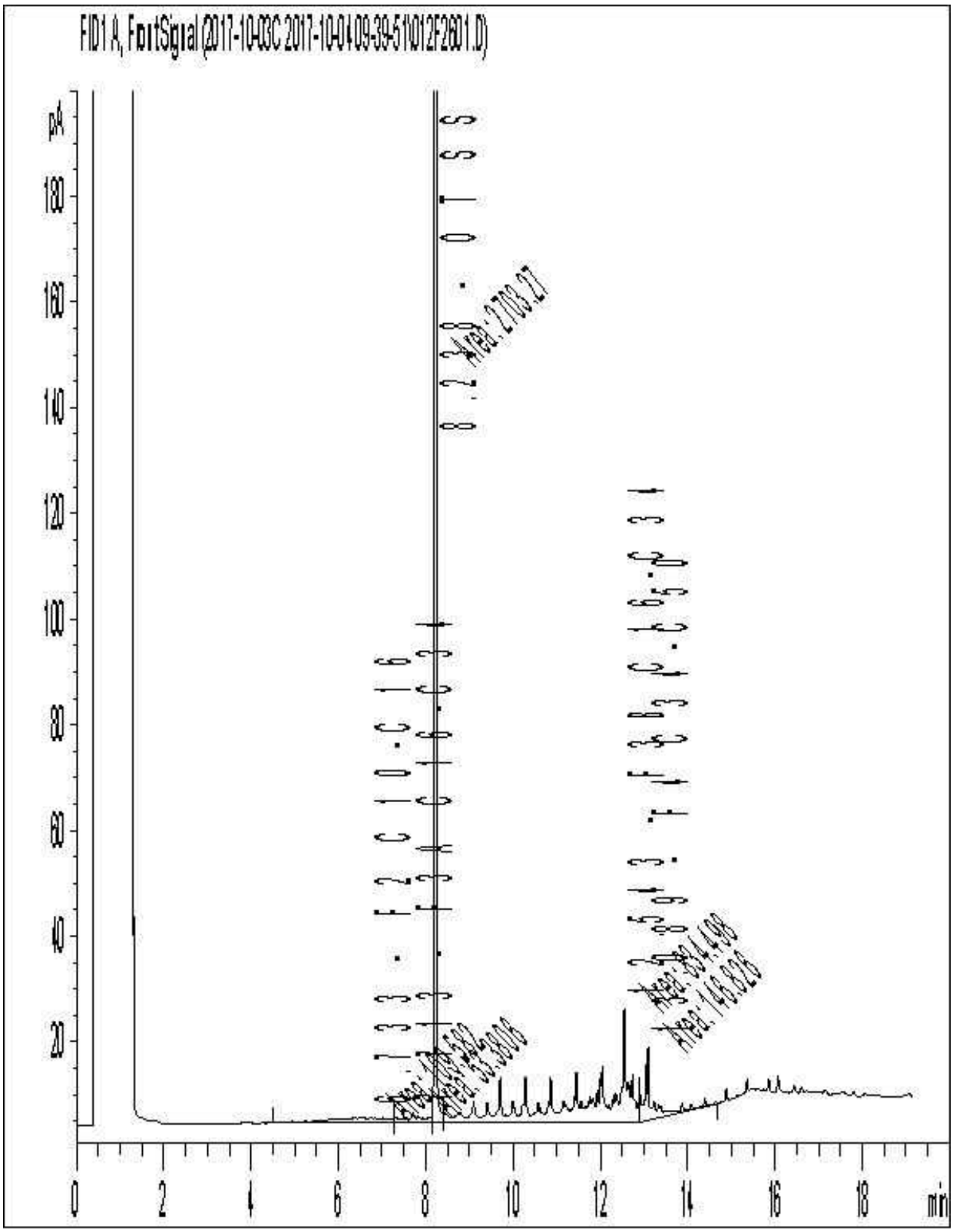



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7L6328
Report Date: 2017/10/05
Maxxam Sample: FFX940

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: S05

**Petroleum Hydrocarbons F2-F4 in Soil Chromatogram**

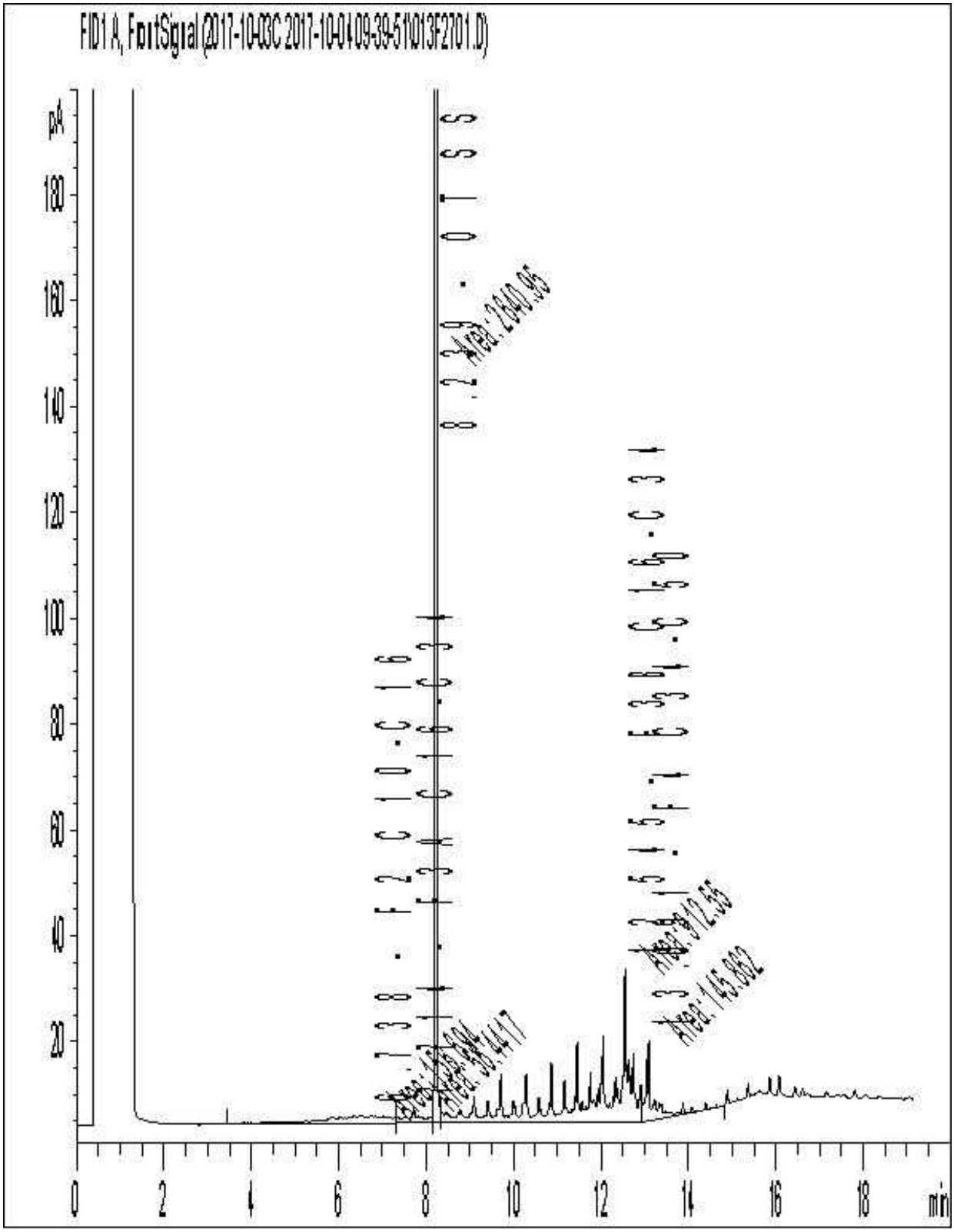



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7L6328
Report Date: 2017/10/05
Maxxam Sample: FFX941

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: S06

**Petroleum Hydrocarbons F2-F4 in Soil Chromatogram**

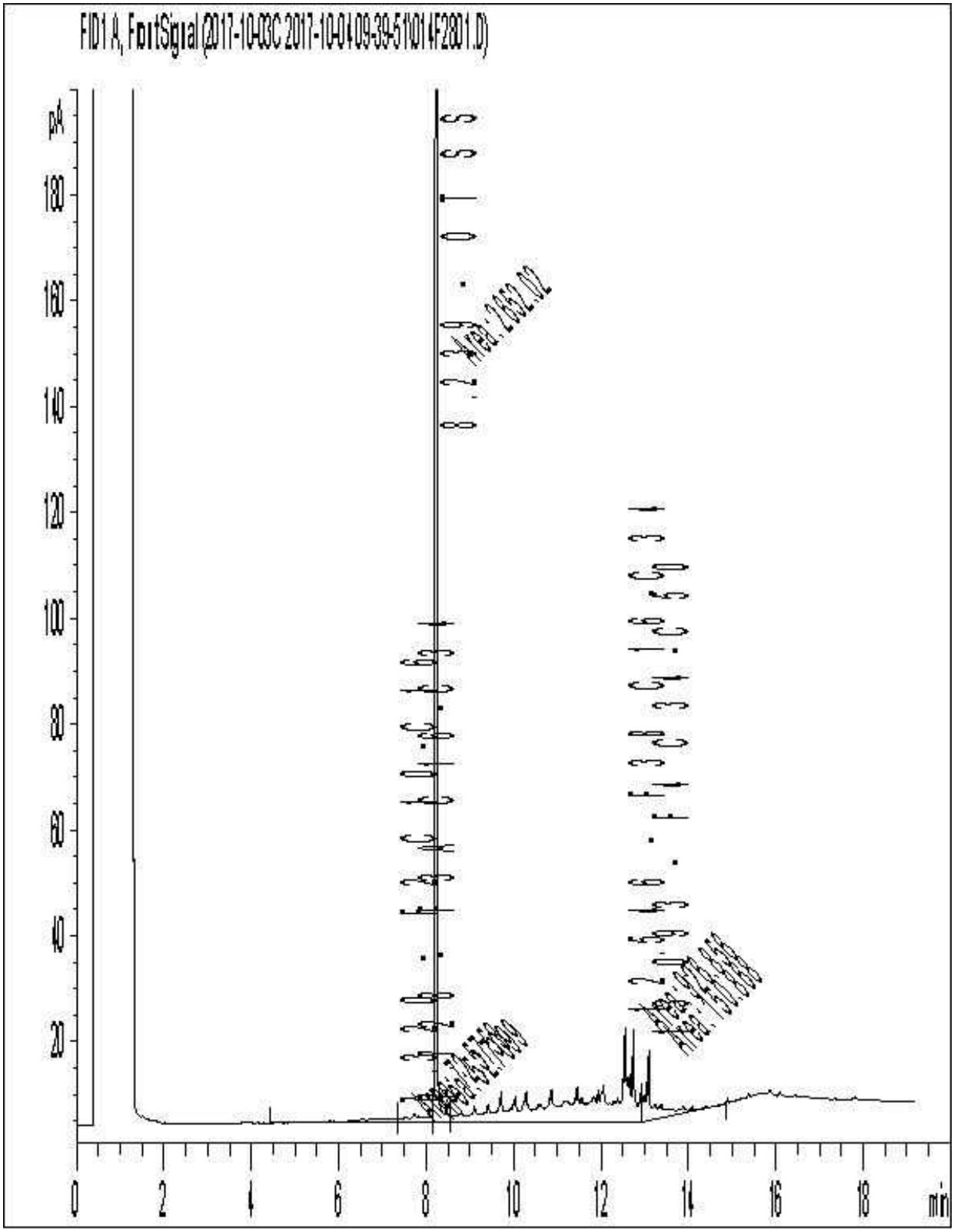



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7L6328
Report Date: 2017/10/05
Maxxam Sample: FFX942

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: S07

**Petroleum Hydrocarbons F2-F4 in Soil Chromatogram**

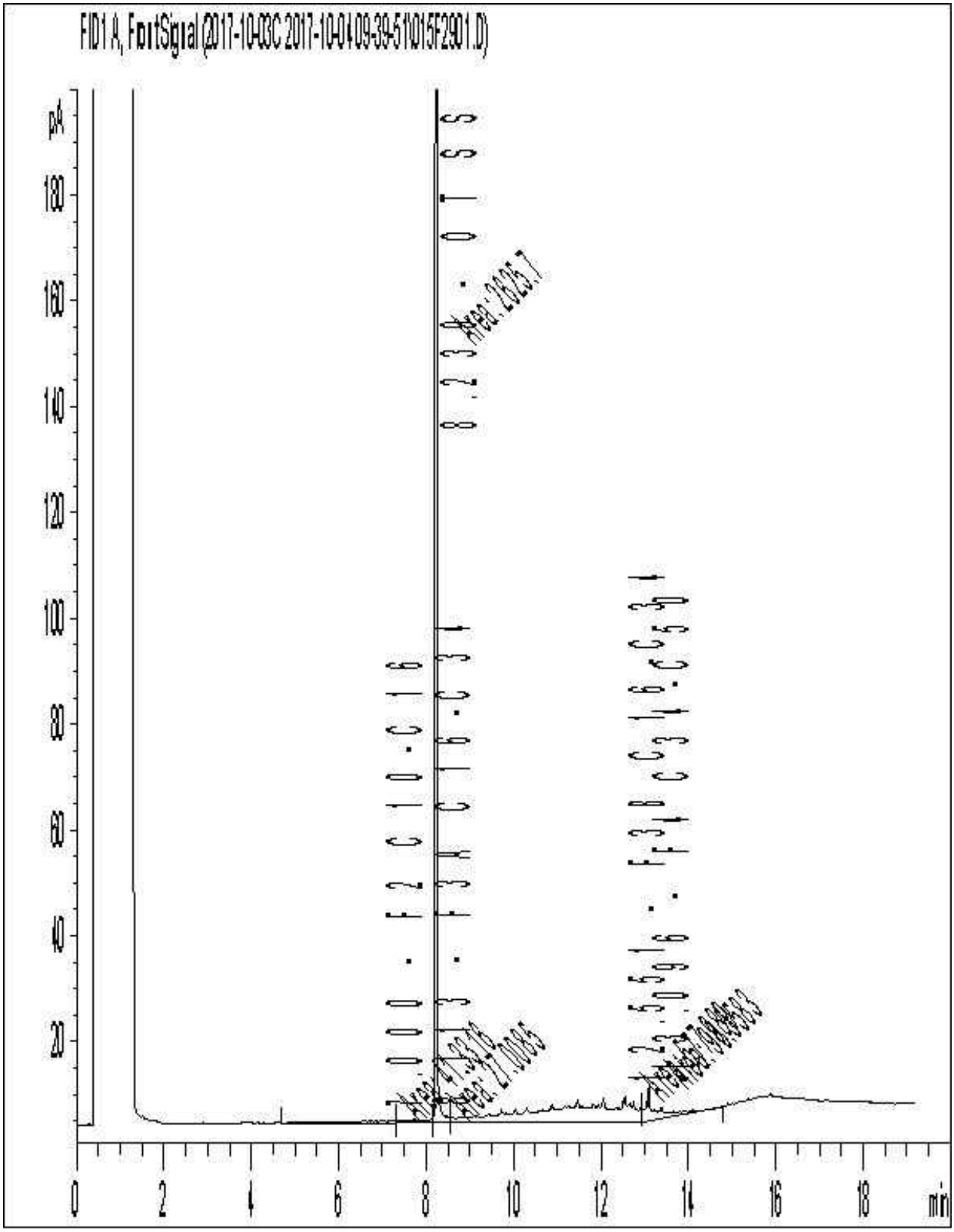



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7L6328
Report Date: 2017/10/05
Maxxam Sample: FFX943

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: S08

**Petroleum Hydrocarbons F2-F4 in Soil Chromatogram**




**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam
A Bureau Veritas Group Company

Your Project #: 102153-000
Site Location: TC IQALUIT
Your C.O.C. #: 629077-02-01

**Attention:Ryan Fletcher**

ARCADIS Canada Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

**Report Date: 2017/10/20**
Report #: R4793884
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B7M2114**
**Received: 2017/10/06, 23:05**

Sample Matrix: Water
# Samples Received: 7

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Reference |
|---|---|---|---|---|---|
| Chloride by Automated Colourimetry (1) | 7 | N/A | 2017/10/12 | CAM SOP-00463 | EPA 325.2 m |
| Total Cyanide (1) | 6 | 2017/10/12 | 2017/10/16 | CAM SOP-00457 | OMOE E3015 5 m |
| Total Cyanide (1) | 1 | 2017/10/12 | 2017/10/17 | CAM SOP-00457 | OMOE E3015 5 m |
| Petroleum Hydro. CCME F1 & BTEX in Water (1) | 7 | N/A | 2017/10/12 | CAM SOP-00315 | CCME PHC-CWS m |
| Petroleum Hydrocarbons F2-F4 in Water (1, 2) | 7 | 2017/10/12 | 2017/10/13 | CAM SOP-00316 | CCME PHC-CWS m |
| Fluoride (1) | 7 | 2017/10/13 | 2017/10/16 | CAM SOP-00449 | SM 22 4500-F C m |
| Mercury (low level) (1) | 7 | 2017/10/12 | 2017/10/13 | CAM SOP-00453 | EPA 7470 m |
| Total Ammonia-N (1) | 7 | N/A | 2017/10/17 | CAM SOP-00441 | EPA GS I-2522-90 m |
| Nitrate (NO3) and Nitrite (NO2) in Water (1, 3) | 7 | N/A | 2017/10/14 | CAM SOP-00440 | SM 22 4500-NO3I/NO2B |
| OC Pesticides (Selected) & PCB (1, 4) | 6 | 2017/10/12 | 2017/10/13 | CAM SOP-00307 | EPA 8081A/8082B m |
| OC Pesticides (Selected) & PCB (1, 4) | 1 | 2017/10/12 | 2017/10/14 | CAM SOP-00307 | EPA 8081A/8082B m |
| OC Pesticides Summed Parameters (1) | 7 | N/A | 2017/10/12 | CAM SOP-00307 | EPA 8081A/8082B m |
| PAH Compounds in Water by GC/MS (SIM) (1) | 7 | 2017/10/11 | 2017/10/12 | CAM SOP-00318 | EPA 8270 m |
| pH (1) | 7 | N/A | 2017/10/16 | CAM SOP-00413 | SM 4500H+ B m |
| Sulphate by Automated Colourimetry (1) | 7 | N/A | 2017/10/12 | CAM SOP-00464 | EPA 375.4 m |
| Sulphide (1) | 7 | N/A | 2017/10/11 | CAM SOP-00455 | SM 22 4500-S G m |

**Remarks:**

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope



Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Your Project #: 102153-000
Site Location: TC IQALUIT
Your C.O.C. #: 629077-02-01

**Attention:Ryan Fletcher**

ARCADIS Canada Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

**Report Date: 2017/10/20**
Report #: R4793884
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B7M2114**
**Received: 2017/10/06, 23:05**

dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Analytics Mississauga
(2) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.
(3) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.
(4) Chlordane ( Total) = Alpha Chlordane + Gamma Chlordane

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jonathan Urben, Senior Project Manager
Email: jurben@maxxam.ca
Phone# (613) 274-0573

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B7M2114
Report Date: 2017/10/20

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## CCME PETROLEUM HYDROCARBONS IN WATER (WATER)

| Maxxam ID | | FGZ972 | FGZ972 | FGZ973 | FGZ973 | FGZ974 | FGZ975 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/03 14:00 | 2017/10/03 14:00 | 2017/10/03 14:30 | 2017/10/03 14:30 | 2017/10/03 15:00 | 2017/10/03 15:30 | | |
| COC Number | | 629077-02-01 | 629077-02-01 | 629077-02-01 | 629077-02-01 | 629077-02-01 | 629077-02-01 | | |
| | **UNITS** | **LTM2** | **LTM2 Lab-Dup** | **LTM3** | **LTM3 Lab-Dup** | **LTM4** | **LTM5** | **RDL** | **QC Batch** |
| **BTEX & F1 Hydrocarbons** | | | | | | | | | |
| Benzene | ug/L | <0.20 | <0.20 | <0.20 | | <0.20 | <0.20 | 0.20 | 5207888 |
| Toluene | ug/L | <0.20 | <0.20 | 0.69 | | <0.20 | <0.20 | 0.20 | 5207888 |
| Ethylbenzene | ug/L | <0.20 | <0.20 | <0.20 | | <0.20 | <0.20 | 0.20 | 5207888 |
| o-Xylene | ug/L | <0.20 | <0.20 | <0.20 | | <0.20 | <0.20 | 0.20 | 5207888 |
| p+m-Xylene | ug/L | <0.40 | <0.40 | <0.40 | | <0.40 | <0.40 | 0.40 | 5207888 |
| Total Xylenes | ug/L | <0.40 | <0.40 | <0.40 | | <0.40 | <0.40 | 0.40 | 5207888 |
| F1 (C6-C10) | ug/L | <25 | <25 | 56 | | <25 | <25 | 25 | 5207888 |
| F1 (C6-C10) - BTEX | ug/L | <25 | <25 | 56 | | <25 | <25 | 25 | 5207888 |
| **F2-F4 Hydrocarbons** | | | | | | | | | |
| F2 (C10-C16 Hydrocarbons) | ug/L | <100 | | 220 | 230 | <100 | <100 | 100 | 5209092 |
| F3 (C16-C34 Hydrocarbons) | ug/L | <200 | | <200 | <200 | <200 | <200 | 200 | 5209092 |
| F4 (C34-C50 Hydrocarbons) | ug/L | <200 | | <200 | <200 | <200 | <200 | 200 | 5209092 |
| Reached Baseline at C50 | ug/L | Yes | | Yes | Yes | Yes | Yes | | 5209092 |
| **Surrogate Recovery (%)** | | | | | | | | | |
| 1,4-Difluorobenzene | % | 104 | 103 | 104 | | 105 | 104 | | 5207888 |
| 4-Bromofluorobenzene | % | 98 | 99 | 100 | | 97 | 97 | | 5207888 |
| D10-Ethylbenzene | % | 96 | 87 | 88 | | 88 | 86 | | 5207888 |
| D4-1,2-Dichloroethane | % | 97 | 98 | 97 | | 98 | 97 | | 5207888 |
| o-Terphenyl | % | 103 | | 104 | 104 | 103 | 104 | | 5209092 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Maxxam Job #: B7M2114
Report Date: 2017/10/20

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## CCME PETROLEUM HYDROCARBONS IN WATER (WATER)

| Maxxam ID | | FGZ976 | FGZ977 | FGZ978 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/03 16:00 | 2017/10/03 16:30 | 2017/10/03 | | |
| COC Number | | 629077-02-01 | 629077-02-01 | 629077-02-01 | | |
| | **UNITS** | **LTM6** | **LTM7** | **DUP2** | **RDL** | **QC Batch** |
| **BTEX & F1 Hydrocarbons** | | | | | | |
| Benzene | ug/L | <0.20 | <0.20 | <0.20 | 0.20 | 5207888 |
| Toluene | ug/L | <0.20 | <0.20 | <0.20 | 0.20 | 5207888 |
| Ethylbenzene | ug/L | <0.20 | <0.20 | <0.20 | 0.20 | 5207888 |
| o-Xylene | ug/L | <0.20 | <0.20 | <0.20 | 0.20 | 5207888 |
| p+m-Xylene | ug/L | <0.40 | <0.40 | <0.40 | 0.40 | 5207888 |
| Total Xylenes | ug/L | <0.40 | <0.40 | <0.40 | 0.40 | 5207888 |
| F1 (C6-C10) | ug/L | <25 | <25 | <25 | 25 | 5207888 |
| F1 (C6-C10) - BTEX | ug/L | <25 | <25 | <25 | 25 | 5207888 |
| **F2-F4 Hydrocarbons** | | | | | | |
| F2 (C10-C16 Hydrocarbons) | ug/L | <100 | <100 | <100 | 100 | 5209092 |
| F3 (C16-C34 Hydrocarbons) | ug/L | <200 | <200 | <200 | 200 | 5209092 |
| F4 (C34-C50 Hydrocarbons) | ug/L | <200 | <200 | <200 | 200 | 5209092 |
| Reached Baseline at C50 | ug/L | Yes | Yes | Yes | | 5209092 |
| **Surrogate Recovery (%)** | | | | | | |
| 1,4-Difluorobenzene | % | 104 | 104 | 105 | | 5207888 |
| 4-Bromofluorobenzene | % | 96 | 98 | 97 | | 5207888 |
| D10-Ethylbenzene | % | 90 | 90 | 89 | | 5207888 |
| D4-1,2-Dichloroethane | % | 96 | 98 | 98 | | 5207888 |
| o-Terphenyl | % | 104 | 100 | 101 | | 5209092 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7M2114
Report Date: 2017/10/20

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## RESULTS OF ANALYSES OF WATER

| Maxxam ID | | FGZ972 | | FGZ973 | FGZ973 | | FGZ974 | FGZ975 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/03 14:00 | | 2017/10/03 14:30 | 2017/10/03 14:30 | | 2017/10/03 15:00 | 2017/10/03 15:30 | | |
| COC Number | | 629077-02-01 | | 629077-02-01 | 629077-02-01 | | 629077-02-01 | 629077-02-01 | | |
| | **UNITS** | **LTM2** | **RDL** | **LTM3** | **LTM3 Lab-Dup** | **RDL** | **LTM4** | **LTM5** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | | |
| Total Ammonia-N | mg/L | <0.050 | 0.050 | 0.16 | | 0.050 | <0.050 | <0.050 | 0.050 | 5210777 |
| Fluoride (F-) | mg/L | 0.10 | 0.10 | <0.10 | <0.10 | 0.10 | <0.10 | <0.10 | 0.10 | 5211345 |
| pH | pH | 6.64 | | 6.79 | 6.82 | | 7.43 | 7.41 | | 5211354 |
| Dissolved Sulphate (SO4) | mg/L | 83 | 1.0 | 420 | | 2.0 | 5.0 | 5.7 | 1.0 | 5207158 |
| Sulphide | mg/L | <0.020 | 0.020 | <0.020 | | 0.020 | <0.020 | <0.020 | 0.020 | 5206808 |
| Total Cyanide (CN) | mg/L | <0.0050 | 0.0050 | <0.0050 | | 0.0050 | <0.0050 | <0.0050 | 0.0050 | 5204058 |
| Dissolved Chloride (Cl) | mg/L | 47 | 1.0 | 63 | | 1.0 | 9.6 | 11 | 1.0 | 5207152 |
| Nitrite (N) | mg/L | <0.010 | 0.010 | <0.010 | | 0.010 | <0.010 | <0.010 | 0.010 | 5206985 |
| Nitrate (N) | mg/L | 0.18 | 0.10 | 2.06 | | 0.10 | 0.50 | 0.45 | 0.10 | 5206985 |
| Nitrate + Nitrite (N) | mg/L | 0.18 | 0.10 | 2.06 | | 0.10 | 0.50 | 0.45 | 0.10 | 5206985 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

| Maxxam ID | | FGZ975 | FGZ976 | | FGZ977 | | FGZ978 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/03 15:30 | 2017/10/03 16:00 | | 2017/10/03 16:30 | | 2017/10/03 | | |
| COC Number | | 629077-02-01 | 629077-02-01 | | 629077-02-01 | | 629077-02-01 | | |
| | **UNITS** | **LTM5 Lab-Dup** | **LTM6** | **QC Batch** | **LTM7** | **QC Batch** | **DUP2** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | |
| Total Ammonia-N | mg/L | <0.050 | <0.050 | 5210777 | 0.46 | 5210777 | 0.45 | 0.050 | 5210777 |
| Fluoride (F-) | mg/L | | <0.10 | 5211345 | <0.10 | 5211345 | <0.10 | 0.10 | 5211345 |
| pH | pH | | 7.37 | 5211354 | 7.23 | 5211354 | 7.22 | | 5211354 |
| Dissolved Sulphate (SO4) | mg/L | | 3.4 | 5207158 | 7.8 | 5207158 | 7.7 | 1.0 | 5207158 |
| Sulphide | mg/L | | <0.020 | 5206808 | <0.020 | 5206808 | <0.020 | 0.020 | 5206808 |
| Total Cyanide (CN) | mg/L | | <0.0050 | 5204058 | <0.0050 | 5213541 | <0.0050 | 0.0050 | 5204058 |
| Dissolved Chloride (Cl) | mg/L | | 10 | 5207152 | 14 | 5207152 | 15 | 1.0 | 5207152 |
| Nitrite (N) | mg/L | | <0.010 | 5206985 | <0.010 | 5206985 | <0.010 | 0.010 | 5206985 |
| Nitrate (N) | mg/L | | <0.10 | 5206985 | 0.23 | 5206985 | 0.23 | 0.10 | 5206985 |
| Nitrate + Nitrite (N) | mg/L | | <0.10 | 5206985 | 0.23 | 5206985 | 0.23 | 0.10 | 5206985 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B7M2114
Report Date: 2017/10/20

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

| Maxxam ID | | FGZ972 | FGZ973 | FGZ974 | FGZ974 | FGZ975 | FGZ976 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/03 14:00 | 2017/10/03 14:30 | 2017/10/03 15:00 | 2017/10/03 15:00 | 2017/10/03 15:30 | 2017/10/03 16:00 | | |
| COC Number | | 629077-02-01 | 629077-02-01 | 629077-02-01 | 629077-02-01 | 629077-02-01 | 629077-02-01 | | |
| | **UNITS** | **LTM2** | **LTM3** | **LTM4** | **LTM4 Lab-Dup** | **LTM5** | **LTM6** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | | |
| Mercury (Hg) | ug/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | 5208851 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

| Maxxam ID | | FGZ977 | | FGZ978 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/03 16:30 | | 2017/10/03 | | |
| COC Number | | 629077-02-01 | | 629077-02-01 | | |
| | **UNITS** | **LTM7** | **QC Batch** | **DUP2** | **RDL** | **QC Batch** |
| **Metals** | | | | | | |
| Mercury (Hg) | ug/L | <0.01 | 5208851 | <0.01 | 0.01 | 5208867 |

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Maxxam Job #: B7M2114
Report Date: 2017/10/20

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

| Maxxam ID | | FGZ972 | FGZ972 | FGZ973 | FGZ974 | FGZ975 | FGZ976 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/03 14:00 | 2017/10/03 14:00 | 2017/10/03 14:30 | 2017/10/03 15:00 | 2017/10/03 15:30 | 2017/10/03 16:00 | | |
| COC Number | | 629077-02-01 | 629077-02-01 | 629077-02-01 | 629077-02-01 | 629077-02-01 | 629077-02-01 | | |
| | **UNITS** | **LTM2** | **LTM2 Lab-Dup** | **LTM3** | **LTM4** | **LTM5** | **LTM6** | **RDL** | **QC Batch** |
| **Polyaromatic Hydrocarbons** | | | | | | | | | |
| Acenaphthene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5207330 |
| Acenaphthylene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5207330 |
| Anthracene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5207330 |
| Benzo(a)anthracene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5207330 |
| Benzo(a)pyrene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5207330 |
| Benzo(b/j)fluoranthene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5207330 |
| Benzo(g,h,i)perylene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5207330 |
| Benzo(k)fluoranthene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5207330 |
| Chrysene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5207330 |
| Dibenz(a,h)anthracene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5207330 |
| Fluoranthene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5207330 |
| Fluorene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5207330 |
| Indeno(1,2,3-cd)pyrene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5207330 |
| 1-Methylnaphthalene | ug/L | <0.010 | <0.010 | 0.20 | <0.010 | <0.010 | <0.010 | 0.010 | 5207330 |
| 2-Methylnaphthalene | ug/L | <0.010 | <0.010 | 0.28 | <0.010 | 0.013 | <0.010 | 0.010 | 5207330 |
| Naphthalene | ug/L | <0.010 | <0.010 | 0.052 | <0.010 | <0.010 | <0.010 | 0.010 | 5207330 |
| Phenanthrene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5207330 |
| Pyrene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5207330 |
| **Surrogate Recovery (%)** | | | | | | | | | |
| D10-Anthracene | % | 89 | 91 | 96 | 90 | 82 | 95 | | 5207330 |
| D14-Terphenyl (FS) | % | 88 | 90 | 93 | 88 | 82 | 93 | | 5207330 |
| D8-Acenaphthylene | % | 86 | 88 | 94 | 88 | 79 | 93 | | 5207330 |

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Maxxam Job #: B7M2114
Report Date: 2017/10/20

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

| Maxxam ID | | FGZ977 | FGZ978 | | |
|---|---|---|---|---|---|
| Sampling Date | | 2017/10/03 16:30 | 2017/10/03 | | |
| COC Number | | 629077-02-01 | 629077-02-01 | | |
| | **UNITS** | **LTM7** | **DUP2** | **RDL** | **QC Batch** |
| **Polyaromatic Hydrocarbons** | | | | | |
| Acenaphthene | ug/L | <0.010 | <0.010 | 0.010 | 5207330 |
| Acenaphthylene | ug/L | <0.010 | <0.010 | 0.010 | 5207330 |
| Anthracene | ug/L | <0.010 | <0.010 | 0.010 | 5207330 |
| Benzo(a)anthracene | ug/L | <0.010 | <0.010 | 0.010 | 5207330 |
| Benzo(a)pyrene | ug/L | <0.010 | <0.010 | 0.010 | 5207330 |
| Benzo(b/j)fluoranthene | ug/L | <0.010 | <0.010 | 0.010 | 5207330 |
| Benzo(g,h,i)perylene | ug/L | <0.010 | <0.010 | 0.010 | 5207330 |
| Benzo(k)fluoranthene | ug/L | <0.010 | <0.010 | 0.010 | 5207330 |
| Chrysene | ug/L | <0.010 | <0.010 | 0.010 | 5207330 |
| Dibenz(a,h)anthracene | ug/L | <0.010 | <0.010 | 0.010 | 5207330 |
| Fluoranthene | ug/L | <0.010 | <0.010 | 0.010 | 5207330 |
| Fluorene | ug/L | <0.010 | <0.010 | 0.010 | 5207330 |
| Indeno(1,2,3-cd)pyrene | ug/L | <0.010 | <0.010 | 0.010 | 5207330 |
| 1-Methylnaphthalene | ug/L | <0.010 | <0.010 | 0.010 | 5207330 |
| 2-Methylnaphthalene | ug/L | <0.010 | <0.010 | 0.010 | 5207330 |
| Naphthalene | ug/L | <0.010 | <0.010 | 0.010 | 5207330 |
| Phenanthrene | ug/L | <0.010 | <0.010 | 0.010 | 5207330 |
| Pyrene | ug/L | <0.010 | <0.010 | 0.010 | 5207330 |
| **Surrogate Recovery (%)** | | | | | |
| D10-Anthracene | % | 81 | 90 | | 5207330 |
| D14-Terphenyl (FS) | % | 79 | 89 | | 5207330 |
| D8-Acenaphthylene | % | 79 | 88 | | 5207330 |

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Maxxam Job #: B7M2114
Report Date: 2017/10/20

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## ORGANOCHLORINATED PESTICIDES BY GC-ECD (WATER)

| Maxxam ID | | FGZ972 | FGZ973 | FGZ974 | FGZ975 | FGZ976 | FGZ977 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/03 14:00 | 2017/10/03 14:30 | 2017/10/03 15:00 | 2017/10/03 15:30 | 2017/10/03 16:00 | 2017/10/03 16:30 | | |
| COC Number | | 629077-02-01 | 629077-02-01 | 629077-02-01 | 629077-02-01 | 629077-02-01 | 629077-02-01 | | |
| | **UNITS** | **LTM2** | **LTM3** | **LTM4** | **LTM5** | **LTM6** | **LTM7** | **RDL** | **QC Batch** |
| **Calculated Parameters** | | | | | | | | | |
| Aldrin + Dieldrin | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5204027 |
| Chlordane (Total) | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5204027 |
| DDT+ Metabolites | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5204027 |
| Heptachlor + Heptachlor epoxide | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5204027 |
| o,p-DDD + p,p-DDD | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5204027 |
| o,p-DDE + p,p-DDE | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5204027 |
| o,p-DDT + p,p-DDT | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5204027 |
| Total Endosulfan | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5204027 |
| Total PCB | ug/L | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.05 | 5204027 |
| **Pesticides & Herbicides** | | | | | | | | | |
| Aldrin | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| Dieldrin | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| a-Chlordane | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| g-Chlordane | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| o,p-DDD | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| p,p-DDD | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| o,p-DDE | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| p,p-DDE | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| o,p-DDT | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| p,p-DDT | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| Lindane | ug/L | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | 0.003 | 5208924 |
| Endosulfan I (alpha) | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| Endosulfan II (beta) | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| Endrin | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| Heptachlor | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| Heptachlor epoxide | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| Hexachlorobenzene | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| Methoxychlor | ug/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | 5208924 |
| Aroclor 1016 | ug/L | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.05 | 5208924 |
| Aroclor 1221 | ug/L | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.05 | 5208924 |
| Aroclor 1232 | ug/L | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.05 | 5208924 |
| Aroclor 1242 | ug/L | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.05 | 5208924 |
| Aroclor 1248 | ug/L | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.05 | 5208924 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B7M2114
Report Date: 2017/10/20

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## ORGANOCHLORINATED PESTICIDES BY GC-ECD (WATER)

| Maxxam ID | | FGZ972 | FGZ973 | FGZ974 | FGZ975 | FGZ976 | FGZ977 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/03 14:00 | 2017/10/03 14:30 | 2017/10/03 15:00 | 2017/10/03 15:30 | 2017/10/03 16:00 | 2017/10/03 16:30 | | |
| COC Number | | 629077-02-01 | 629077-02-01 | 629077-02-01 | 629077-02-01 | 629077-02-01 | 629077-02-01 | | |
| | **UNITS** | **LTM2** | **LTM3** | **LTM4** | **LTM5** | **LTM6** | **LTM7** | **RDL** | **QC Batch** |
| Aroclor 1254 | ug/L | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.05 | 5208924 |
| Aroclor 1260 | ug/L | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.05 | 5208924 |
| alpha-BHC | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| beta-BHC | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| delta-BHC | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| Endosulfan sulfate | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| Endrin aldehyde | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| Endrin ketone | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| Mirex | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| Octachlorostyrene | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| Oxychlordane | ug/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 | 5208924 |
| Toxaphene | ug/L | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | 0.2 | 5208924 |
| **Surrogate Recovery (%)** | | | | | | | | | |
| 2,4,5,6-Tetrachloro-m-xylene | % | 63 | 64 | 67 | 72 | 71 | 75 | | 5208924 |
| Decachlorobiphenyl | % | 56 | 60 | 85 | 76 | 91 | 95 | | 5208924 |

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Maxxam Job #: B7M2114
Report Date: 2017/10/20

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## ORGANOCHLORINATED PESTICIDES BY GC-ECD (WATER)

| Maxxam ID | | FGZ978 | | |
|---|---|---|---|---|
| Sampling Date | | 2017/10/03 | | |
| COC Number | | 629077-02-01 | | |
| | **UNITS** | **DUP2** | **RDL** | **QC Batch** |
| **Calculated Parameters** | | | | |
| Aldrin + Dieldrin | ug/L | <0.005 | 0.005 | 5204027 |
| Chlordane (Total) | ug/L | <0.005 | 0.005 | 5204027 |
| DDT+ Metabolites | ug/L | 0.005 | 0.005 | 5204027 |
| Heptachlor + Heptachlor epoxide | ug/L | <0.005 | 0.005 | 5204027 |
| o,p-DDD + p,p-DDD | ug/L | <0.005 | 0.005 | 5204027 |
| o,p-DDE + p,p-DDE | ug/L | <0.005 | 0.005 | 5204027 |
| o,p-DDT + p,p-DDT | ug/L | 0.005 | 0.005 | 5204027 |
| Total Endosulfan | ug/L | <0.005 | 0.005 | 5204027 |
| Total PCB | ug/L | <0.05 | 0.05 | 5204027 |
| **Pesticides & Herbicides** | | | | |
| Aldrin | ug/L | <0.005 | 0.005 | 5208924 |
| Dieldrin | ug/L | <0.005 | 0.005 | 5208924 |
| a-Chlordane | ug/L | <0.005 | 0.005 | 5208924 |
| g-Chlordane | ug/L | <0.005 | 0.005 | 5208924 |
| o,p-DDD | ug/L | <0.005 | 0.005 | 5208924 |
| p,p-DDD | ug/L | <0.005 | 0.005 | 5208924 |
| o,p-DDE | ug/L | <0.005 | 0.005 | 5208924 |
| p,p-DDE | ug/L | <0.005 | 0.005 | 5208924 |
| o,p-DDT | ug/L | <0.005 | 0.005 | 5208924 |
| p,p-DDT | ug/L | 0.005 | 0.005 | 5208924 |
| Lindane | ug/L | <0.003 | 0.003 | 5208924 |
| Endosulfan I (alpha) | ug/L | <0.005 | 0.005 | 5208924 |
| Endosulfan II (beta) | ug/L | <0.005 | 0.005 | 5208924 |
| Endrin | ug/L | <0.005 | 0.005 | 5208924 |
| Heptachlor | ug/L | <0.005 | 0.005 | 5208924 |
| Heptachlor epoxide | ug/L | <0.005 | 0.005 | 5208924 |
| Hexachlorobenzene | ug/L | <0.005 | 0.005 | 5208924 |
| Methoxychlor | ug/L | <0.01 | 0.01 | 5208924 |
| Aroclor 1016 | ug/L | <0.05 | 0.05 | 5208924 |
| Aroclor 1221 | ug/L | <0.05 | 0.05 | 5208924 |
| Aroclor 1232 | ug/L | <0.05 | 0.05 | 5208924 |
| Aroclor 1242 | ug/L | <0.05 | 0.05 | 5208924 |
| Aroclor 1248 | ug/L | <0.05 | 0.05 | 5208924 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B7M2114
Report Date: 2017/10/20

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## ORGANOCHLORINATED PESTICIDES BY GC-ECD (WATER)

| Maxxam ID | | FGZ978 | | |
|---|---|---|---|---|
| Sampling Date | | 2017/10/03 | | |
| COC Number | | 629077-02-01 | | |
| | **UNITS** | **DUP2** | **RDL** | **QC Batch** |
| Aroclor 1254 | ug/L | <0.05 | 0.05 | 5208924 |
| Aroclor 1260 | ug/L | <0.05 | 0.05 | 5208924 |
| alpha-BHC | ug/L | <0.005 | 0.005 | 5208924 |
| beta-BHC | ug/L | <0.005 | 0.005 | 5208924 |
| delta-BHC | ug/L | <0.005 | 0.005 | 5208924 |
| Endosulfan sulfate | ug/L | <0.005 | 0.005 | 5208924 |
| Endrin aldehyde | ug/L | <0.005 | 0.005 | 5208924 |
| Endrin ketone | ug/L | <0.005 | 0.005 | 5208924 |
| Mirex | ug/L | <0.005 | 0.005 | 5208924 |
| Octachlorostyrene | ug/L | <0.005 | 0.005 | 5208924 |
| Oxychlordane | ug/L | <0.005 | 0.005 | 5208924 |
| Toxaphene | ug/L | <0.2 | 0.2 | 5208924 |
| **Surrogate Recovery (%)** | | | | |
| 2,4,5,6-Tetrachloro-m-xylene | % | 72 | | 5208924 |
| Decachlorobiphenyl | % | 72 | | 5208924 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7M2114
Report Date: 2017/10/20

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** FGZ972
**Sample ID:** LTM2
**Matrix:** Water

**Collected:** 2017/10/03
**Shipped:**
**Received:** 2017/10/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Chloride by Automated Colourimetry | KONE | 5207152 | N/A | 2017/10/12 | Alina Dobreanu |
| Total Cyanide | SKAL/CN | 5204058 | 2017/10/12 | 2017/10/16 | Xuanhong Qiu |
| Petroleum Hydro. CCME F1 & BTEX in Water | HSGC/MSFD | 5207888 | N/A | 2017/10/12 | Anca Ganea |
| Petroleum Hydrocarbons F2-F4 in Water | GC/FID | 5209092 | 2017/10/12 | 2017/10/13 | Zhiyue (Frank) Zhu |
| Fluoride | ISE | 5211345 | 2017/10/13 | 2017/10/16 | Surinder Rai |
| Mercury (low level) | CV/AA | 5208851 | 2017/10/12 | 2017/10/13 | Ron Morrison |
| Total Ammonia-N | LACH/NH4 | 5210777 | N/A | 2017/10/17 | Charles Opoku-Ware |
| Nitrate (NO3) and Nitrite (NO2) in Water | LACH | 5206985 | N/A | 2017/10/14 | Anastasia Hamanov |
| OC Pesticides (Selected) & PCB | GC/ECD | 5208924 | 2017/10/12 | 2017/10/13 | Mahmudul Khan |
| OC Pesticides Summed Parameters | CALC | 5204027 | N/A | 2017/10/12 | Automated Statchk |
| PAH Compounds in Water by GC/MS (SIM) | GC/MS | 5207330 | 2017/10/11 | 2017/10/12 | Mitesh Raj |
| pH | AT | 5211354 | N/A | 2017/10/16 | Surinder Rai |
| Sulphate by Automated Colourimetry | KONE | 5207158 | N/A | 2017/10/12 | Alina Dobreanu |
| Sulphide | ISE/S | 5206808 | N/A | 2017/10/11 | Tahir Anwar |

**Maxxam ID:** FGZ972 Dup
**Sample ID:** LTM2
**Matrix:** Water

**Collected:** 2017/10/03
**Shipped:**
**Received:** 2017/10/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Petroleum Hydro. CCME F1 & BTEX in Water | HSGC/MSFD | 5207888 | N/A | 2017/10/12 | Anca Ganea |
| PAH Compounds in Water by GC/MS (SIM) | GC/MS | 5207330 | 2017/10/11 | 2017/10/12 | Mitesh Raj |

**Maxxam ID:** FGZ973
**Sample ID:** LTM3
**Matrix:** Water

**Collected:** 2017/10/03
**Shipped:**
**Received:** 2017/10/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Chloride by Automated Colourimetry | KONE | 5207152 | N/A | 2017/10/12 | Alina Dobreanu |
| Total Cyanide | SKAL/CN | 5204058 | 2017/10/12 | 2017/10/16 | Xuanhong Qiu |
| Petroleum Hydro. CCME F1 & BTEX in Water | HSGC/MSFD | 5207888 | N/A | 2017/10/12 | Anca Ganea |
| Petroleum Hydrocarbons F2-F4 in Water | GC/FID | 5209092 | 2017/10/12 | 2017/10/13 | Zhiyue (Frank) Zhu |
| Fluoride | ISE | 5211345 | 2017/10/13 | 2017/10/16 | Surinder Rai |
| Mercury (low level) | CV/AA | 5208851 | 2017/10/12 | 2017/10/13 | Ron Morrison |
| Total Ammonia-N | LACH/NH4 | 5210777 | N/A | 2017/10/17 | Charles Opoku-Ware |
| Nitrate (NO3) and Nitrite (NO2) in Water | LACH | 5206985 | N/A | 2017/10/14 | Anastasia Hamanov |
| OC Pesticides (Selected) & PCB | GC/ECD | 5208924 | 2017/10/12 | 2017/10/13 | Mahmudul Khan |
| OC Pesticides Summed Parameters | CALC | 5204027 | N/A | 2017/10/12 | Automated Statchk |
| PAH Compounds in Water by GC/MS (SIM) | GC/MS | 5207330 | 2017/10/11 | 2017/10/12 | Mitesh Raj |
| pH | AT | 5211354 | N/A | 2017/10/16 | Surinder Rai |
| Sulphate by Automated Colourimetry | KONE | 5207158 | N/A | 2017/10/12 | Alina Dobreanu |
| Sulphide | ISE/S | 5206808 | N/A | 2017/10/11 | Tahir Anwar |



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Maxxam Job #: B7M2114
Report Date: 2017/10/20

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** FGZ973 Dup
**Sample ID:** LTM3
**Matrix:** Water

**Collected:** 2017/10/03
**Shipped:**
**Received:** 2017/10/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Petroleum Hydrocarbons F2-F4 in Water | GC/FID | 5209092 | 2017/10/12 | 2017/10/13 | Zhiyue (Frank) Zhu |
| Fluoride | ISE | 5211345 | 2017/10/13 | 2017/10/16 | Surinder Rai |
| pH | AT | 5211354 | N/A | 2017/10/16 | Surinder Rai |

**Maxxam ID:** FGZ974
**Sample ID:** LTM4
**Matrix:** Water

**Collected:** 2017/10/03
**Shipped:**
**Received:** 2017/10/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Chloride by Automated Colourimetry | KONE | 5207152 | N/A | 2017/10/12 | Alina Dobreanu |
| Total Cyanide | SKAL/CN | 5204058 | 2017/10/12 | 2017/10/16 | Xuanhong Qiu |
| Petroleum Hydro. CCME F1 & BTEX in Water | HSGC/MSFD | 5207888 | N/A | 2017/10/12 | Anca Ganea |
| Petroleum Hydrocarbons F2-F4 in Water | GC/FID | 5209092 | 2017/10/12 | 2017/10/13 | Zhiyue (Frank) Zhu |
| Fluoride | ISE | 5211345 | 2017/10/13 | 2017/10/16 | Surinder Rai |
| Mercury (low level) | CV/AA | 5208851 | 2017/10/12 | 2017/10/13 | Ron Morrison |
| Total Ammonia-N | LACH/NH4 | 5210777 | N/A | 2017/10/17 | Charles Opoku-Ware |
| Nitrate (NO3) and Nitrite (NO2) in Water | LACH | 5206985 | N/A | 2017/10/14 | Anastasia Hamanov |
| OC Pesticides (Selected) & PCB | GC/ECD | 5208924 | 2017/10/12 | 2017/10/13 | Mahmudul Khan |
| OC Pesticides Summed Parameters | CALC | 5204027 | N/A | 2017/10/12 | Automated Statchk |
| PAH Compounds in Water by GC/MS (SIM) | GC/MS | 5207330 | 2017/10/11 | 2017/10/12 | Mitesh Raj |
| pH | AT | 5211354 | N/A | 2017/10/16 | Surinder Rai |
| Sulphate by Automated Colourimetry | KONE | 5207158 | N/A | 2017/10/12 | Alina Dobreanu |
| Sulphide | ISE/S | 5206808 | N/A | 2017/10/11 | Tahir Anwar |

**Maxxam ID:** FGZ974 Dup
**Sample ID:** LTM4
**Matrix:** Water

**Collected:** 2017/10/03
**Shipped:**
**Received:** 2017/10/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Mercury (low level) | CV/AA | 5208851 | 2017/10/12 | 2017/10/13 | Ron Morrison |

**Maxxam ID:** FGZ975
**Sample ID:** LTM5
**Matrix:** Water

**Collected:** 2017/10/03
**Shipped:**
**Received:** 2017/10/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Chloride by Automated Colourimetry | KONE | 5207152 | N/A | 2017/10/12 | Alina Dobreanu |
| Total Cyanide | SKAL/CN | 5204058 | 2017/10/12 | 2017/10/16 | Xuanhong Qiu |
| Petroleum Hydro. CCME F1 & BTEX in Water | HSGC/MSFD | 5207888 | N/A | 2017/10/12 | Anca Ganea |
| Petroleum Hydrocarbons F2-F4 in Water | GC/FID | 5209092 | 2017/10/12 | 2017/10/13 | Zhiyue (Frank) Zhu |
| Fluoride | ISE | 5211345 | 2017/10/13 | 2017/10/16 | Surinder Rai |
| Mercury (low level) | CV/AA | 5208851 | 2017/10/12 | 2017/10/13 | Ron Morrison |
| Total Ammonia-N | LACH/NH4 | 5210777 | N/A | 2017/10/17 | Charles Opoku-Ware |
| Nitrate (NO3) and Nitrite (NO2) in Water | LACH | 5206985 | N/A | 2017/10/14 | Anastasia Hamanov |



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Report Date: 2017/10/20

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** FGZ975
**Sample ID:** LTM5
**Matrix:** Water

**Collected:** 2017/10/03
**Shipped:**
**Received:** 2017/10/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| OC Pesticides (Selected) & PCB | GC/ECD | 5208924 | 2017/10/12 | 2017/10/13 | Mahmudul Khan |
| OC Pesticides Summed Parameters | CALC | 5204027 | N/A | 2017/10/12 | Automated Statchk |
| PAH Compounds in Water by GC/MS (SIM) | GC/MS | 5207330 | 2017/10/11 | 2017/10/12 | Mitesh Raj |
| pH | AT | 5211354 | N/A | 2017/10/16 | Surinder Rai |
| Sulphate by Automated Colourimetry | KONE | 5207158 | N/A | 2017/10/12 | Alina Dobreanu |
| Sulphide | ISE/S | 5206808 | N/A | 2017/10/11 | Tahir Anwar |

**Maxxam ID:** FGZ975 Dup
**Sample ID:** LTM5
**Matrix:** Water

**Collected:** 2017/10/03
**Shipped:**
**Received:** 2017/10/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Total Ammonia-N | LACH/NH4 | 5210777 | N/A | 2017/10/17 | Charles Opoku-Ware |

**Maxxam ID:** FGZ976
**Sample ID:** LTM6
**Matrix:** Water

**Collected:** 2017/10/03
**Shipped:**
**Received:** 2017/10/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Chloride by Automated Colourimetry | KONE | 5207152 | N/A | 2017/10/12 | Alina Dobreanu |
| Total Cyanide | SKAL/CN | 5204058 | 2017/10/12 | 2017/10/16 | Xuanhong Qiu |
| Petroleum Hydro. CCME F1 & BTEX in Water | HSGC/MSFD | 5207888 | N/A | 2017/10/12 | Anca Ganea |
| Petroleum Hydrocarbons F2-F4 in Water | GC/FID | 5209092 | 2017/10/12 | 2017/10/13 | Zhiyue (Frank) Zhu |
| Fluoride | ISE | 5211345 | 2017/10/13 | 2017/10/16 | Surinder Rai |
| Mercury (low level) | CV/AA | 5208851 | 2017/10/12 | 2017/10/13 | Ron Morrison |
| Total Ammonia-N | LACH/NH4 | 5210777 | N/A | 2017/10/17 | Charles Opoku-Ware |
| Nitrate (NO3) and Nitrite (NO2) in Water | LACH | 5206985 | N/A | 2017/10/14 | Anastasia Hamanov |
| OC Pesticides (Selected) & PCB | GC/ECD | 5208924 | 2017/10/12 | 2017/10/13 | Mahmudul Khan |
| OC Pesticides Summed Parameters | CALC | 5204027 | N/A | 2017/10/12 | Automated Statchk |
| PAH Compounds in Water by GC/MS (SIM) | GC/MS | 5207330 | 2017/10/11 | 2017/10/12 | Mitesh Raj |
| pH | AT | 5211354 | N/A | 2017/10/16 | Surinder Rai |
| Sulphate by Automated Colourimetry | KONE | 5207158 | N/A | 2017/10/12 | Alina Dobreanu |
| Sulphide | ISE/S | 5206808 | N/A | 2017/10/11 | Tahir Anwar |

**Maxxam ID:** FGZ977
**Sample ID:** LTM7
**Matrix:** Water

**Collected:** 2017/10/03
**Shipped:**
**Received:** 2017/10/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Chloride by Automated Colourimetry | KONE | 5207152 | N/A | 2017/10/12 | Alina Dobreanu |
| Total Cyanide | SKAL/CN | 5213541 | 2017/10/12 | 2017/10/17 | Xuanhong Qiu |
| Petroleum Hydro. CCME F1 & BTEX in Water | HSGC/MSFD | 5207888 | N/A | 2017/10/12 | Anca Ganea |
| Petroleum Hydrocarbons F2-F4 in Water | GC/FID | 5209092 | 2017/10/12 | 2017/10/13 | Zhiyue (Frank) Zhu |
| Fluoride | ISE | 5211345 | 2017/10/13 | 2017/10/16 | Surinder Rai |



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Maxxam Job #: B7M2114
Report Date: 2017/10/20

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** FGZ977
**Sample ID:** LTM7
**Matrix:** Water

**Collected:** 2017/10/03
**Shipped:**
**Received:** 2017/10/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Mercury (low level) | CV/AA | 5208851 | 2017/10/12 | 2017/10/13 | Ron Morrison |
| Total Ammonia-N | LACH/NH4 | 5210777 | N/A | 2017/10/17 | Charles Opoku-Ware |
| Nitrate (NO3) and Nitrite (NO2) in Water | LACH | 5206985 | N/A | 2017/10/14 | Anastasia Hamanov |
| OC Pesticides (Selected) & PCB | GC/ECD | 5208924 | 2017/10/12 | 2017/10/13 | Mahmudul Khan |
| OC Pesticides Summed Parameters | CALC | 5204027 | N/A | 2017/10/12 | Automated Statchk |
| PAH Compounds in Water by GC/MS (SIM) | GC/MS | 5207330 | 2017/10/11 | 2017/10/12 | Mitesh Raj |
| pH | AT | 5211354 | N/A | 2017/10/16 | Surinder Rai |
| Sulphate by Automated Colourimetry | KONE | 5207158 | N/A | 2017/10/12 | Alina Dobreanu |
| Sulphide | ISE/S | 5206808 | N/A | 2017/10/11 | Tahir Anwar |

**Maxxam ID:** FGZ978
**Sample ID:** DUP2
**Matrix:** Water

**Collected:** 2017/10/03
**Shipped:**
**Received:** 2017/10/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Chloride by Automated Colourimetry | KONE | 5207152 | N/A | 2017/10/12 | Alina Dobreanu |
| Total Cyanide | SKAL/CN | 5204058 | 2017/10/12 | 2017/10/16 | Xuanhong Qiu |
| Petroleum Hydro. CCME F1 & BTEX in Water | HSGC/MSFD | 5207888 | N/A | 2017/10/12 | Anca Ganea |
| Petroleum Hydrocarbons F2-F4 in Water | GC/FID | 5209092 | 2017/10/12 | 2017/10/13 | Zhiyue (Frank) Zhu |
| Fluoride | ISE | 5211345 | 2017/10/13 | 2017/10/16 | Surinder Rai |
| Mercury (low level) | CV/AA | 5208867 | 2017/10/12 | 2017/10/13 | Ron Morrison |
| Total Ammonia-N | LACH/NH4 | 5210777 | N/A | 2017/10/17 | Charles Opoku-Ware |
| Nitrate (NO3) and Nitrite (NO2) in Water | LACH | 5206985 | N/A | 2017/10/14 | Anastasia Hamanov |
| OC Pesticides (Selected) & PCB | GC/ECD | 5208924 | 2017/10/12 | 2017/10/14 | Mahmudul Khan |
| OC Pesticides Summed Parameters | CALC | 5204027 | N/A | 2017/10/12 | Automated Statchk |
| PAH Compounds in Water by GC/MS (SIM) | GC/MS | 5207330 | 2017/10/11 | 2017/10/12 | Mitesh Raj |
| pH | AT | 5211354 | N/A | 2017/10/16 | Surinder Rai |
| Sulphate by Automated Colourimetry | KONE | 5207158 | N/A | 2017/10/12 | Alina Dobreanu |
| Sulphide | ISE/S | 5206808 | N/A | 2017/10/11 | Tahir Anwar |



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Maxxam Job #: B7M2114
Report Date: 2017/10/20

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

| | |
|---|---|
| Package 1 | 1.0°C |
| Package 2 | 1.3°C |
| Package 3 | 1.7°C |

**Results relate only to the items tested.**



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Maxxam Job #: B7M2114
Report Date: 2017/10/20

## QUALITY ASSURANCE REPORT

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5207330 | D10-Anthracene | 2017/10/12 | 96 | 50 - 130 | 98 | 50 - 130 | 97 | % | | |
| 5207330 | D14-Terphenyl (FS) | 2017/10/12 | 95 | 50 - 130 | 95 | 50 - 130 | 93 | % | | |
| 5207330 | D8-Acenaphthylene | 2017/10/12 | 93 | 50 - 130 | 97 | 50 - 130 | 95 | % | | |
| 5207888 | 1,4-Difluorobenzene | 2017/10/12 | 104 | 70 - 130 | 105 | 70 - 130 | 102 | % | | |
| 5207888 | 4-Bromofluorobenzene | 2017/10/12 | 101 | 70 - 130 | 99 | 70 - 130 | 95 | % | | |
| 5207888 | D10-Ethylbenzene | 2017/10/12 | 92 | 70 - 130 | 95 | 70 - 130 | 91 | % | | |
| 5207888 | D4-1,2-Dichloroethane | 2017/10/12 | 97 | 70 - 130 | 104 | 70 - 130 | 102 | % | | |
| 5208924 | 2,4,5,6-Tetrachloro-m-xylene | 2017/10/13 | 80 | 50 - 130 | 63 | 50 - 130 | 62 | % | | |
| 5208924 | Decachlorobiphenyl | 2017/10/13 | 107 | 50 - 130 | 98 | 50 - 130 | 93 | % | | |
| 5209092 | o-Terphenyl | 2017/10/13 | 108 | 60 - 130 | 109 | 60 - 130 | 107 | % | | |
| 5204058 | Total Cyanide (CN) | 2017/10/16 | 104 | 80 - 120 | 102 | 80 - 120 | <0.0050 | mg/L | NC | 20 |
| 5206808 | Sulphide | 2017/10/11 | 83 | 80 - 120 | 83 | 80 - 120 | <0.020 | mg/L | NC | 20 |
| 5206985 | Nitrate (N) | 2017/10/14 | NC | 80 - 120 | 88 | 80 - 120 | <0.10 | mg/L | 1.6 | 20 |
| 5206985 | Nitrite (N) | 2017/10/14 | 103 | 80 - 120 | 104 | 80 - 120 | <0.010 | mg/L | 1.9 | 20 |
| 5207152 | Dissolved Chloride (Cl) | 2017/10/12 | NC | 80 - 120 | 104 | 80 - 120 | <1.0 | mg/L | 0.099 | 20 |
| 5207158 | Dissolved Sulphate (SO4) | 2017/10/12 | NC | 75 - 125 | 102 | 80 - 120 | <1.0 | mg/L | 1.7 | 20 |
| 5207330 | 1-Methylnaphthalene | 2017/10/12 | 95 | 50 - 130 | 101 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5207330 | 2-Methylnaphthalene | 2017/10/12 | 89 | 50 - 130 | 93 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5207330 | Acenaphthene | 2017/10/12 | 92 | 50 - 130 | 97 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5207330 | Acenaphthylene | 2017/10/12 | 90 | 50 - 130 | 95 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5207330 | Anthracene | 2017/10/12 | 91 | 50 - 130 | 94 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5207330 | Benzo(a)anthracene | 2017/10/12 | 107 | 50 - 130 | 105 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5207330 | Benzo(a)pyrene | 2017/10/12 | 103 | 50 - 130 | 106 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5207330 | Benzo(b/j)fluoranthene | 2017/10/12 | 99 | 50 - 130 | 104 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5207330 | Benzo(g,h,i)perylene | 2017/10/12 | 88 | 50 - 130 | 96 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5207330 | Benzo(k)fluoranthene | 2017/10/12 | 104 | 50 - 130 | 107 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5207330 | Chrysene | 2017/10/12 | 105 | 50 - 130 | 110 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5207330 | Dibenz(a,h)anthracene | 2017/10/12 | 76 | 50 - 130 | 69 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5207330 | Fluoranthene | 2017/10/12 | 102 | 50 - 130 | 105 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5207330 | Fluorene | 2017/10/12 | 93 | 50 - 130 | 97 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5207330 | Indeno(1,2,3-cd)pyrene | 2017/10/12 | 91 | 50 - 130 | 108 | 50 - 130 | <0.010 | ug/L | NC | 30 |



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## QUALITY ASSURANCE REPORT(CONT'D)



| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5207330 | Naphthalene | 2017/10/12 | 86 | 50 - 130 | 91 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5207330 | Phenanthrene | 2017/10/12 | 94 | 50 - 130 | 100 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5207330 | Pyrene | 2017/10/12 | 102 | 50 - 130 | 106 | 50 - 130 | <0.010 | ug/L | NC | 30 |
| 5207888 | Benzene | 2017/10/12 | 108 | 70 - 130 | 110 | 70 - 130 | <0.20 | ug/L | NC | 30 |
| 5207888 | Ethylbenzene | 2017/10/12 | 100 | 70 - 130 | 101 | 70 - 130 | <0.20 | ug/L | NC | 30 |
| 5207888 | F1 (C6-C10) - BTEX | 2017/10/12 | | | | | <25 | ug/L | NC | 30 |
| 5207888 | F1 (C6-C10) | 2017/10/12 | 119 | 70 - 130 | 95 | 70 - 130 | <25 | ug/L | NC | 30 |
| 5207888 | o-Xylene | 2017/10/12 | 102 | 70 - 130 | 103 | 70 - 130 | <0.20 | ug/L | NC | 30 |
| 5207888 | p+m-Xylene | 2017/10/12 | 99 | 70 - 130 | 99 | 70 - 130 | <0.40 | ug/L | NC | 30 |
| 5207888 | Toluene | 2017/10/12 | 105 | 70 - 130 | 105 | 70 - 130 | <0.20 | ug/L | NC | 30 |
| 5207888 | Total Xylenes | 2017/10/12 | | | | | <0.40 | ug/L | NC | 30 |
| 5208851 | Mercury (Hg) | 2017/10/13 | 89 | 75 - 125 | 106 | 80 - 120 | <0.01 | ug/L | NC | 20 |
| 5208867 | Mercury (Hg) | 2017/10/13 | 101 | 75 - 125 | 99 | 80 - 120 | <0.01 | ug/L | NC | 20 |
| 5208924 | a-Chlordane | 2017/10/13 | 93 | 50 - 130 | 91 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5208924 | Aldrin | 2017/10/13 | 87 | 50 - 130 | 83 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5208924 | alpha-BHC | 2017/10/13 | 81 | 30 - 130 | 79 | 30 - 130 | <0.005 | ug/L | NC | 40 |
| 5208924 | Aroclor 1016 | 2017/10/13 | | | | | <0.05 | ug/L | NC | 30 |
| 5208924 | Aroclor 1221 | 2017/10/13 | | | | | <0.05 | ug/L | NC | 30 |
| 5208924 | Aroclor 1232 | 2017/10/13 | | | | | <0.05 | ug/L | NC | 30 |
| 5208924 | Aroclor 1242 | 2017/10/13 | | | | | <0.05 | ug/L | NC | 30 |
| 5208924 | Aroclor 1248 | 2017/10/13 | | | | | <0.05 | ug/L | NC | 30 |
| 5208924 | Aroclor 1254 | 2017/10/13 | | | | | <0.05 | ug/L | NC | 30 |
| 5208924 | Aroclor 1260 | 2017/10/13 | | | | | <0.05 | ug/L | NC | 30 |
| 5208924 | beta-BHC | 2017/10/13 | 79 | 30 - 130 | 74 | 30 - 130 | <0.005 | ug/L | NC | 40 |
| 5208924 | delta-BHC | 2017/10/13 | 77 | 30 - 130 | 72 | 30 - 130 | <0.005 | ug/L | NC | 40 |
| 5208924 | Dieldrin | 2017/10/13 | 109 | 50 - 130 | 106 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5208924 | Endosulfan I (alpha) | 2017/10/13 | 101 | 50 - 130 | 98 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5208924 | Endosulfan II (beta) | 2017/10/13 | 91 | 50 - 130 | 84 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5208924 | Endosulfan sulfate | 2017/10/13 | 99 | 30 - 130 | 96 | 30 - 130 | <0.005 | ug/L | NC | 40 |
| 5208924 | Endrin aldehyde | 2017/10/13 | 74 | 30 - 130 | 80 | 30 - 130 | <0.005 | ug/L | NC | 40 |
| 5208924 | Endrin ketone | 2017/10/13 | 92 | 30 - 130 | 82 | 30 - 130 | <0.005 | ug/L | NC | 40 |

Maxxam Job #: B7M2114
Report Date: 2017/10/20

## QUALITY ASSURANCE REPORT(CONT'D)

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5208924 | Endrin | 2017/10/13 | 117 | 50 - 130 | 106 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5208924 | g-Chlordane | 2017/10/13 | 98 | 50 - 130 | 94 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5208924 | Heptachlor epoxide | 2017/10/13 | 87 | 50 - 130 | 82 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5208924 | Heptachlor | 2017/10/13 | 81 | 50 - 130 | 76 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5208924 | Hexachlorobenzene | 2017/10/13 | 96 | 50 - 130 | 87 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5208924 | Lindane | 2017/10/13 | 79 | 50 - 130 | 75 | 50 - 130 | <0.003 | ug/L | NC | 30 |
| 5208924 | Methoxychlor | 2017/10/13 | 102 | 50 - 130 | 87 | 50 - 130 | <0.01 | ug/L | NC | 30 |
| 5208924 | Mirex | 2017/10/13 | 106 | 30 - 130 | 94 | 30 - 130 | <0.005 | ug/L | NC | 40 |
| 5208924 | o,p-DDD | 2017/10/13 | 109 | 50 - 130 | 104 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5208924 | o,p-DDE | 2017/10/13 | 85 | 50 - 130 | 80 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5208924 | o,p-DDT | 2017/10/13 | 96 | 50 - 130 | 85 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5208924 | Octachlorostyrene | 2017/10/13 | 93 | 30 - 130 | 89 | 30 - 130 | <0.005 | ug/L | NC | 40 |
| 5208924 | Oxychlordane | 2017/10/13 | 80 | 30 - 130 | 75 | 30 - 130 | <0.005 | ug/L | NC | 30 |
| 5208924 | p,p-DDD | 2017/10/13 | 103 | 50 - 130 | 95 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5208924 | p,p-DDE | 2017/10/13 | 111 | 50 - 130 | 107 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5208924 | p,p-DDT | 2017/10/13 | 100 | 50 - 130 | 91 | 50 - 130 | <0.005 | ug/L | NC | 30 |
| 5208924 | Toxaphene | 2017/10/13 | | | | | <0.2 | ug/L | NC | 40 |
| 5209092 | F2 (C10-C16 Hydrocarbons) | 2017/10/13 | 100 | 50 - 130 | 100 | 60 - 130 | <100 | ug/L | 2.3 | 30 |
| 5209092 | F3 (C16-C34 Hydrocarbons) | 2017/10/13 | 99 | 50 - 130 | 101 | 60 - 130 | <200 | ug/L | NC | 30 |
| 5209092 | F4 (C34-C50 Hydrocarbons) | 2017/10/13 | 104 | 50 - 130 | 105 | 60 - 130 | <200 | ug/L | NC | 30 |
| 5210777 | Total Ammonia-N | 2017/10/17 | 95 | 80 - 120 | 97 | 85 - 115 | <0.050 | mg/L | NC | 20 |
| 5211345 | Fluoride (F-) | 2017/10/16 | 104 | 80 - 120 | 101 | 80 - 120 | <0.10 | mg/L | NC | 20 |
| 5211354 | pH | 2017/10/16 | | | 101 | 98 - 103 | | | 0.48 | N/A |



Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Maxxam Job #: B7M2114
Report Date: 2017/10/20

## QUALITY ASSURANCE REPORT(CONT'D)

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5213541 | Total Cyanide (CN) | 2017/10/17 | 110 | 80 - 120 | 105 | 80 - 120 | <0.0050 | mg/L | NC | 20 |

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



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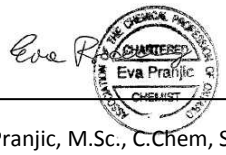
Maxxam Job #: B7M2114
Report Date: 2017/10/20

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).




Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



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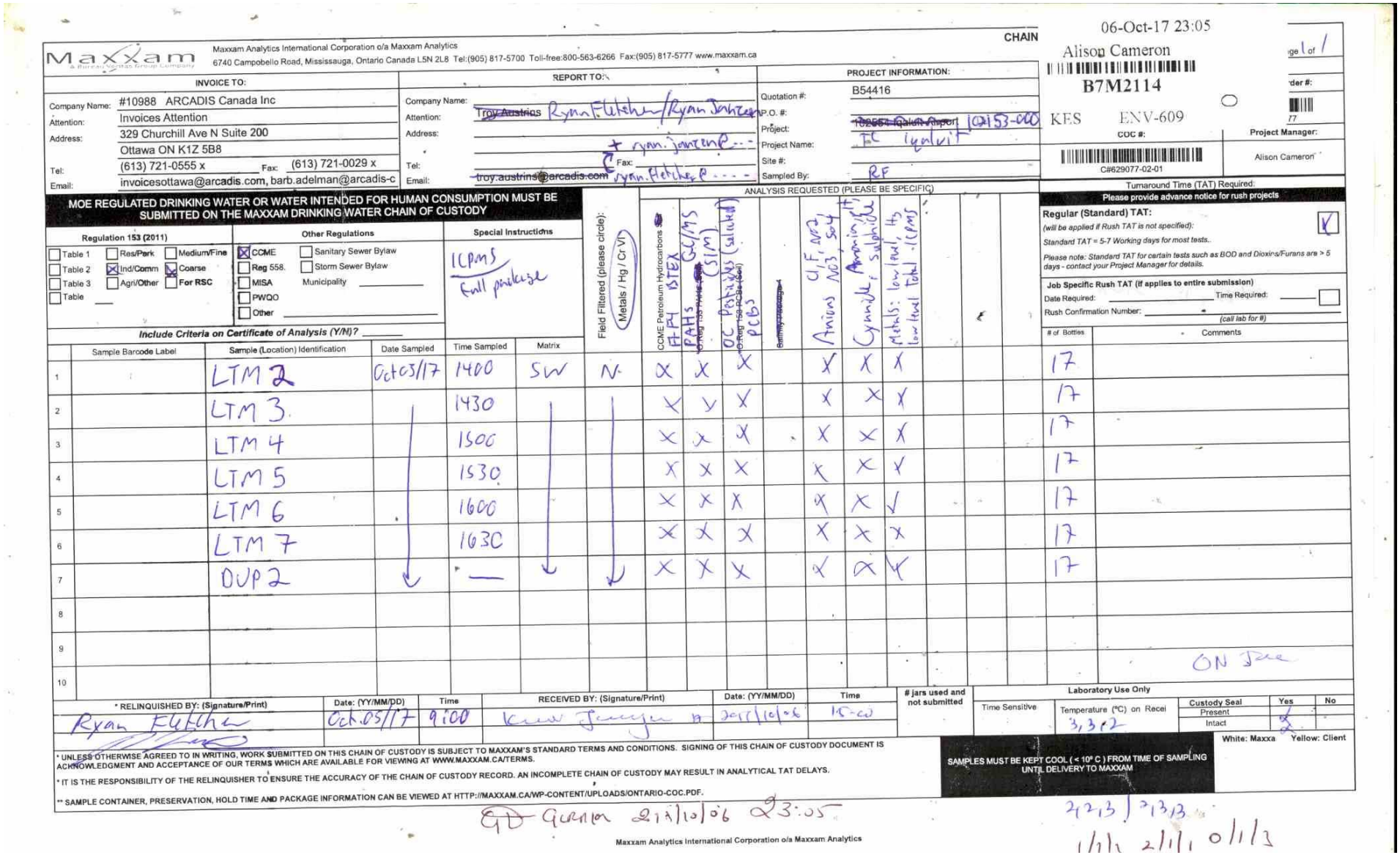


Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.maxxam.ca

CHAIN

06-Oct-17 23:05
Alison Cameron
B7M2114
KES ENV-609

INVOICE TO:
Company Name: #10988 ARCADIS Canada Inc
Attention: Invoices Attention
Address: 329 Churchill Ave N Suite 200, Ottawa ON K1Z 5B8
Tel: (613) 721-0555 x Fax: (613) 721-0029 x
Email: invoicesottawa@arcadis.com, barb.adelman@arcadis-c

REPORT TO:
Company Name:
Attention: Troy Austrins Ryan Fletcher/Ryan Jowzen
Address:
Tel: Fax:
Email: troy.austrins@arcadis.com ryan.fletcher@... + ryan.jowzen@...

PROJECT INFORMATION:
Quotation #: B54416
P.O. #:
Project: 102651 Galetta Airport 102153-000
Project Name: TC Lynlvit
Site #:
Sampled By: RF

COC #: C#629077-02-01
Project Manager: Alison Cameron

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011): Table 1, Table 2, Table 3, Table ___; Res/Park, Ind/Comm, Agri/Other; Medium/Fine, Coarse, For RSC
Other Regulations: CCME, Reg 558, MISA, PWQO, Other; Sanitary Sewer Bylaw, Storm Sewer Bylaw, Municipality
Special Instructions: ICPMS Full package
Include Criteria on Certificate of Analysis (Y/N)?

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects
Regular (Standard) TAT: (will be applied if Rush TAT is not specified): Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details. [X]
Job Specific Rush TAT (if applies to entire submission)
Date Required: Time Required:
Rush Confirmation Number: (call lab for #)

| | Sample Barcode Label | Sample (Location) Identification | Date Sampled | Time Sampled | Matrix | Field Filtered (please circle): Metals / Hg / Cr VI | CCME Petroleum Hydrocarbons: F1-F4 BTEX | PAHs (Reg 153 Table 35) | OC Pesticides (selected) (Reg 153 PCBs (Total)) | Sanitary Parameters | CL, F, NO2, SO4 Anions | Cyanide, Ammonia, Sulphide | Metals: low level, Hg low level Total (ICPMS) | | | # of Bottles | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | LTM 2 | Oct 05/17 | 1400 | SW | N | X | X | X | | X | X | X | | | 17 | |
| 2 | | LTM 3 | | 1430 | | | X | X | X | | X | X | X | | | 17 | |
| 3 | | LTM 4 | | 1500 | | | X | X | X | | X | X | X | | | 17 | |
| 4 | | LTM 5 | | 1530 | | | X | X | X | | X | X | X | | | 17 | |
| 5 | | LTM 6 | | 1600 | | | X | X | X | | X | X | ✓ | | | 17 | |
| 6 | | LTM 7 | | 1630 | | | X | X | X | | X | X | X | | | 17 | |
| 7 | | DUP 2 | | — | | | X | X | X | | X | X | X | | | 17 | |
| 8 | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | ON Jar |

| * RELINQUISHED BY: (Signature/Print) | Date: (YY/MM/DD) | Time | RECEIVED BY: (Signature/Print) | Date: (YY/MM/DD) | Time | # jars used and not submitted |
|---|---|---|---|---|---|---|
| Ryan Fletcher | Oct.05/17 | 9:00 | Kris Jennings | 17/10/06 | 15:00 | |

Laboratory Use Only: Time Sensitive; Temperature (°C) on Recei: 3, 3, 2; Custody Seal Present: Yes; Intact: Yes

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.
** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT HTTP://MAXXAM.CA/WP-CONTENT/UPLOADS/ONTARIO-COC.PDF.

SAMPLES MUST BE KEPT COOL ( < 10° C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

White: Maxxa Yellow: Client

GD Gurmon 2017/10/06 23:05

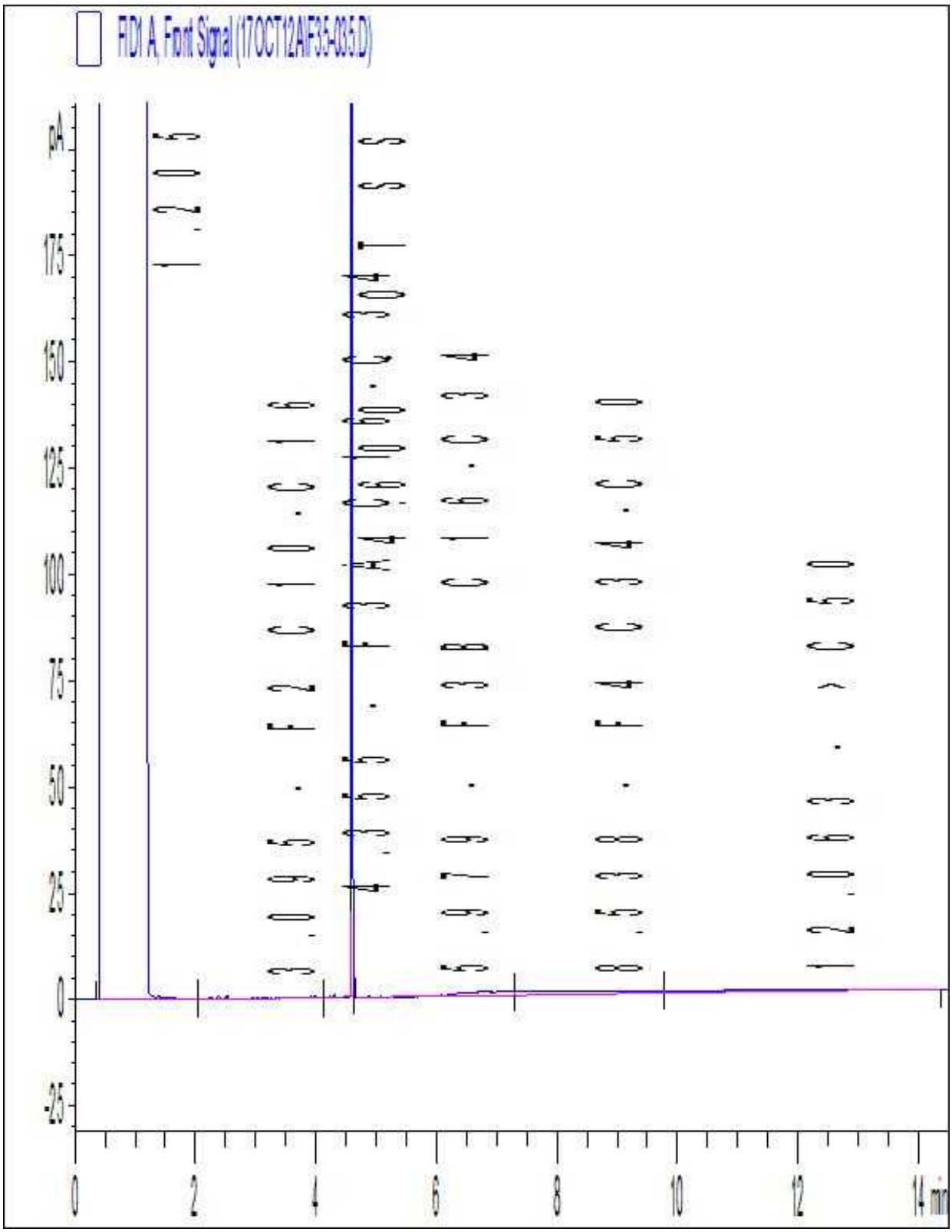
Maxxam Analytics International Corporation o/a Maxxam Analytics

2/2/3 / 2/3/3
1/1/1 2/1/1 0/1/1

Maxxam Job #: B7M2114
Report Date: 2017/10/20
Maxxam Sample: FGZ972

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: LTM2

**Petroleum Hydrocarbons F2-F4 in Water Chromatogram**

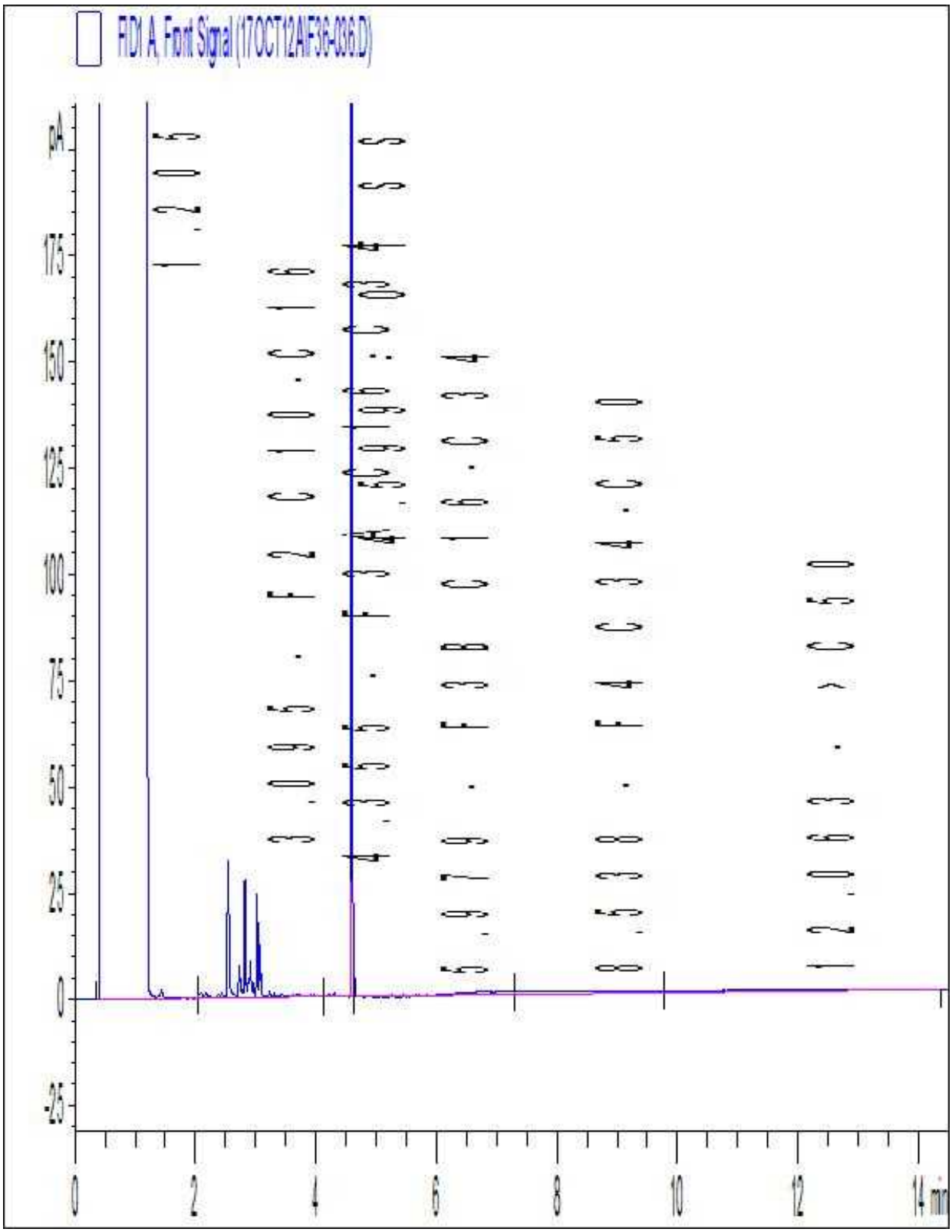



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7M2114
Report Date: 2017/10/20
Maxxam Sample: FGZ973

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: LTM3

**Petroleum Hydrocarbons F2-F4 in Water Chromatogram**

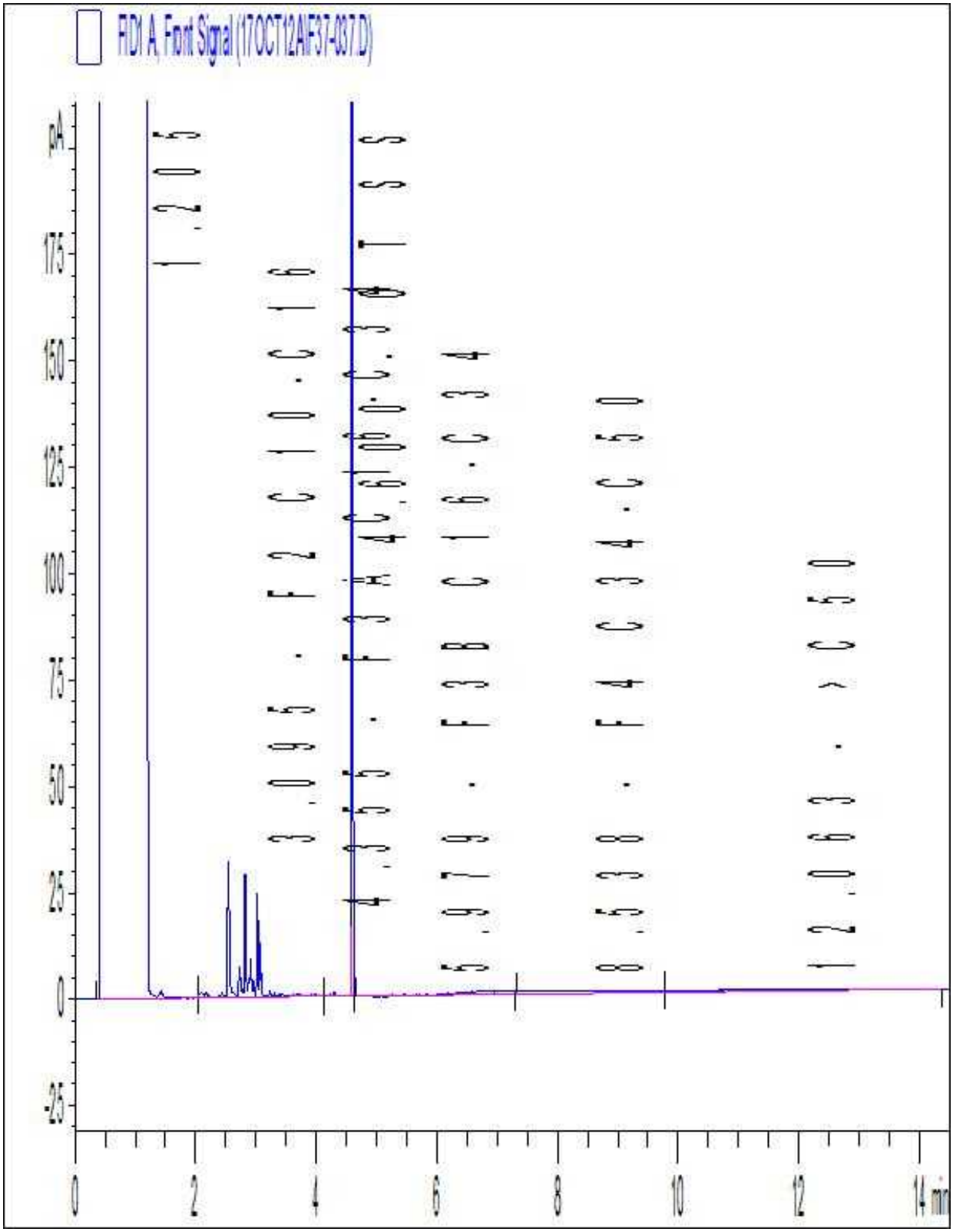



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7M2114
Report Date: 2017/10/20
Maxxam Sample: FGZ973 Lab-Dup

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: LTM3

**Petroleum Hydrocarbons F2-F4 in Water Chromatogram**

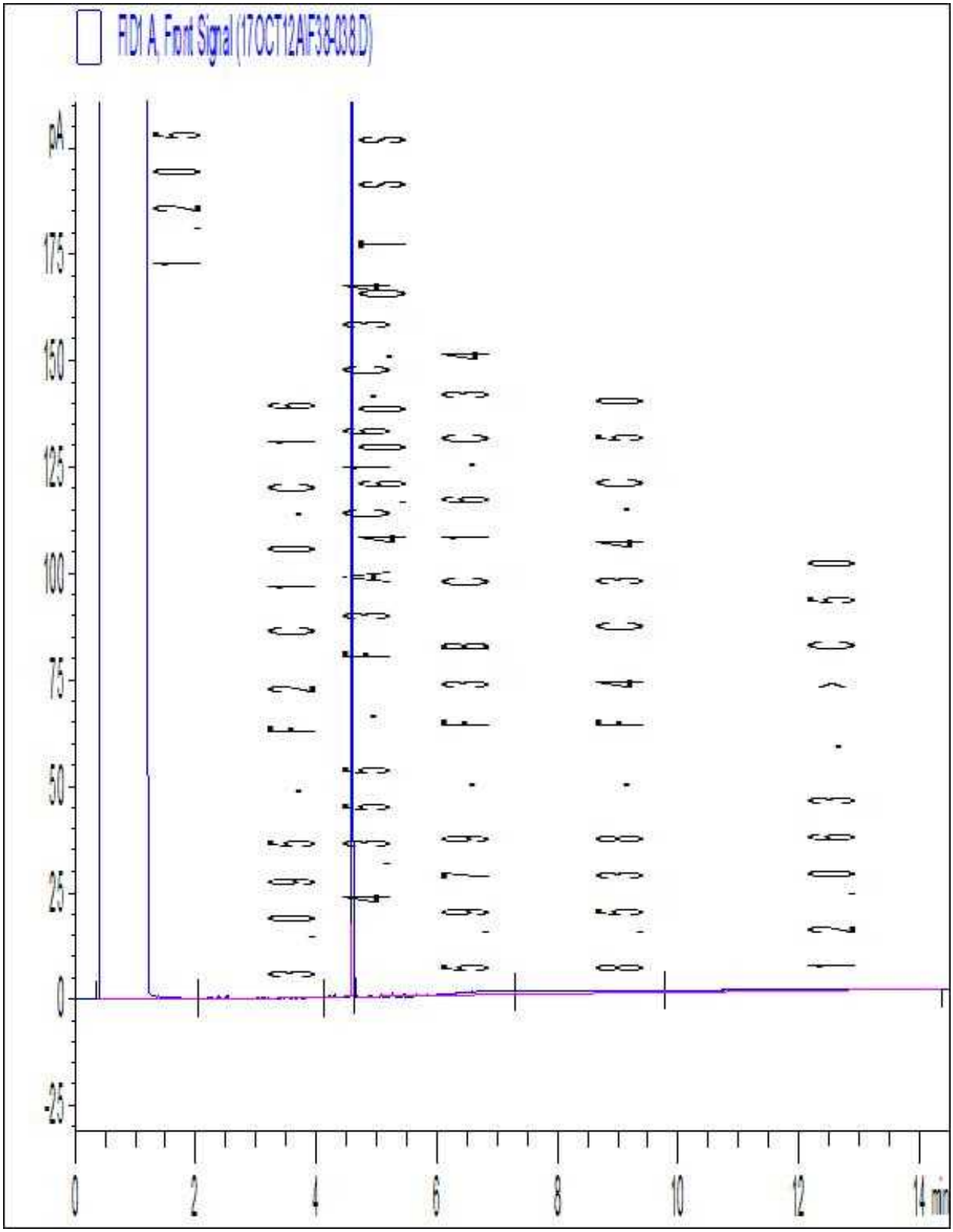



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7M2114
Report Date: 2017/10/20
Maxxam Sample: FGZ974

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: LTM4

**Petroleum Hydrocarbons F2-F4 in Water Chromatogram**

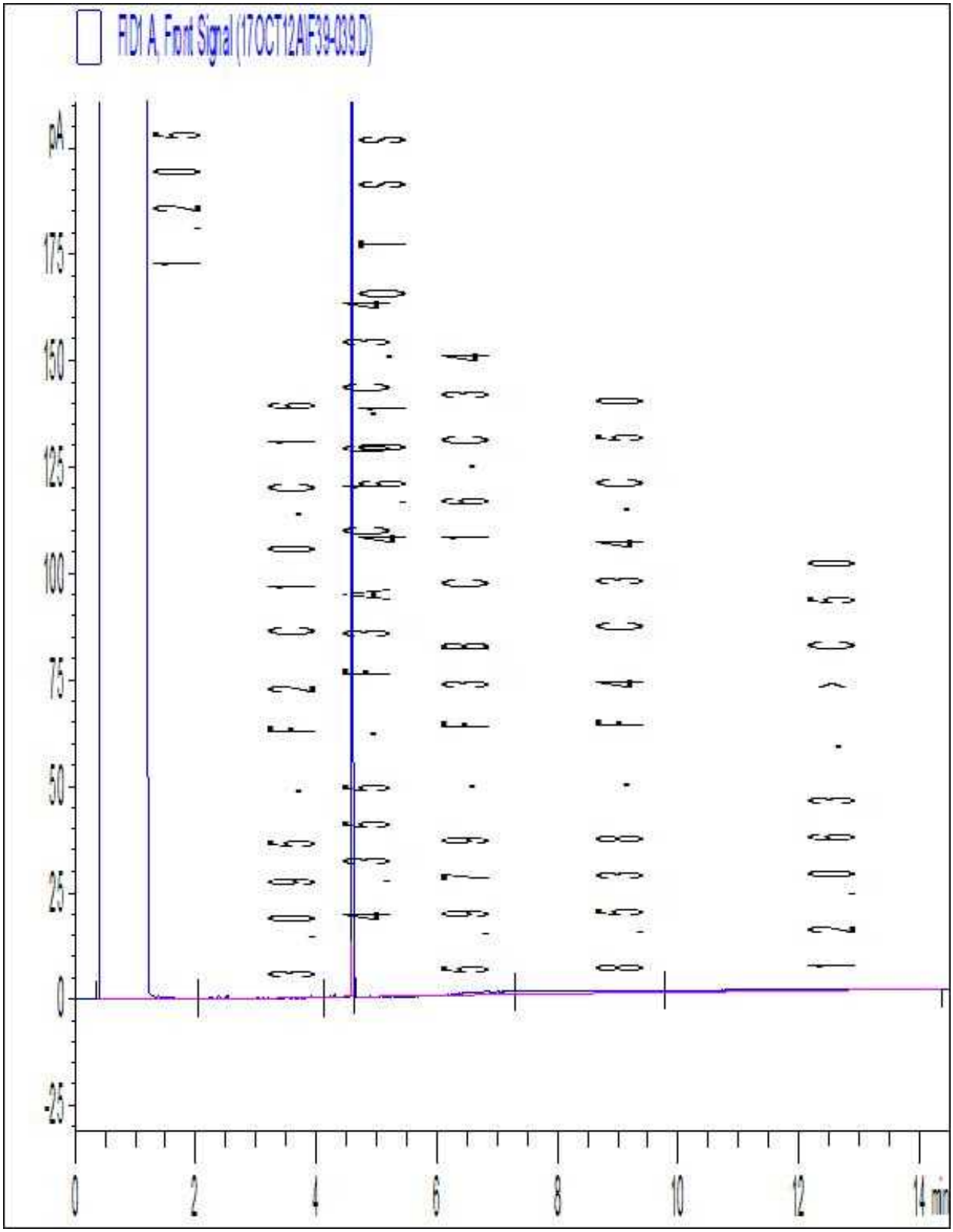



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7M2114
Report Date: 2017/10/20
Maxxam Sample: FGZ975

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: LTM5

**Petroleum Hydrocarbons F2-F4 in Water Chromatogram**

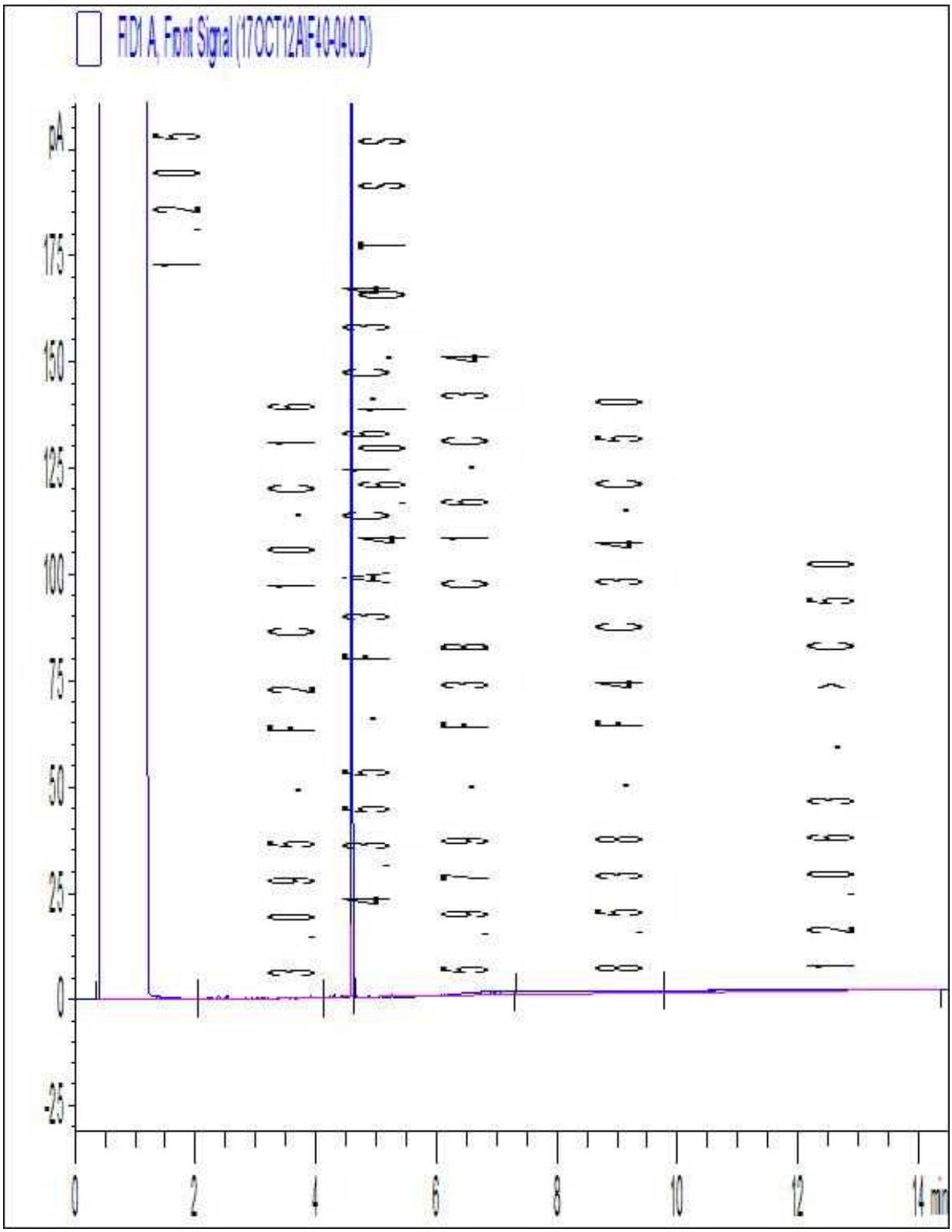



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7M2114
Report Date: 2017/10/20
Maxxam Sample: FGZ976

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: LTM6

**Petroleum Hydrocarbons F2-F4 in Water Chromatogram**

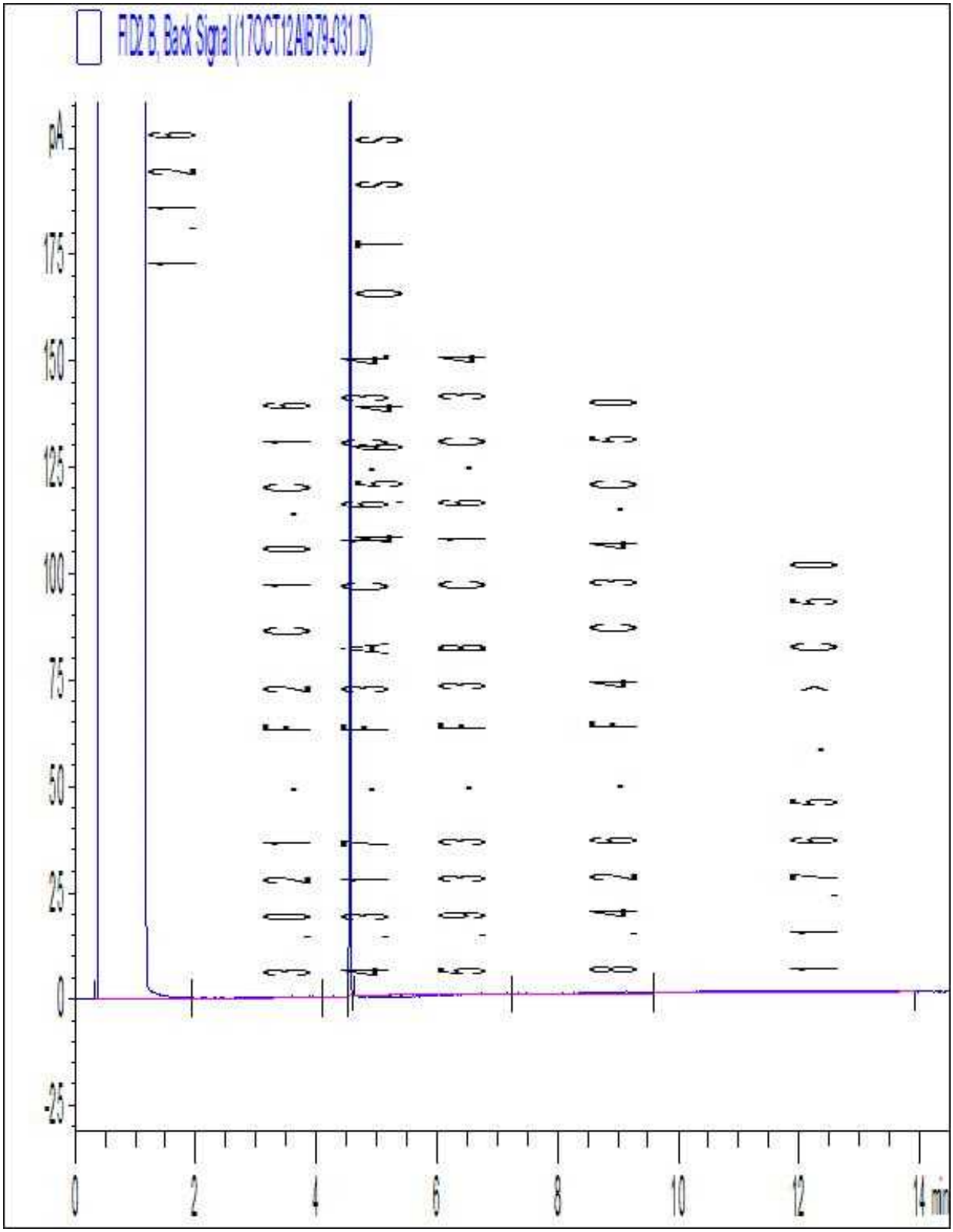



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7M2114
Report Date: 2017/10/20
Maxxam Sample: FGZ977

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: LTM7

**Petroleum Hydrocarbons F2-F4 in Water Chromatogram**

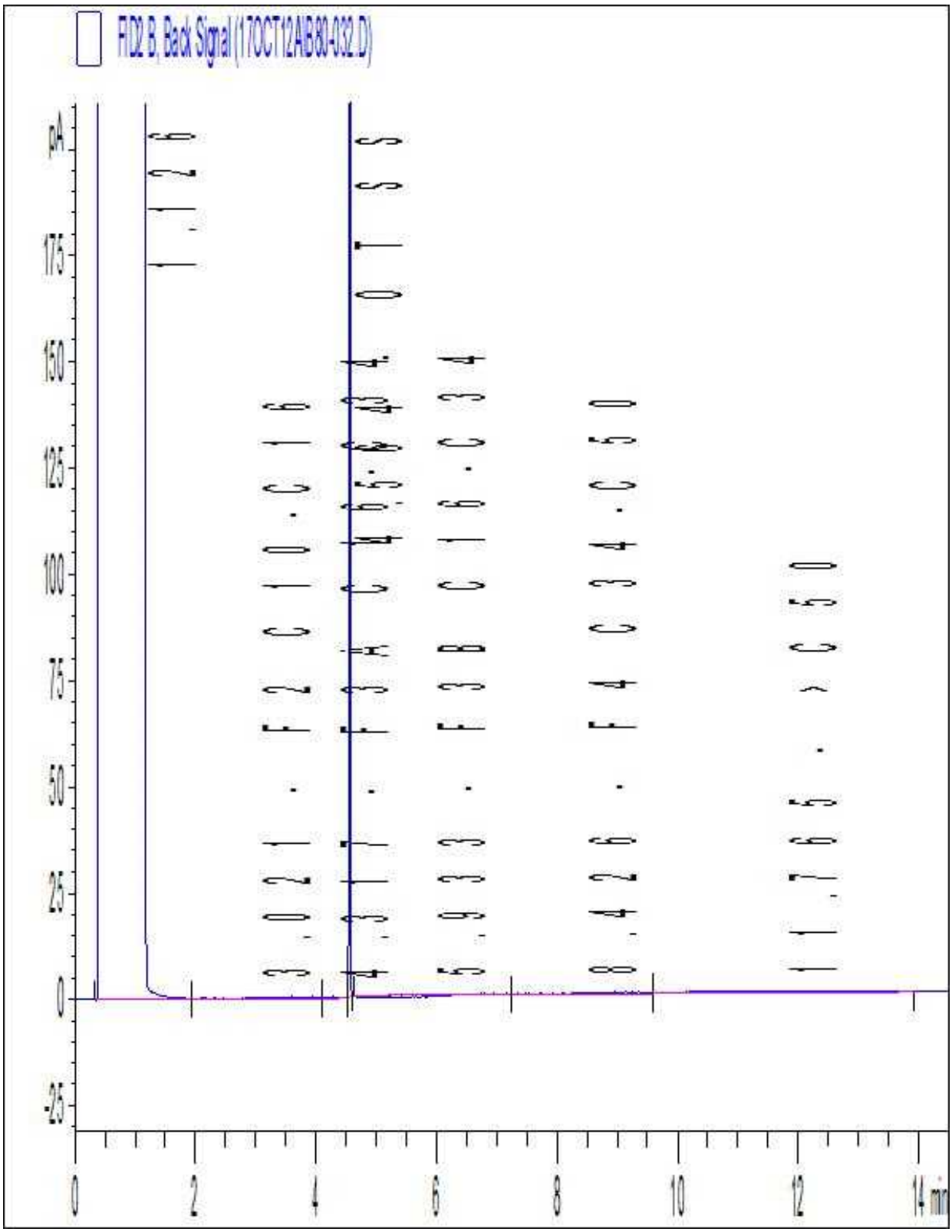



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7M2114
Report Date: 2017/10/20
Maxxam Sample: FGZ978

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: DUP2

**Petroleum Hydrocarbons F2-F4 in Water Chromatogram**




**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your Project #: MB7M2114
Site#: TC IQALUIT
Site Location: 102153-000
Your C.O.C. #: B7M2114-M058-01-01

**Attention:ALISON CAMERON**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

**Report Date: 2017/10/17**
Report #: R2461408
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B789895**
**Received: 2017/10/13, 08:25**

Sample Matrix: Water
# Samples Received: 7

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Analytical Method |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) (1) | 3 | N/A | 2017/10/15 | BBY WI-00033 | Auto Calc |
| Hardness Total (calculated as CaCO3) (1) | 4 | N/A | 2017/10/17 | BBY WI-00033 | Auto Calc |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | 3 | 2017/10/13 | 2017/10/15 | BBY7SOP-00002 | EPA 6020B R2 m |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | 4 | 2017/10/13 | 2017/10/17 | BBY7SOP-00002 | EPA 6020B R2 m |
| Elements by CRC ICPMS (total) | 3 | 2017/10/13 | 2017/10/15 | BBY7SOP-00003, | BCLM2005,EPA6020bR2m |
| Elements by CRC ICPMS (total) | 4 | 2017/10/13 | 2017/10/17 | BBY7SOP-00003, | BCLM2005,EPA6020bR2m |

**Remarks:**

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) "Total Hardness" was calculated from Total Ca and Mg concentrations and may be biased high (Hardness, or Dissolved Hardness, calculated from Dissolved Ca and Mg, should be used for compliance if available).



Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Your Project #: MB7M2114
Site#: TC IQALUIT
Site Location: 102153-000
Your C.O.C. #: B7M2114-M058-01-01

**Attention:ALISON CAMERON**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

**Report Date: 2017/10/17**
Report #: R2461408
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B789895**
**Received: 2017/10/13, 08:25**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Namita Sahni, Burnaby Project Manager
Email: NSahni@maxxam.ca
Phone# (604)639-2614
==========
This report has been generated and distributed using a secure automated process.
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B789895
Report Date: 2017/10/17

MAXXAM ANALYTICS
Client Project #: MB7M2114
Site Location: 102153-000
Sampler Initials: RF

## CCME TOTAL METALS IN WATER (WATER)

| Maxxam ID | | SE9707 | | SE9708 | | SE9709 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/03 14:00 | | 2017/10/03 14:30 | | 2017/10/03 15:00 | | |
| COC Number | | B7M2114-M058-01-01 | | B7M2114-M058-01-01 | | B7M2114-M058-01-01 | | |
| | UNITS | LTM2 (FGZ972) | QC Batch | LTM3 (FGZ973) | QC Batch | LTM4 (FGZ974) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | | |
| Total Hardness (CaCO3) | mg/L | 83.8 | 8791538 | 400 | 8791538 | 48.3 | 0.50 | 8791538 |
| **Total Metals by ICPMS** | | | | | | | | |
| Total Aluminum (Al) | ug/L | 50.7 | 8792065 | 122 | 8791833 | 14.4 | 3.0 | 8792065 |
| Total Antimony (Sb) | ug/L | <0.50 | 8792065 | <0.50 | 8791833 | <0.50 | 0.50 | 8792065 |
| Total Arsenic (As) | ug/L | <0.10 | 8792065 | 0.60 | 8791833 | <0.10 | 0.10 | 8792065 |
| Total Barium (Ba) | ug/L | 1.1 | 8792065 | 2.8 | 8791833 | 3.3 | 1.0 | 8792065 |
| Total Beryllium (Be) | ug/L | <0.10 | 8792065 | <0.10 | 8791833 | <0.10 | 0.10 | 8792065 |
| Total Bismuth (Bi) | ug/L | <1.0 | 8792065 | <1.0 | 8791833 | <1.0 | 1.0 | 8792065 |
| Total Boron (B) | ug/L | 195 | 8792065 | 588 | 8791833 | <50 | 50 | 8792065 |
| Total Cadmium (Cd) | ug/L | 0.111 | 8792065 | 0.017 | 8791833 | 0.040 | 0.010 | 8792065 |
| Total Chromium (Cr) | ug/L | <1.0 | 8792065 | <1.0 | 8791833 | <1.0 | 1.0 | 8792065 |
| Total Cobalt (Co) | ug/L | 0.33 | 8792065 | 0.54 | 8791833 | <0.20 | 0.20 | 8792065 |
| Total Copper (Cu) | ug/L | 3.31 | 8792065 | 2.52 | 8791833 | 0.72 | 0.50 | 8792065 |
| Total Iron (Fe) | ug/L | 162 | 8792065 | 4440 | 8791833 | 488 | 10 | 8792065 |
| Total Lead (Pb) | ug/L | 2.31 | 8792065 | 12.9 | 8791833 | <0.20 | 0.20 | 8792065 |
| Total Lithium (Li) | ug/L | 3.1 | 8792065 | 6.4 | 8791833 | <2.0 | 2.0 | 8792065 |
| Total Manganese (Mn) | ug/L | 123 | 8792065 | 764 | 8791833 | 63.7 | 1.0 | 8792065 |
| Total Molybdenum (Mo) | ug/L | <1.0 | 8792065 | 1.8 | 8791833 | <1.0 | 1.0 | 8792065 |
| Total Nickel (Ni) | ug/L | 1.3 | 8792065 | 2.5 | 8791833 | <1.0 | 1.0 | 8792065 |
| Total Selenium (Se) | ug/L | <0.10 | 8792065 | 0.11 | 8791833 | <0.10 | 0.10 | 8792065 |
| Total Silicon (Si) | ug/L | 3340 | 8792065 | 5080 | 8791833 | 5160 | 100 | 8792065 |
| Total Silver (Ag) | ug/L | <0.020 | 8792065 | <0.020 | 8791833 | <0.020 | 0.020 | 8792065 |
| Total Strontium (Sr) | ug/L | 113 | 8792065 | 575 | 8791833 | 32.8 | 1.0 | 8792065 |
| Total Thallium (Tl) | ug/L | <0.010 | 8792065 | <0.010 | 8791833 | <0.010 | 0.010 | 8792065 |
| Total Tin (Sn) | ug/L | <5.0 | 8792065 | <5.0 | 8791833 | <5.0 | 5.0 | 8792065 |
| Total Titanium (Ti) | ug/L | <5.0 | 8792065 | 8.7 | 8791833 | <5.0 | 5.0 | 8792065 |
| Total Uranium (U) | ug/L | <0.10 | 8792065 | 0.29 | 8791833 | <0.10 | 0.10 | 8792065 |
| Total Vanadium (V) | ug/L | <5.0 | 8792065 | <5.0 | 8791833 | <5.0 | 5.0 | 8792065 |
| Total Zinc (Zn) | ug/L | 14.7 | 8792065 | 18.4 | 8791833 | 5.3 | 5.0 | 8792065 |
| Total Zirconium (Zr) | ug/L | <0.10 | 8792065 | <0.10 | 8791833 | <0.10 | 0.10 | 8792065 |
| Total Calcium (Ca) | mg/L | 17.7 | 8791682 | 111 | 8791682 | 14.3 | 0.050 | 8791682 |

RDL = Reportable Detection Limit



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Maxxam Job #: B789895
Report Date: 2017/10/17

MAXXAM ANALYTICS
Client Project #: MB7M2114
Site Location: 102153-000
Sampler Initials: RF

## CCME TOTAL METALS IN WATER (WATER)

| **Maxxam ID** | | SE9707 | | SE9708 | | SE9709 | | |
|---|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2017/10/03 14:00 | | 2017/10/03 14:30 | | 2017/10/03 15:00 | | |
| **COC Number** | | B7M2114-M058-01-01 | | B7M2114-M058-01-01 | | B7M2114-M058-01-01 | | |
| | **UNITS** | **LTM2 (FGZ972)** | **QC Batch** | **LTM3 (FGZ973)** | **QC Batch** | **LTM4 (FGZ974)** | **RDL** | **QC Batch** |
| Total Magnesium (Mg) | mg/L | 9.60 | 8791682 | 29.8 | 8791682 | 3.07 | 0.050 | 8791682 |
| Total Potassium (K) | mg/L | 4.69 | 8791682 | 11.8 | 8791682 | 0.750 | 0.050 | 8791682 |
| Total Sodium (Na) | mg/L | 62.2 | 8791682 | 91.3 | 8791682 | 5.54 | 0.050 | 8791682 |
| Total Sulphur (S) | mg/L | 27.4 | 8791682 | 155 | 8791682 | <3.0 | 3.0 | 8791682 |
| RDL = Reportable Detection Limit | | | | | | | | |



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Maxxam Job #: B789895
Report Date: 2017/10/17

MAXXAM ANALYTICS
Client Project #: MB7M2114
Site Location: 102153-000
Sampler Initials: RF

## CCME TOTAL METALS IN WATER (WATER)

| Maxxam ID | | SE9710 | | SE9711 | SE9712 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/03 15:30 | | 2017/10/03 16:00 | 2017/10/03 16:30 | | |
| COC Number | | B7M2114-M058-01-01 | | B7M2114-M058-01-01 | B7M2114-M058-01-01 | | |
| | UNITS | LTM5 (FGZ975) | QC Batch | LTM6 (FGZ976) | LTM7 (FGZ977) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Total Hardness (CaCO3) | mg/L | 49.2 | 8791538 | 42.6 | 72.4 | 0.50 | 8791538 |
| **Total Metals by ICPMS** | | | | | | | |
| Total Aluminum (Al) | ug/L | 20.8 | 8792065 | 34.7 | 60.9 | 3.0 | 8791833 |
| Total Antimony (Sb) | ug/L | <0.50 | 8792065 | <0.50 | <0.50 | 0.50 | 8791833 |
| Total Arsenic (As) | ug/L | <0.10 | 8792065 | <0.10 | 0.17 | 0.10 | 8791833 |
| Total Barium (Ba) | ug/L | 7.4 | 8792065 | 4.5 | 8.9 | 1.0 | 8791833 |
| Total Beryllium (Be) | ug/L | <0.10 | 8792065 | <0.10 | <0.10 | 0.10 | 8791833 |
| Total Bismuth (Bi) | ug/L | <1.0 | 8792065 | <1.0 | <1.0 | 1.0 | 8791833 |
| Total Boron (B) | ug/L | <50 | 8792065 | <50 | <50 | 50 | 8791833 |
| Total Cadmium (Cd) | ug/L | 0.043 | 8792065 | 0.043 | 0.013 | 0.010 | 8791833 |
| Total Chromium (Cr) | ug/L | <1.0 | 8792065 | <1.0 | <1.0 | 1.0 | 8791833 |
| Total Cobalt (Co) | ug/L | 0.22 | 8792065 | 0.26 | 0.56 | 0.20 | 8791833 |
| Total Copper (Cu) | ug/L | 0.77 | 8792065 | 0.74 | 1.30 | 0.50 | 8791833 |
| Total Iron (Fe) | ug/L | 463 | 8792065 | 740 | 1830 | 10 | 8791833 |
| Total Lead (Pb) | ug/L | <0.20 | 8792065 | <0.20 | 0.61 | 0.20 | 8791833 |
| Total Lithium (Li) | ug/L | <2.0 | 8792065 | <2.0 | <2.0 | 2.0 | 8791833 |
| Total Manganese (Mn) | ug/L | 76.5 | 8792065 | 69.6 | 230 | 1.0 | 8791833 |
| Total Molybdenum (Mo) | ug/L | <1.0 | 8792065 | <1.0 | <1.0 | 1.0 | 8791833 |
| Total Nickel (Ni) | ug/L | <1.0 | 8792065 | <1.0 | <1.0 | 1.0 | 8791833 |
| Total Selenium (Se) | ug/L | <0.10 | 8792065 | <0.10 | <0.10 | 0.10 | 8791833 |
| Total Silicon (Si) | ug/L | 4850 | 8792065 | 3390 | 3460 | 100 | 8791833 |
| Total Silver (Ag) | ug/L | <0.020 | 8792065 | <0.020 | <0.020 | 0.020 | 8791833 |
| Total Strontium (Sr) | ug/L | 53.9 | 8792065 | 32.8 | 73.5 | 1.0 | 8791833 |
| Total Thallium (Tl) | ug/L | <0.010 | 8792065 | <0.010 | <0.010 | 0.010 | 8791833 |
| Total Tin (Sn) | ug/L | <5.0 | 8792065 | <5.0 | <5.0 | 5.0 | 8791833 |
| Total Titanium (Ti) | ug/L | <5.0 | 8792065 | <5.0 | <5.0 | 5.0 | 8791833 |
| Total Uranium (U) | ug/L | <0.10 | 8792065 | <0.10 | <0.10 | 0.10 | 8791833 |
| Total Vanadium (V) | ug/L | <5.0 | 8792065 | <5.0 | <5.0 | 5.0 | 8791833 |
| Total Zinc (Zn) | ug/L | 28.0 | 8792065 | 9.1 | 223 | 5.0 | 8791833 |
| Total Zirconium (Zr) | ug/L | <0.10 | 8792065 | <0.10 | <0.10 | 0.10 | 8791833 |
| Total Calcium (Ca) | mg/L | 14.3 | 8791682 | 12.4 | 21.7 | 0.050 | 8791682 |

RDL = Reportable Detection Limit



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Maxxam Job #: B789895
Report Date: 2017/10/17

MAXXAM ANALYTICS
Client Project #: MB7M2114
Site Location: 102153-000
Sampler Initials: RF

## CCME TOTAL METALS IN WATER (WATER)

| **Maxxam ID** | | SE9710 | | SE9711 | SE9712 | | |
|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2017/10/03 15:30 | | 2017/10/03 16:00 | 2017/10/03 16:30 | | |
| **COC Number** | | B7M2114-M058-01-01 | | B7M2114-M058-01-01 | B7M2114-M058-01-01 | | |
| | **UNITS** | **LTM5 (FGZ975)** | **QC Batch** | **LTM6 (FGZ976)** | **LTM7 (FGZ977)** | **RDL** | **QC Batch** |
| Total Magnesium (Mg) | mg/L | 3.26 | 8791682 | 2.82 | 4.44 | 0.050 | 8791682 |
| Total Potassium (K) | mg/L | 0.852 | 8791682 | 0.732 | 3.11 | 0.050 | 8791682 |
| Total Sodium (Na) | mg/L | 7.01 | 8791682 | 4.95 | 6.97 | 0.050 | 8791682 |
| Total Sulphur (S) | mg/L | <3.0 | 8791682 | <3.0 | <3.0 | 3.0 | 8791682 |
| RDL = Reportable Detection Limit | | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB7M2114
Site Location: 102153-000
Sampler Initials: RF

## CCME TOTAL METALS IN WATER (WATER)

| Maxxam ID | | SE9713 | | |
|---|---|---|---|---|
| Sampling Date | | 2017/10/03 | | |
| COC Number | | B7M2114-M058-01-01 | | |
| | UNITS | DUP2 (FGZ978) | RDL | QC Batch |
| **Calculated Parameters** | | | | |
| Total Hardness (CaCO3) | mg/L | 75.2 | 0.50 | 8791538 |
| **Total Metals by ICPMS** | | | | |
| Total Aluminum (Al) | ug/L | 66.2 | 3.0 | 8791833 |
| Total Antimony (Sb) | ug/L | <0.50 | 0.50 | 8791833 |
| Total Arsenic (As) | ug/L | 0.17 | 0.10 | 8791833 |
| Total Barium (Ba) | ug/L | 11.6 | 1.0 | 8791833 |
| Total Beryllium (Be) | ug/L | <0.10 | 0.10 | 8791833 |
| Total Bismuth (Bi) | ug/L | <1.0 | 1.0 | 8791833 |
| Total Boron (B) | ug/L | <50 | 50 | 8791833 |
| Total Cadmium (Cd) | ug/L | 0.019 | 0.010 | 8791833 |
| Total Chromium (Cr) | ug/L | <1.0 | 1.0 | 8791833 |
| Total Cobalt (Co) | ug/L | 0.62 | 0.20 | 8791833 |
| Total Copper (Cu) | ug/L | 1.38 | 0.50 | 8791833 |
| Total Iron (Fe) | ug/L | 1880 | 10 | 8791833 |
| Total Lead (Pb) | ug/L | 0.62 | 0.20 | 8791833 |
| Total Lithium (Li) | ug/L | <2.0 | 2.0 | 8791833 |
| Total Manganese (Mn) | ug/L | 237 | 1.0 | 8791833 |
| Total Molybdenum (Mo) | ug/L | <1.0 | 1.0 | 8791833 |
| Total Nickel (Ni) | ug/L | 1.3 | 1.0 | 8791833 |
| Total Selenium (Se) | ug/L | <0.10 | 0.10 | 8791833 |
| Total Silicon (Si) | ug/L | 3500 | 100 | 8791833 |
| Total Silver (Ag) | ug/L | <0.020 | 0.020 | 8791833 |
| Total Strontium (Sr) | ug/L | 83.2 | 1.0 | 8791833 |
| Total Thallium (Tl) | ug/L | <0.010 | 0.010 | 8791833 |
| Total Tin (Sn) | ug/L | <5.0 | 5.0 | 8791833 |
| Total Titanium (Ti) | ug/L | <5.0 | 5.0 | 8791833 |
| Total Uranium (U) | ug/L | <0.10 | 0.10 | 8791833 |
| Total Vanadium (V) | ug/L | <5.0 | 5.0 | 8791833 |
| Total Zinc (Zn) | ug/L | 254 | 5.0 | 8791833 |
| Total Zirconium (Zr) | ug/L | <0.10 | 0.10 | 8791833 |
| Total Calcium (Ca) | mg/L | 22.5 | 0.050 | 8791682 |
| RDL = Reportable Detection Limit | | | | |



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Report Date: 2017/10/17

MAXXAM ANALYTICS
Client Project #: MB7M2114
Site Location: 102153-000
Sampler Initials: RF

## CCME TOTAL METALS IN WATER (WATER)

| **Maxxam ID** | | SE9713 | | |
|---|---|---|---|---|
| **Sampling Date** | | 2017/10/03 | | |
| **COC Number** | | B7M2114-M058-01-01 | | |
| | **UNITS** | **DUP2 (FGZ978)** | **RDL** | **QC Batch** |
| Total Magnesium (Mg) | mg/L | 4.61 | 0.050 | 8791682 |
| Total Potassium (K) | mg/L | 3.14 | 0.050 | 8791682 |
| Total Sodium (Na) | mg/L | 7.35 | 0.050 | 8791682 |
| Total Sulphur (S) | mg/L | 3.1 | 3.0 | 8791682 |
| RDL = Reportable Detection Limit | | | | |



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Maxxam Job #: B789895
Report Date: 2017/10/17

MAXXAM ANALYTICS
Client Project #: MB7M2114
Site Location: 102153-000
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** SE9707
**Sample ID:** LTM2 (FGZ972)
**Matrix:** Water

**Collected:** 2017/10/03
**Shipped:**
**Received:** 2017/10/13

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 8791538 | N/A | 2017/10/15 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | ICP/CRCM | 8791682 | 2017/10/15 | 2017/10/15 | Automated Statchk |
| Elements by CRC ICPMS (total) | ICP/CRCM | 8792065 | 2017/10/13 | 2017/10/15 | Adnan Dzebic |

**Maxxam ID:** SE9708
**Sample ID:** LTM3 (FGZ973)
**Matrix:** Water

**Collected:** 2017/10/03
**Shipped:**
**Received:** 2017/10/13

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 8791538 | N/A | 2017/10/17 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | ICP/CRCM | 8791682 | 2017/10/17 | 2017/10/17 | Automated Statchk |
| Elements by CRC ICPMS (total) | ICP/CRCM | 8791833 | 2017/10/13 | 2017/10/17 | Andrew An |

**Maxxam ID:** SE9709
**Sample ID:** LTM4 (FGZ974)
**Matrix:** Water

**Collected:** 2017/10/03
**Shipped:**
**Received:** 2017/10/13

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 8791538 | N/A | 2017/10/15 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | ICP/CRCM | 8791682 | 2017/10/15 | 2017/10/15 | Automated Statchk |
| Elements by CRC ICPMS (total) | ICP/CRCM | 8792065 | 2017/10/13 | 2017/10/15 | Adnan Dzebic |

**Maxxam ID:** SE9710
**Sample ID:** LTM5 (FGZ975)
**Matrix:** Water

**Collected:** 2017/10/03
**Shipped:**
**Received:** 2017/10/13

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 8791538 | N/A | 2017/10/15 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | ICP/CRCM | 8791682 | 2017/10/15 | 2017/10/15 | Automated Statchk |
| Elements by CRC ICPMS (total) | ICP/CRCM | 8792065 | 2017/10/13 | 2017/10/15 | Adnan Dzebic |

**Maxxam ID:** SE9711
**Sample ID:** LTM6 (FGZ976)
**Matrix:** Water

**Collected:** 2017/10/03
**Shipped:**
**Received:** 2017/10/13

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 8791538 | N/A | 2017/10/17 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | ICP/CRCM | 8791682 | 2017/10/17 | 2017/10/17 | Automated Statchk |
| Elements by CRC ICPMS (total) | ICP/CRCM | 8791833 | 2017/10/13 | 2017/10/17 | Andrew An |



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Maxxam Job #: B789895
Report Date: 2017/10/17

MAXXAM ANALYTICS
Client Project #: MB7M2114
Site Location: 102153-000
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** SE9712
**Sample ID:** LTM7 (FGZ977)
**Matrix:** Water

**Collected:** 2017/10/03
**Shipped:**
**Received:** 2017/10/13

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 8791538 | N/A | 2017/10/17 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | ICP/CRCM | 8791682 | 2017/10/17 | 2017/10/17 | Automated Statchk |
| Elements by CRC ICPMS (total) | ICP/CRCM | 8791833 | 2017/10/13 | 2017/10/17 | Andrew An |

**Maxxam ID:** SE9713
**Sample ID:** DUP2 (FGZ978)
**Matrix:** Water

**Collected:** 2017/10/03
**Shipped:**
**Received:** 2017/10/13

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 8791538 | N/A | 2017/10/17 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | ICP/CRCM | 8791682 | 2017/10/17 | 2017/10/17 | Automated Statchk |
| Elements by CRC ICPMS (total) | ICP/CRCM | 8791833 | 2017/10/13 | 2017/10/17 | Andrew An |



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Maxxam Job #: B789895
Report Date: 2017/10/17

MAXXAM ANALYTICS
Client Project #: MB7M2114
Site Location: 102153-000
Sampler Initials: RF

## GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

| | |
|---|---|
| Package 1 | 12.0°C |

**Results relate only to the items tested.**



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Maxxam Job #: B789895
Report Date: 2017/10/17

## QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: MB7M2114
Site Location: 102153-000
Sampler Initials: RF

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 8791833 | Total Aluminum (Al) | 2017/10/17 | 110 | 80 - 120 | 106 | 80 - 120 | <3.0 | ug/L | 8.1 (1) | 20 |
| 8791833 | Total Antimony (Sb) | 2017/10/17 | 101 | 80 - 120 | 97 | 80 - 120 | <0.50 | ug/L | NC (1) | 20 |
| 8791833 | Total Arsenic (As) | 2017/10/17 | 102 | 80 - 120 | 100 | 80 - 120 | <0.10 | ug/L | 0.31 (1) | 20 |
| 8791833 | Total Barium (Ba) | 2017/10/17 | 100 | 80 - 120 | 98 | 80 - 120 | <1.0 | ug/L | 2.0 (1) | 20 |
| 8791833 | Total Beryllium (Be) | 2017/10/17 | 98 | 80 - 120 | 95 | 80 - 120 | <0.10 | ug/L | NC (1) | 20 |
| 8791833 | Total Bismuth (Bi) | 2017/10/17 | 96 | 80 - 120 | 98 | 80 - 120 | <1.0 | ug/L | NC (1) | 20 |
| 8791833 | Total Boron (B) | 2017/10/17 | 96 | 80 - 120 | 92 | 80 - 120 | <50 | ug/L | NC (1) | 20 |
| 8791833 | Total Cadmium (Cd) | 2017/10/17 | 101 | 80 - 120 | 98 | 80 - 120 | <0.010 | ug/L | NC (1) | 20 |
| 8791833 | Total Chromium (Cr) | 2017/10/17 | 99 | 80 - 120 | 97 | 80 - 120 | <1.0 | ug/L | NC (1) | 20 |
| 8791833 | Total Cobalt (Co) | 2017/10/17 | 93 | 80 - 120 | 93 | 80 - 120 | <0.20 | ug/L | NC (1) | 20 |
| 8791833 | Total Copper (Cu) | 2017/10/17 | 98 | 80 - 120 | 97 | 80 - 120 | <0.50 | ug/L | 1.1 (1) | 20 |
| 8791833 | Total Iron (Fe) | 2017/10/17 | NC | 80 - 120 | 102 | 80 - 120 | <10 | ug/L | 1.3 (1) | 20 |
| 8791833 | Total Lead (Pb) | 2017/10/17 | 94 | 80 - 120 | 95 | 80 - 120 | <0.20 | ug/L | NC (1) | 20 |
| 8791833 | Total Lithium (Li) | 2017/10/17 | 94 | 80 - 120 | 94 | 80 - 120 | <2.0 | ug/L | NC (1) | 20 |
| 8791833 | Total Manganese (Mn) | 2017/10/17 | NC | 80 - 120 | 93 | 80 - 120 | <1.0 | ug/L | 0.49 (1) | 20 |
| 8791833 | Total Molybdenum (Mo) | 2017/10/17 | 104 | 80 - 120 | 98 | 80 - 120 | <1.0 | ug/L | NC (1) | 20 |
| 8791833 | Total Nickel (Ni) | 2017/10/17 | 98 | 80 - 120 | 98 | 80 - 120 | <1.0 | ug/L | NC (1) | 20 |
| 8791833 | Total Selenium (Se) | 2017/10/17 | 104 | 80 - 120 | 102 | 80 - 120 | <0.10 | ug/L | NC (1) | 20 |
| 8791833 | Total Silicon (Si) | 2017/10/17 | | | | | <100 | ug/L | 0.71 (1) | 20 |
| 8791833 | Total Silver (Ag) | 2017/10/17 | 104 | 80 - 120 | 105 | 80 - 120 | <0.020 | ug/L | NC (1) | 20 |
| 8791833 | Total Strontium (Sr) | 2017/10/17 | NC | 80 - 120 | 93 | 80 - 120 | <1.0 | ug/L | 1.3 (1) | 20 |
| 8791833 | Total Thallium (Tl) | 2017/10/17 | 97 | 80 - 120 | 96 | 80 - 120 | <0.010 | ug/L | NC (1) | 20 |
| 8791833 | Total Tin (Sn) | 2017/10/17 | 102 | 80 - 120 | 97 | 80 - 120 | <5.0 | ug/L | NC (1) | 20 |
| 8791833 | Total Titanium (Ti) | 2017/10/17 | 95 | 80 - 120 | 99 | 80 - 120 | <5.0 | ug/L | NC (1) | 20 |
| 8791833 | Total Uranium (U) | 2017/10/17 | 95 | 80 - 120 | 92 | 80 - 120 | <0.10 | ug/L | NC (1) | 20 |
| 8791833 | Total Vanadium (V) | 2017/10/17 | 100 | 80 - 120 | 96 | 80 - 120 | <5.0 | ug/L | NC (1) | 20 |
| 8791833 | Total Zinc (Zn) | 2017/10/17 | 103 | 80 - 120 | 98 | 80 - 120 | <5.0 | ug/L | 0.19 (1) | 20 |
| 8791833 | Total Zirconium (Zr) | 2017/10/17 | 93 | 80 - 120 | 98 | 80 - 120 | <0.10 | ug/L | NC (1) | 20 |
| 8792065 | Total Aluminum (Al) | 2017/10/14 | 108 | 80 - 120 | 108 | 80 - 120 | <3.0 | ug/L | | |
| 8792065 | Total Antimony (Sb) | 2017/10/14 | 102 | 80 - 120 | 102 | 80 - 120 | <0.50 | ug/L | | |
| 8792065 | Total Arsenic (As) | 2017/10/14 | 104 | 80 - 120 | 101 | 80 - 120 | <0.10 | ug/L | | |

Maxxam Job #: B789895
Report Date: 2017/10/17

## QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: MB7M2114
Site Location: 102153-000
Sampler Initials: RF

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 8792065 | Total Barium (Ba) | 2017/10/14 | 104 | 80 - 120 | 104 | 80 - 120 | <1.0 | ug/L | | |
| 8792065 | Total Beryllium (Be) | 2017/10/14 | 106 | 80 - 120 | 104 | 80 - 120 | <0.10 | ug/L | | |
| 8792065 | Total Bismuth (Bi) | 2017/10/14 | 96 | 80 - 120 | 102 | 80 - 120 | <1.0 | ug/L | | |
| 8792065 | Total Boron (B) | 2017/10/14 | NC | 80 - 120 | 99 | 80 - 120 | <50 | ug/L | 0.070 (1) | 20 |
| 8792065 | Total Cadmium (Cd) | 2017/10/14 | 101 | 80 - 120 | 101 | 80 - 120 | <0.010 | ug/L | | |
| 8792065 | Total Chromium (Cr) | 2017/10/14 | 96 | 80 - 120 | 95 | 80 - 120 | <1.0 | ug/L | | |
| 8792065 | Total Cobalt (Co) | 2017/10/14 | 93 | 80 - 120 | 94 | 80 - 120 | <0.20 | ug/L | | |
| 8792065 | Total Copper (Cu) | 2017/10/14 | 91 | 80 - 120 | 95 | 80 - 120 | <0.50 | ug/L | | |
| 8792065 | Total Iron (Fe) | 2017/10/14 | 98 | 80 - 120 | 109 | 80 - 120 | <10 | ug/L | | |
| 8792065 | Total Lead (Pb) | 2017/10/14 | 99 | 80 - 120 | 104 | 80 - 120 | <0.20 | ug/L | | |
| 8792065 | Total Lithium (Li) | 2017/10/14 | NC | 80 - 120 | 109 | 80 - 120 | <2.0 | ug/L | | |
| 8792065 | Total Manganese (Mn) | 2017/10/14 | 98 | 80 - 120 | 96 | 80 - 120 | <1.0 | ug/L | | |
| 8792065 | Total Molybdenum (Mo) | 2017/10/14 | NC | 80 - 120 | 101 | 80 - 120 | <1.0 | ug/L | | |
| 8792065 | Total Nickel (Ni) | 2017/10/14 | 95 | 80 - 120 | 96 | 80 - 120 | <1.0 | ug/L | | |
| 8792065 | Total Selenium (Se) | 2017/10/14 | 101 | 80 - 120 | 99 | 80 - 120 | <0.10 | ug/L | | |
| 8792065 | Total Silicon (Si) | 2017/10/14 | | | | | <100 | ug/L | | |
| 8792065 | Total Silver (Ag) | 2017/10/14 | 105 | 80 - 120 | 108 | 80 - 120 | <0.020 | ug/L | | |
| 8792065 | Total Strontium (Sr) | 2017/10/14 | NC | 80 - 120 | 98 | 80 - 120 | <1.0 | ug/L | | |
| 8792065 | Total Thallium (Tl) | 2017/10/14 | 97 | 80 - 120 | 102 | 80 - 120 | <0.010 | ug/L | | |
| 8792065 | Total Tin (Sn) | 2017/10/14 | 101 | 80 - 120 | 101 | 80 - 120 | <5.0 | ug/L | | |
| 8792065 | Total Titanium (Ti) | 2017/10/14 | 102 | 80 - 120 | 100 | 80 - 120 | <5.0 | ug/L | | |
| 8792065 | Total Uranium (U) | 2017/10/14 | 107 | 80 - 120 | 106 | 80 - 120 | <0.10 | ug/L | | |
| 8792065 | Total Vanadium (V) | 2017/10/14 | 98 | 80 - 120 | 96 | 80 - 120 | <5.0 | ug/L | | |
| 8792065 | Total Zinc (Zn) | 2017/10/14 | 101 | 80 - 120 | 97 | 80 - 120 | <5.0 | ug/L | | |



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Maxxam Job #: B789895
Report Date: 2017/10/17

## QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: MB7M2114
Site Location: 102153-000
Sampler Initials: RF

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 8792065 | Total Zirconium (Zr) | 2017/10/14 | 104 | 80 - 120 | 96 | 80 - 120 | <0.10 | ug/L | | |

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Duplicate Parent ID



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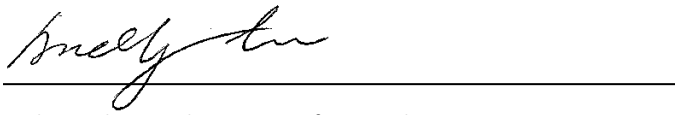
Maxxam Job #: B789895
Report Date: 2017/10/17

MAXXAM ANALYTICS
Client Project #: MB7M2114
Site Location: 102153-000
Sampler Initials: RF

## VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Andy Lu, Ph.D., P.Chem., Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



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Maxxam
A Bureau Veritas Group Company

Your Project #: 102153-000
Site Location: TC IQALUIT
Your C.O.C. #: 629077-04-01

**Attention:Ryan Fletcher**

ARCADIS Canada Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

**Report Date: 2017/10/17**
Report #: R4787032
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B7M2127**
**Received: 2017/10/06, 23:05**

Sample Matrix: Soil
# Samples Received: 3

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Reference |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | 1 | N/A | 2017/10/13 | CAM SOP-00301 | EPA 8270D m |
| Petroleum Hydrocarbons F2-F4 in Soil (1) | 3 | 2017/10/10 | 2017/10/11 | CAM SOP-00316 | CCME CWS m |
| Glycols in Soil by GC-FID | 1 | N/A | 2017/10/14 | CAM SOP-00322 | EPA 8015 m |
| Moisture | 1 | N/A | 2017/10/11 | CAM SOP-00445 | Carter 2nd ed 51.2 m |
| Moisture | 2 | N/A | 2017/10/12 | CAM SOP-00445 | Carter 2nd ed 51.2 m |
| PAH Compounds in Soil by GC/MS (SIM) | 1 | 2017/10/10 | 2017/10/11 | CAM SOP-00318 | EPA 8270D m |
| Polychlorinated Biphenyl in Soil | 1 | 2017/10/13 | 2017/10/13 | CAM SOP-00309 | EPA 8082A m |
| Volatile Organic Compounds and F1 PHCs | 3 | N/A | 2017/10/11 | CAM SOP-00230 | EPA 8260 m |

**Remarks:**

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Maxxam
A Bureau Veritas Group Company

Your Project #: 102153-000
Site Location: TC IQALUIT
Your C.O.C. #: 629077-04-01

**Attention:Ryan Fletcher**

ARCADIS Canada Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

**Report Date: 2017/10/17**
Report #: R4787032
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B7M2127**

**Received: 2017/10/06, 23:05**

(1) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Alison Cameron, Project Manager
Email: ACameron@maxxam.ca
Phone# (905) 817-5700

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



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Maxxam Job #: B7M2127
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## CCME PETROLEUM HYDROCARBONS SOIL (SOIL)

| Maxxam ID | | FHA097 | FHA098 | | FHA099 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/04 13:00 | 2017/10/04 13:15 | | 2017/10/04 13:30 | | |
| COC Number | | 629077-04-01 | 629077-04-01 | | 629077-04-01 | | |
| | **UNITS** | **TWA5-20171004** | **TWA6-20171004** | **QC Batch** | **TWA7-20171004** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | |
| Moisture | % | 14 | 12 | 5208409 | 7.1 | 1.0 | 5206258 |
| **Volatile Organics** | | | | | | | |
| Benzene | ug/g | <0.0060 | <0.0060 | 5205509 | 0.011 | 0.0060 | 5205509 |
| Ethylbenzene | ug/g | <0.010 | <0.010 | 5205509 | 0.024 | 0.010 | 5205509 |
| Toluene | ug/g | <0.020 | <0.020 | 5205509 | 0.023 | 0.020 | 5205509 |
| p+m-Xylene | ug/g | <0.020 | <0.020 | 5205509 | 0.073 | 0.020 | 5205509 |
| o-Xylene | ug/g | <0.020 | <0.020 | 5205509 | 0.024 | 0.020 | 5205509 |
| Total Xylenes | ug/g | <0.020 | <0.020 | 5205509 | 0.097 | 0.020 | 5205509 |
| F1 (C6-C10) | ug/g | <10 | <10 | 5205509 | <10 | 10 | 5205509 |
| F1 (C6-C10) - BTEX | ug/g | <10 | <10 | 5205509 | <10 | 10 | 5205509 |
| **F2-F4 Hydrocarbons** | | | | | | | |
| F2 (C10-C16 Hydrocarbons) | ug/g | 17 | <10 | 5205275 | 12 | 10 | 5204524 |
| F3 (C16-C34 Hydrocarbons) | ug/g | 560 | <50 | 5205275 | 120 | 50 | 5204524 |
| F4 (C34-C50 Hydrocarbons) | ug/g | 160 | <50 | 5205275 | 62 | 50 | 5204524 |
| Reached Baseline at C50 | ug/g | No | Yes | 5205275 | No | | 5204524 |
| **Surrogate Recovery (%)** | | | | | | | |
| o-Terphenyl | % | 101 | 93 | 5205275 | 93 | | 5204524 |
| 4-Bromofluorobenzene | % | 95 | 97 | 5205509 | 99 | | 5205509 |
| D10-o-Xylene | % | 98 | 104 | 5205509 | 102 | | 5205509 |
| D4-1,2-Dichloroethane | % | 102 | 102 | 5205509 | 101 | | 5205509 |
| D8-Toluene | % | 98 | 97 | 5205509 | 98 | | 5205509 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7M2127
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## O.REG 153 PAHS (SOIL)

| Maxxam ID | | FHA099 | | |
|---|---|---|---|---|
| Sampling Date | | 2017/10/04 13:30 | | |
| COC Number | | 629077-04-01 | | |
| | **UNITS** | **TWA7-20171004** | **RDL** | **QC Batch** |
| **Calculated Parameters** | | | | |
| Methylnaphthalene, 2-(1-) | ug/g | 0.0092 | 0.0071 | 5202559 |
| **Polyaromatic Hydrocarbons** | | | | |
| Acenaphthene | ug/g | <0.0050 | 0.0050 | 5204510 |
| Acenaphthylene | ug/g | <0.0050 | 0.0050 | 5204510 |
| Anthracene | ug/g | <0.0050 | 0.0050 | 5204510 |
| Benzo(a)anthracene | ug/g | 0.0050 | 0.0050 | 5204510 |
| Benzo(a)pyrene | ug/g | 0.0070 | 0.0050 | 5204510 |
| Benzo(b/j)fluoranthene | ug/g | 0.0070 | 0.0050 | 5204510 |
| Benzo(g,h,i)perylene | ug/g | 0.0090 | 0.0050 | 5204510 |
| Benzo(k)fluoranthene | ug/g | <0.0050 | 0.0050 | 5204510 |
| Chrysene | ug/g | <0.0050 | 0.0050 | 5204510 |
| Dibenz(a,h)anthracene | ug/g | <0.0050 | 0.0050 | 5204510 |
| Fluoranthene | ug/g | 0.0075 | 0.0050 | 5204510 |
| Fluorene | ug/g | <0.0050 | 0.0050 | 5204510 |
| Indeno(1,2,3-cd)pyrene | ug/g | <0.0050 | 0.0050 | 5204510 |
| 1-Methylnaphthalene | ug/g | <0.0050 | 0.0050 | 5204510 |
| 2-Methylnaphthalene | ug/g | 0.0092 | 0.0050 | 5204510 |
| Naphthalene | ug/g | 0.0053 | 0.0050 | 5204510 |
| Phenanthrene | ug/g | 0.0050 | 0.0050 | 5204510 |
| Pyrene | ug/g | 0.013 | 0.0050 | 5204510 |
| **Surrogate Recovery (%)** | | | | |
| D10-Anthracene | % | 102 | | 5204510 |
| D14-Terphenyl (FS) | % | 87 | | 5204510 |
| D8-Acenaphthylene | % | 106 | | 5204510 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7M2127
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## O.REG 153 PCBS (SOIL)

| Maxxam ID | | FHA099 | | |
|---|---|---|---|---|
| Sampling Date | | 2017/10/04 13:30 | | |
| COC Number | | 629077-04-01 | | |
| | **UNITS** | **TWA7-20171004** | **RDL** | **QC Batch** |
| **PCBs** | | | | |
| Aroclor 1242 | ug/g | <0.010 | 0.010 | 5211410 |
| Aroclor 1248 | ug/g | <0.010 | 0.010 | 5211410 |
| Aroclor 1254 | ug/g | <0.010 | 0.010 | 5211410 |
| Aroclor 1260 | ug/g | 0.022 | 0.010 | 5211410 |
| Total PCB | ug/g | 0.022 | 0.010 | 5211410 |
| **Surrogate Recovery (%)** | | | | |
| Decachlorobiphenyl | % | 100 | | 5211410 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7M2127
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## GLYCOLS BY GC-FID (SOIL)

| Maxxam ID | | FHA099 | FHA099 | | |
|---|---|---|---|---|---|
| Sampling Date | | 2017/10/04 13:30 | 2017/10/04 13:30 | | |
| COC Number | | 629077-04-01 | 629077-04-01 | | |
| | **UNITS** | **TWA7-20171004** | **TWA7-20171004 Lab-Dup** | **RDL** | **QC Batch** |
| **Glycols** | | | | | |
| Propylene Glycol | mg/kg | <10 | <10 | 10 | 5212315 |
| Ethylene Glycol | mg/kg | <10 | <10 | 10 | 5212315 |
| Diethylene Glycol | mg/kg | <10 | <10 | 10 | 5212315 |
| Total Glycol | mg/kg | <10 | <10 | 10 | 5212315 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B7M2127
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** FHA097
**Sample ID:** TWA5-20171004
**Matrix:** Soil

**Collected:** 2017/10/04
**Shipped:**
**Received:** 2017/10/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5205275 | 2017/10/10 | 2017/10/11 | Barbara Wowk |
| Moisture | BAL | 5208409 | N/A | 2017/10/12 | Min Yang |
| Volatile Organic Compounds and F1 PHCs | GC/MS | 5205509 | N/A | 2017/10/11 | Yang (Philip) Yu |

**Maxxam ID:** FHA098
**Sample ID:** TWA6-20171004
**Matrix:** Soil

**Collected:** 2017/10/04
**Shipped:**
**Received:** 2017/10/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5205275 | 2017/10/10 | 2017/10/11 | Barbara Wowk |
| Moisture | BAL | 5208409 | N/A | 2017/10/12 | Min Yang |
| Volatile Organic Compounds and F1 PHCs | GC/MS | 5205509 | N/A | 2017/10/11 | Yang (Philip) Yu |

**Maxxam ID:** FHA099
**Sample ID:** TWA7-20171004
**Matrix:** Soil

**Collected:** 2017/10/04
**Shipped:**
**Received:** 2017/10/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | CALC | 5202559 | N/A | 2017/10/13 | Automated Statchk |
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5204524 | 2017/10/10 | 2017/10/11 | Margaret Kulczyk-Stanko |
| Glycols in Soil by GC-FID | GC/FID | 5212315 | N/A | 2017/10/14 | Wenhui (Susie) Shi |
| Moisture | BAL | 5206258 | N/A | 2017/10/11 | Prgya Panchal |
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5204510 | 2017/10/10 | 2017/10/11 | Mitesh Raj |
| Polychlorinated Biphenyl in Soil | GC/ECD | 5211410 | 2017/10/13 | 2017/10/13 | Sarah Huang |
| Volatile Organic Compounds and F1 PHCs | GC/MS | 5205509 | N/A | 2017/10/11 | Yang (Philip) Yu |

**Maxxam ID:** FHA099 Dup
**Sample ID:** TWA7-20171004
**Matrix:** Soil

**Collected:** 2017/10/04
**Shipped:**
**Received:** 2017/10/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Glycols in Soil by GC-FID | GC/FID | 5212315 | N/A | 2017/10/14 | Wenhui (Susie) Shi |



Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B7M2127
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

| | |
|---|---|
| Package 1 | 1.0°C |
| Package 2 | 2.3°C |
| Package 3 | 2.7°C |

**Results relate only to the items tested.**



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Maxxam Job #: B7M2127
Report Date: 2017/10/17

## QUALITY ASSURANCE REPORT

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5204510 | D10-Anthracene | 2017/10/11 | 93 | 50 - 130 | 103 | 50 - 130 | 90 | % | | |
| 5204510 | D14-Terphenyl (FS) | 2017/10/11 | 89 | 50 - 130 | 90 | 50 - 130 | 81 | % | | |
| 5204510 | D8-Acenaphthylene | 2017/10/11 | 94 | 50 - 130 | 92 | 50 - 130 | 87 | % | | |
| 5204524 | o-Terphenyl | 2017/10/11 | 95 | 60 - 130 | 97 | 60 - 130 | 98 | % | | |
| 5205275 | o-Terphenyl | 2017/10/11 | 99 | 60 - 130 | 97 | 60 - 130 | 98 | % | | |
| 5205509 | 4-Bromofluorobenzene | 2017/10/11 | 103 | 60 - 140 | 105 | 60 - 140 | 100 | % | | |
| 5205509 | D10-o-Xylene | 2017/10/11 | 105 | 60 - 130 | 105 | 60 - 130 | 91 | % | | |
| 5205509 | D4-1,2-Dichloroethane | 2017/10/11 | 101 | 60 - 140 | 101 | 60 - 140 | 103 | % | | |
| 5205509 | D8-Toluene | 2017/10/11 | 100 | 60 - 140 | 100 | 60 - 140 | 97 | % | | |
| 5211410 | Decachlorobiphenyl | 2017/10/13 | 114 | 60 - 130 | 101 | 60 - 130 | 108 | % | | |
| 5204510 | 1-Methylnaphthalene | 2017/10/11 | 91 | 50 - 130 | 101 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | 2-Methylnaphthalene | 2017/10/11 | 84 | 50 - 130 | 94 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Acenaphthene | 2017/10/11 | 89 | 50 - 130 | 90 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Acenaphthylene | 2017/10/11 | 91 | 50 - 130 | 87 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Anthracene | 2017/10/11 | 77 | 50 - 130 | 87 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Benzo(a)anthracene | 2017/10/11 | 86 | 50 - 130 | 89 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Benzo(a)pyrene | 2017/10/11 | 84 | 50 - 130 | 88 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Benzo(b/j)fluoranthene | 2017/10/11 | 86 | 50 - 130 | 93 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Benzo(g,h,i)perylene | 2017/10/11 | 80 | 50 - 130 | 98 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Benzo(k)fluoranthene | 2017/10/11 | 86 | 50 - 130 | 92 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Chrysene | 2017/10/11 | 87 | 50 - 130 | 92 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Dibenz(a,h)anthracene | 2017/10/11 | 76 | 50 - 130 | 90 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Fluoranthene | 2017/10/11 | 81 | 50 - 130 | 88 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Fluorene | 2017/10/11 | 94 | 50 - 130 | 97 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Indeno(1,2,3-cd)pyrene | 2017/10/11 | 76 | 50 - 130 | 91 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Naphthalene | 2017/10/11 | 76 | 50 - 130 | 87 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Phenanthrene | 2017/10/11 | 85 | 50 - 130 | 92 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Pyrene | 2017/10/11 | 85 | 50 - 130 | 88 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204524 | F2 (C10-C16 Hydrocarbons) | 2017/10/11 | 91 | 50 - 130 | 96 | 80 - 120 | <10 | ug/g | NC | 30 |
| 5204524 | F3 (C16-C34 Hydrocarbons) | 2017/10/11 | 95 | 50 - 130 | 93 | 80 - 120 | <50 | ug/g | NC | 30 |
| 5204524 | F4 (C34-C50 Hydrocarbons) | 2017/10/11 | 96 | 50 - 130 | 90 | 80 - 120 | <50 | ug/g | NC | 30 |



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A Bureau Veritas Group Company

Maxxam Job #: B7M2127
Report Date: 2017/10/17

## QUALITY ASSURANCE REPORT(CONT'D)

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5205275 | F2 (C10-C16 Hydrocarbons) | 2017/10/11 | 96 | 50 - 130 | 93 | 80 - 120 | <10 | ug/g | NC | 30 |
| 5205275 | F3 (C16-C34 Hydrocarbons) | 2017/10/11 | 99 | 50 - 130 | 95 | 80 - 120 | <50 | ug/g | NC | 30 |
| 5205275 | F4 (C34-C50 Hydrocarbons) | 2017/10/11 | 99 | 50 - 130 | 95 | 80 - 120 | <50 | ug/g | NC | 30 |
| 5205509 | Benzene | 2017/10/11 | 100 | 60 - 140 | 101 | 60 - 130 | <0.0060 | ug/g | NC | 50 |
| 5205509 | Ethylbenzene | 2017/10/11 | 99 | 60 - 140 | 100 | 60 - 130 | <0.010 | ug/g | NC | 50 |
| 5205509 | F1 (C6-C10) - BTEX | 2017/10/11 | | | | | <10 | ug/g | NC | 30 |
| 5205509 | F1 (C6-C10) | 2017/10/11 | 108 | 60 - 140 | 99 | 80 - 120 | <10 | ug/g | NC | 30 |
| 5205509 | o-Xylene | 2017/10/11 | 100 | 60 - 140 | 101 | 60 - 130 | <0.020 | ug/g | NC | 50 |
| 5205509 | p+m-Xylene | 2017/10/11 | 105 | 60 - 140 | 105 | 60 - 130 | <0.020 | ug/g | NC | 50 |
| 5205509 | Toluene | 2017/10/11 | 95 | 60 - 140 | 96 | 60 - 130 | <0.020 | ug/g | NC | 50 |
| 5205509 | Total Xylenes | 2017/10/11 | | | | | <0.020 | ug/g | NC | 50 |
| 5206258 | Moisture | 2017/10/11 | | | | | | | 1.1 | 20 |
| 5208409 | Moisture | 2017/10/12 | | | | | | | 2.0 | 20 |
| 5211410 | Aroclor 1242 | 2017/10/13 | | | | | <0.010 | ug/g | NC | 50 |
| 5211410 | Aroclor 1248 | 2017/10/13 | | | | | <0.010 | ug/g | NC | 50 |
| 5211410 | Aroclor 1254 | 2017/10/13 | | | | | <0.010 | ug/g | 29 | 50 |
| 5211410 | Aroclor 1260 | 2017/10/13 | 118 | 60 - 130 | 105 | 60 - 130 | <0.010 | ug/g | NC | 50 |
| 5211410 | Total PCB | 2017/10/13 | 118 | 60 - 130 | 105 | 60 - 130 | <0.010 | ug/g | 29 | 50 |
| 5212315 | Diethylene Glycol | 2017/10/14 | 83 | 60 - 140 | 74 | 60 - 140 | <10 | mg/kg | NC | 50 |
| 5212315 | Ethylene Glycol | 2017/10/14 | 95 | 60 - 140 | 83 | 60 - 140 | <10 | mg/kg | NC | 50 |
| 5212315 | Propylene Glycol | 2017/10/14 | 98 | 60 - 140 | 87 | 60 - 140 | <10 | mg/kg | NC | 50 |
| 5212315 | Total Glycol | 2017/10/14 | | | | | <10 | mg/kg | NC | 50 |

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



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Maxxam Job #: B7M2127
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Cristina Carriere

Cristina Carriere, Scientific Service Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



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CHAIN

06-Oct-17 23:05
Alison Cameron
B7M2127
KES ENV-1157
C#629077-04-01

Page 1 of 1

| INVOICE TO: | | REPORT TO: | | PROJECT INFORMATION: | |
|---|---|---|---|---|---|
| Company Name: | #10988 ARCADIS Canada Inc | Company Name: | Arcadis | Quotation #: | B54416 |
| Attention: | Invoices Attention | Attention: | Rob Austins / Ryan Fletcher / Ryan Janzen | P.O. #: | |
| Address: | 329 Churchill Ave N Suite 200<br>Ottawa ON K1Z 5B8 | Address: | | Project: | ~~102654 Iqaluit Airport~~ 102153-000 |
| Tel: | (613) 721-0555 x Fax: (613) 721-0029 x | Tel: | Fax: | Project Name: | IC Iqaluit |
| Email: | invoicesottawa@arcadis.com, barb.adelman@arcadis-c | Email: | rob.austins@arcadis.com | Site #: | |
| | | | | Sampled By: | RF |

**MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY**

**Regulation 153 (2011)**
- [ ] Table 1 [ ] Res/Park [ ] Medium/Fine
- [ ] Table 2 [X] Ind/Comm [ ] Coarse
- [ ] Table 3 [ ] Agri/Other [ ] For RSC
- [ ] Table ___

**Other Regulations**
- [X] CCME [ ] Sanitary Sewer Bylaw
- [ ] Reg 558 [ ] Storm Sewer Bylaw
- [ ] MISA Municipality ___
- [ ] PWQO
- [ ] Other ___

**Special Instructions**
TBD

*Include Criteria on Certificate of Analysis (Y/N)?* ___

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

| | Sample Barcode Label | Sample (Location) Identification | Date Sampled | Time Sampled | Matrix | Field Filtered (please circle): Metals / Hg / Cr VI | CCME Petroleum Hydrocarbons Soil F1-F4 / BTEX | O.Reg 153 PAHs (Soil) | O.Reg 153 PCBs (Soil) | Salinity Package 4 | PCB | PAH | Glycol | | | # of Bottles | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | TWA5-20171004 | 17/10/04 | 1300 | Soil | NA | X | | | | | | | | | 3 | |
| 2 | | TWA6-20171004 | " | 1315 | Soil | ↓ | X | | | | | | | | | 3 | |
| 3 | | TWA7-20171004 | " | 1330 | Soil | ↓ | X | | | | X | X | X | | | 6 | |
| 4 | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | ON SK |

**Turnaround Time (TAT) Required:**
Please provide advance notice for rush projects

**Regular (Standard) TAT:** [X]
*(will be applied if Rush TAT is not specified):*
*Standard TAT = 5-7 Working days for most tests..*
*Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.*

**Job Specific Rush TAT (If applies to entire submission)**
Date Required: ___ Time Required: ___ [ ]
Rush Confirmation Number: ___
** (call lab for #)*

| * RELINQUISHED BY: (Signature/Print) | Date: (YY/MM/DD) | Time | RECEIVED BY: (Signature/Print) | Date: (YY/MM/DD) | Time | # jars used and not submitted |
|---|---|---|---|---|---|---|
| Ryan Fletcher | Oct 05/17 | 900 | Kevin Jamieson | 17/10/06 | 15:45 | |

**Laboratory Use Only**

| Time Sensitive | Temperature (°C) on Recei | Custody Seal | Yes | No |
|---|---|---|---|---|
| | 3.3 \| 3.7 | Present | X | |
| | | Intact | X | |

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT HTTP://MAXXAM.CA/WP-CONTENT/UPLOADS/ONTARIO-COC.PDF.

SAMPLES MUST BE KEPT COOL ( < 10° C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

White: Maxxa Yellow: Client

GC Green 2017/10/06 23:05

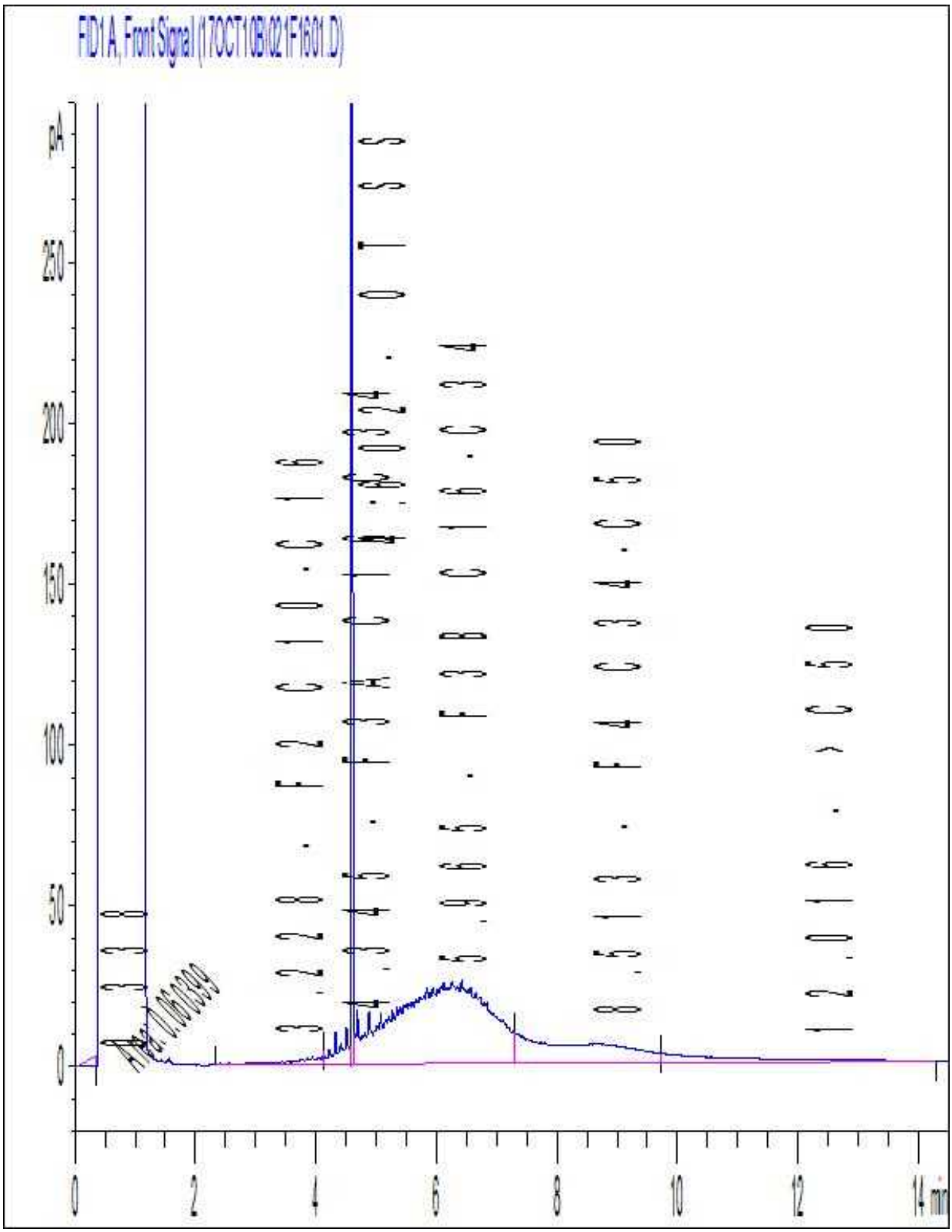
Maxxam Analytics International Corporation o/a Maxxam Analytics

2,3,3 / 2,3,3
1|1|1 2|1|1 0|1|3

Maxxam Job #: B7M2127
Report Date: 2017/10/17
Maxxam Sample: FHA097

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: TWA5-20171004

**Petroleum Hydrocarbons F2-F4 in Soil Chromatogram**

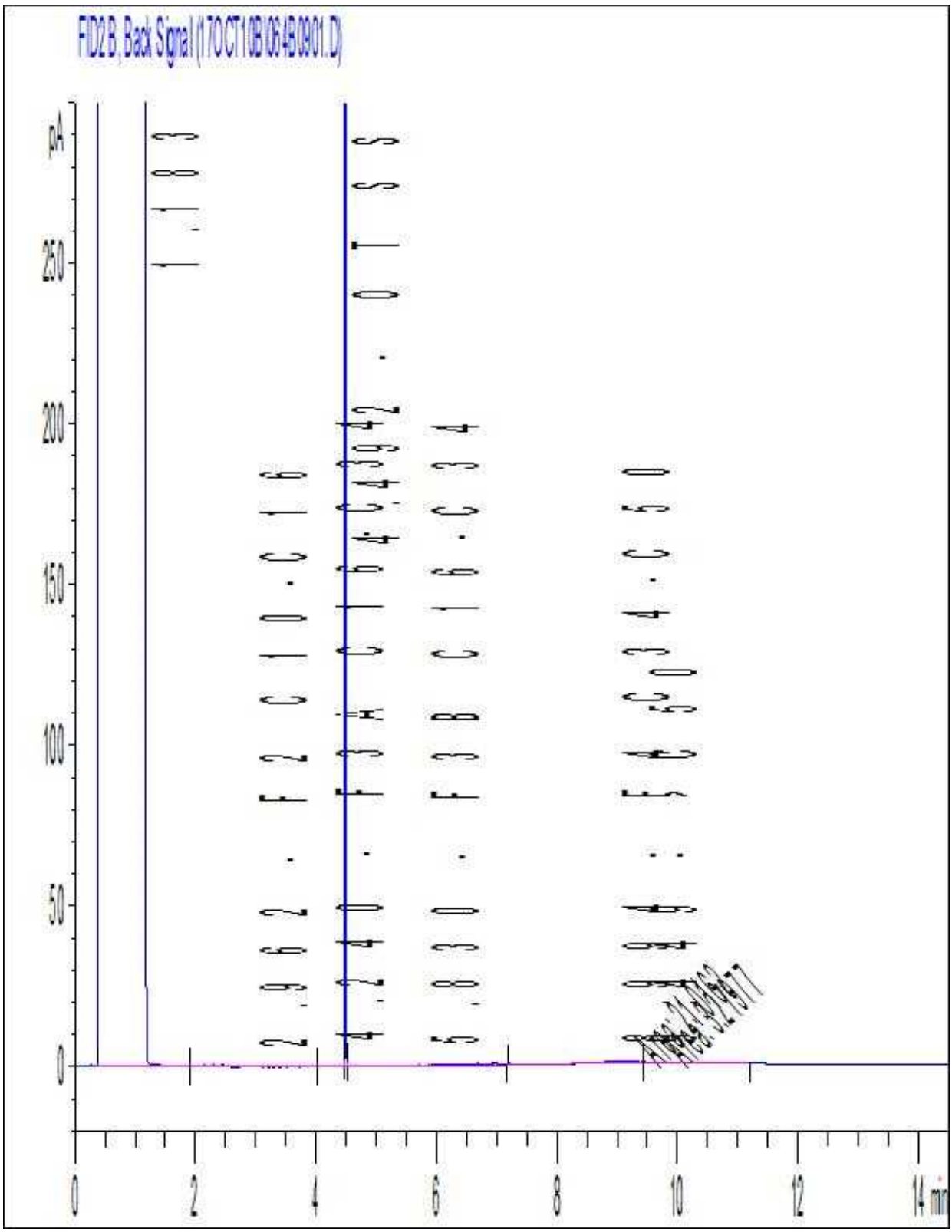



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7M2127
Report Date: 2017/10/17
Maxxam Sample: FHA098

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: TWA6-20171004

**Petroleum Hydrocarbons F2-F4 in Soil Chromatogram**

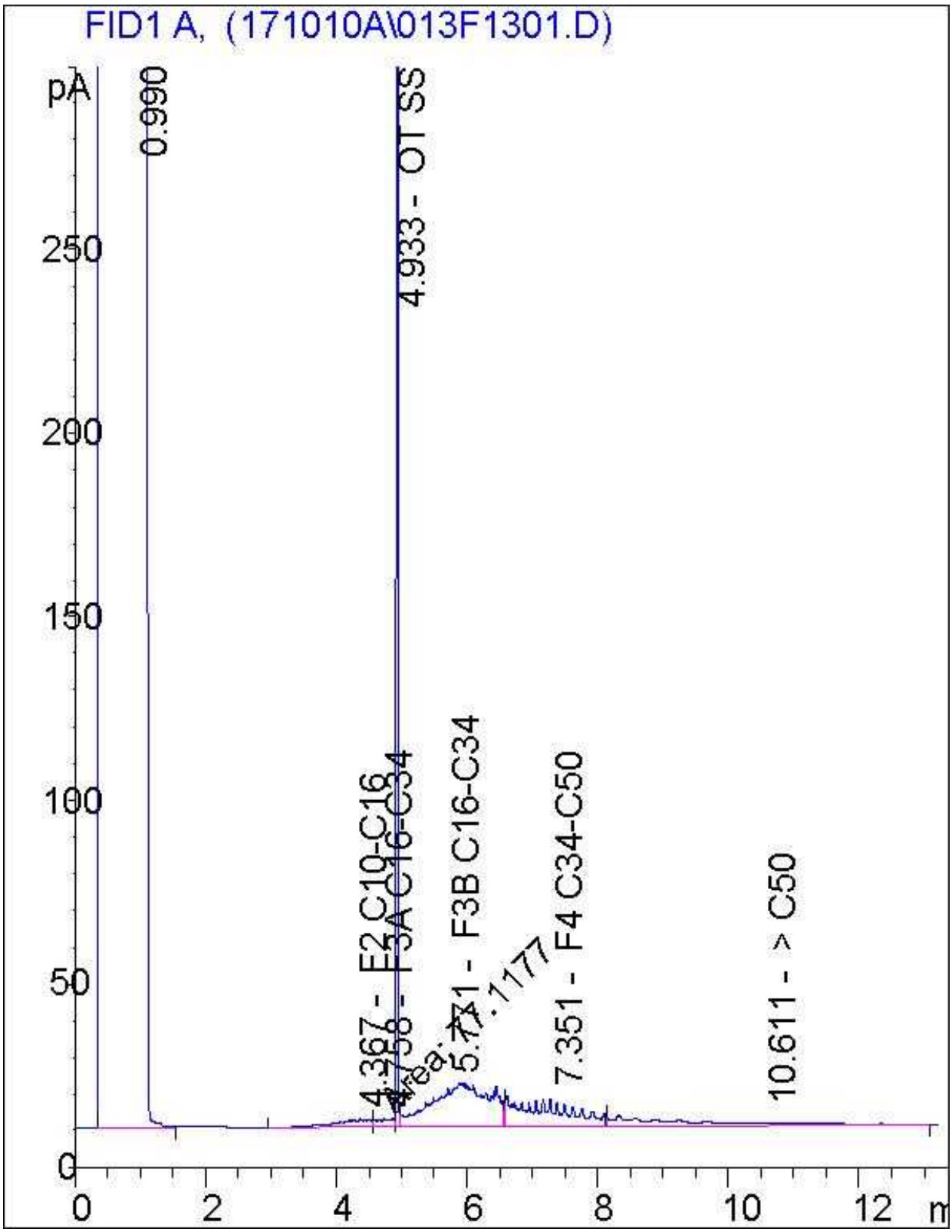



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7M2127
Report Date: 2017/10/17
Maxxam Sample: FHA099

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: TWA7-20171004

**Petroleum Hydrocarbons F2-F4 in Soil Chromatogram**




**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam
A Bureau Veritas Group Company

Your Project #: 102153-000
Site Location: TC IQALUIT
Your C.O.C. #: 629077-04-01

**Attention:Ryan Fletcher**

ARCADIS Canada Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

**Report Date: 2017/10/17**
Report #: R4787032
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B7M2127**
**Received: 2017/10/06, 23:05**

Sample Matrix: Soil
# Samples Received: 3

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Reference |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | 1 | N/A | 2017/10/13 | CAM SOP-00301 | EPA 8270D m |
| Petroleum Hydrocarbons F2-F4 in Soil (1) | 3 | 2017/10/10 | 2017/10/11 | CAM SOP-00316 | CCME CWS m |
| Glycols in Soil by GC-FID | 1 | N/A | 2017/10/14 | CAM SOP-00322 | EPA 8015 m |
| Moisture | 1 | N/A | 2017/10/11 | CAM SOP-00445 | Carter 2nd ed 51.2 m |
| Moisture | 2 | N/A | 2017/10/12 | CAM SOP-00445 | Carter 2nd ed 51.2 m |
| PAH Compounds in Soil by GC/MS (SIM) | 1 | 2017/10/10 | 2017/10/11 | CAM SOP-00318 | EPA 8270D m |
| Polychlorinated Biphenyl in Soil | 1 | 2017/10/13 | 2017/10/13 | CAM SOP-00309 | EPA 8082A m |
| Volatile Organic Compounds and F1 PHCs | 3 | N/A | 2017/10/11 | CAM SOP-00230 | EPA 8260 m |

**Remarks:**

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Maxxam
A Bureau Veritas Group Company

Your Project #: 102153-000
Site Location: TC IQALUIT
Your C.O.C. #: 629077-04-01

**Attention:Ryan Fletcher**

ARCADIS Canada Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

**Report Date: 2017/10/17**
Report #: R4787032
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B7M2127**

**Received: 2017/10/06, 23:05**

(1) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Alison Cameron, Project Manager
Email: ACameron@maxxam.ca
Phone# (905) 817-5700

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



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Maxxam Job #: B7M2127
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## CCME PETROLEUM HYDROCARBONS SOIL (SOIL)

| Maxxam ID | | FHA097 | FHA098 | | FHA099 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/04 13:00 | 2017/10/04 13:15 | | 2017/10/04 13:30 | | |
| COC Number | | 629077-04-01 | 629077-04-01 | | 629077-04-01 | | |
| | **UNITS** | **TWA5-20171004** | **TWA6-20171004** | **QC Batch** | **TWA7-20171004** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | |
| Moisture | % | 14 | 12 | 5208409 | 7.1 | 1.0 | 5206258 |
| **Volatile Organics** | | | | | | | |
| Benzene | ug/g | <0.0060 | <0.0060 | 5205509 | 0.011 | 0.0060 | 5205509 |
| Ethylbenzene | ug/g | <0.010 | <0.010 | 5205509 | 0.024 | 0.010 | 5205509 |
| Toluene | ug/g | <0.020 | <0.020 | 5205509 | 0.023 | 0.020 | 5205509 |
| p+m-Xylene | ug/g | <0.020 | <0.020 | 5205509 | 0.073 | 0.020 | 5205509 |
| o-Xylene | ug/g | <0.020 | <0.020 | 5205509 | 0.024 | 0.020 | 5205509 |
| Total Xylenes | ug/g | <0.020 | <0.020 | 5205509 | 0.097 | 0.020 | 5205509 |
| F1 (C6-C10) | ug/g | <10 | <10 | 5205509 | <10 | 10 | 5205509 |
| F1 (C6-C10) - BTEX | ug/g | <10 | <10 | 5205509 | <10 | 10 | 5205509 |
| **F2-F4 Hydrocarbons** | | | | | | | |
| F2 (C10-C16 Hydrocarbons) | ug/g | 17 | <10 | 5205275 | 12 | 10 | 5204524 |
| F3 (C16-C34 Hydrocarbons) | ug/g | 560 | <50 | 5205275 | 120 | 50 | 5204524 |
| F4 (C34-C50 Hydrocarbons) | ug/g | 160 | <50 | 5205275 | 62 | 50 | 5204524 |
| Reached Baseline at C50 | ug/g | No | Yes | 5205275 | No | | 5204524 |
| **Surrogate Recovery (%)** | | | | | | | |
| o-Terphenyl | % | 101 | 93 | 5205275 | 93 | | 5204524 |
| 4-Bromofluorobenzene | % | 95 | 97 | 5205509 | 99 | | 5205509 |
| D10-o-Xylene | % | 98 | 104 | 5205509 | 102 | | 5205509 |
| D4-1,2-Dichloroethane | % | 102 | 102 | 5205509 | 101 | | 5205509 |
| D8-Toluene | % | 98 | 97 | 5205509 | 98 | | 5205509 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7M2127
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## O.REG 153 PAHS (SOIL)

| Maxxam ID | | FHA099 | | |
|---|---|---|---|---|
| Sampling Date | | 2017/10/04 13:30 | | |
| COC Number | | 629077-04-01 | | |
| | **UNITS** | **TWA7-20171004** | **RDL** | **QC Batch** |
| **Calculated Parameters** | | | | |
| Methylnaphthalene, 2-(1-) | ug/g | 0.0092 | 0.0071 | 5202559 |
| **Polyaromatic Hydrocarbons** | | | | |
| Acenaphthene | ug/g | <0.0050 | 0.0050 | 5204510 |
| Acenaphthylene | ug/g | <0.0050 | 0.0050 | 5204510 |
| Anthracene | ug/g | <0.0050 | 0.0050 | 5204510 |
| Benzo(a)anthracene | ug/g | 0.0050 | 0.0050 | 5204510 |
| Benzo(a)pyrene | ug/g | 0.0070 | 0.0050 | 5204510 |
| Benzo(b/j)fluoranthene | ug/g | 0.0070 | 0.0050 | 5204510 |
| Benzo(g,h,i)perylene | ug/g | 0.0090 | 0.0050 | 5204510 |
| Benzo(k)fluoranthene | ug/g | <0.0050 | 0.0050 | 5204510 |
| Chrysene | ug/g | <0.0050 | 0.0050 | 5204510 |
| Dibenz(a,h)anthracene | ug/g | <0.0050 | 0.0050 | 5204510 |
| Fluoranthene | ug/g | 0.0075 | 0.0050 | 5204510 |
| Fluorene | ug/g | <0.0050 | 0.0050 | 5204510 |
| Indeno(1,2,3-cd)pyrene | ug/g | <0.0050 | 0.0050 | 5204510 |
| 1-Methylnaphthalene | ug/g | <0.0050 | 0.0050 | 5204510 |
| 2-Methylnaphthalene | ug/g | 0.0092 | 0.0050 | 5204510 |
| Naphthalene | ug/g | 0.0053 | 0.0050 | 5204510 |
| Phenanthrene | ug/g | 0.0050 | 0.0050 | 5204510 |
| Pyrene | ug/g | 0.013 | 0.0050 | 5204510 |
| **Surrogate Recovery (%)** | | | | |
| D10-Anthracene | % | 102 | | 5204510 |
| D14-Terphenyl (FS) | % | 87 | | 5204510 |
| D8-Acenaphthylene | % | 106 | | 5204510 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7M2127
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## O.REG 153 PCBS (SOIL)

| Maxxam ID | | FHA099 | | |
|---|---|---|---|---|
| Sampling Date | | 2017/10/04 13:30 | | |
| COC Number | | 629077-04-01 | | |
| | **UNITS** | **TWA7-20171004** | **RDL** | **QC Batch** |
| **PCBs** | | | | |
| Aroclor 1242 | ug/g | <0.010 | 0.010 | 5211410 |
| Aroclor 1248 | ug/g | <0.010 | 0.010 | 5211410 |
| Aroclor 1254 | ug/g | <0.010 | 0.010 | 5211410 |
| Aroclor 1260 | ug/g | 0.022 | 0.010 | 5211410 |
| Total PCB | ug/g | 0.022 | 0.010 | 5211410 |
| **Surrogate Recovery (%)** | | | | |
| Decachlorobiphenyl | % | 100 | | 5211410 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## GLYCOLS BY GC-FID (SOIL)

| Maxxam ID | | FHA099 | FHA099 | | |
|---|---|---|---|---|---|
| Sampling Date | | 2017/10/04 13:30 | 2017/10/04 13:30 | | |
| COC Number | | 629077-04-01 | 629077-04-01 | | |
| | **UNITS** | **TWA7-20171004** | **TWA7-20171004 Lab-Dup** | **RDL** | **QC Batch** |
| **Glycols** | | | | | |
| Propylene Glycol | mg/kg | <10 | <10 | 10 | 5212315 |
| Ethylene Glycol | mg/kg | <10 | <10 | 10 | 5212315 |
| Diethylene Glycol | mg/kg | <10 | <10 | 10 | 5212315 |
| Total Glycol | mg/kg | <10 | <10 | 10 | 5212315 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B7M2127
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** FHA097
**Sample ID:** TWA5-20171004
**Matrix:** Soil

**Collected:** 2017/10/04
**Shipped:**
**Received:** 2017/10/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5205275 | 2017/10/10 | 2017/10/11 | Barbara Wowk |
| Moisture | BAL | 5208409 | N/A | 2017/10/12 | Min Yang |
| Volatile Organic Compounds and F1 PHCs | GC/MS | 5205509 | N/A | 2017/10/11 | Yang (Philip) Yu |

**Maxxam ID:** FHA098
**Sample ID:** TWA6-20171004
**Matrix:** Soil

**Collected:** 2017/10/04
**Shipped:**
**Received:** 2017/10/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5205275 | 2017/10/10 | 2017/10/11 | Barbara Wowk |
| Moisture | BAL | 5208409 | N/A | 2017/10/12 | Min Yang |
| Volatile Organic Compounds and F1 PHCs | GC/MS | 5205509 | N/A | 2017/10/11 | Yang (Philip) Yu |

**Maxxam ID:** FHA099
**Sample ID:** TWA7-20171004
**Matrix:** Soil

**Collected:** 2017/10/04
**Shipped:**
**Received:** 2017/10/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | CALC | 5202559 | N/A | 2017/10/13 | Automated Statchk |
| Petroleum Hydrocarbons F2-F4 in Soil | GC/FID | 5204524 | 2017/10/10 | 2017/10/11 | Margaret Kulczyk-Stanko |
| Glycols in Soil by GC-FID | GC/FID | 5212315 | N/A | 2017/10/14 | Wenhui (Susie) Shi |
| Moisture | BAL | 5206258 | N/A | 2017/10/11 | Prgya Panchal |
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5204510 | 2017/10/10 | 2017/10/11 | Mitesh Raj |
| Polychlorinated Biphenyl in Soil | GC/ECD | 5211410 | 2017/10/13 | 2017/10/13 | Sarah Huang |
| Volatile Organic Compounds and F1 PHCs | GC/MS | 5205509 | N/A | 2017/10/11 | Yang (Philip) Yu |

**Maxxam ID:** FHA099 Dup
**Sample ID:** TWA7-20171004
**Matrix:** Soil

**Collected:** 2017/10/04
**Shipped:**
**Received:** 2017/10/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Glycols in Soil by GC-FID | GC/FID | 5212315 | N/A | 2017/10/14 | Wenhui (Susie) Shi |



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Maxxam Job #: B7M2127
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

| | |
|---|---|
| Package 1 | 1.0°C |
| Package 2 | 2.3°C |
| Package 3 | 2.7°C |

**Results relate only to the items tested.**



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Maxxam Job #: B7M2127
Report Date: 2017/10/17

## QUALITY ASSURANCE REPORT

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5204510 | D10-Anthracene | 2017/10/11 | 93 | 50 - 130 | 103 | 50 - 130 | 90 | % | | |
| 5204510 | D14-Terphenyl (FS) | 2017/10/11 | 89 | 50 - 130 | 90 | 50 - 130 | 81 | % | | |
| 5204510 | D8-Acenaphthylene | 2017/10/11 | 94 | 50 - 130 | 92 | 50 - 130 | 87 | % | | |
| 5204524 | o-Terphenyl | 2017/10/11 | 95 | 60 - 130 | 97 | 60 - 130 | 98 | % | | |
| 5205275 | o-Terphenyl | 2017/10/11 | 99 | 60 - 130 | 97 | 60 - 130 | 98 | % | | |
| 5205509 | 4-Bromofluorobenzene | 2017/10/11 | 103 | 60 - 140 | 105 | 60 - 140 | 100 | % | | |
| 5205509 | D10-o-Xylene | 2017/10/11 | 105 | 60 - 130 | 105 | 60 - 130 | 91 | % | | |
| 5205509 | D4-1,2-Dichloroethane | 2017/10/11 | 101 | 60 - 140 | 101 | 60 - 140 | 103 | % | | |
| 5205509 | D8-Toluene | 2017/10/11 | 100 | 60 - 140 | 100 | 60 - 140 | 97 | % | | |
| 5211410 | Decachlorobiphenyl | 2017/10/13 | 114 | 60 - 130 | 101 | 60 - 130 | 108 | % | | |
| 5204510 | 1-Methylnaphthalene | 2017/10/11 | 91 | 50 - 130 | 101 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | 2-Methylnaphthalene | 2017/10/11 | 84 | 50 - 130 | 94 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Acenaphthene | 2017/10/11 | 89 | 50 - 130 | 90 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Acenaphthylene | 2017/10/11 | 91 | 50 - 130 | 87 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Anthracene | 2017/10/11 | 77 | 50 - 130 | 87 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Benzo(a)anthracene | 2017/10/11 | 86 | 50 - 130 | 89 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Benzo(a)pyrene | 2017/10/11 | 84 | 50 - 130 | 88 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Benzo(b/j)fluoranthene | 2017/10/11 | 86 | 50 - 130 | 93 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Benzo(g,h,i)perylene | 2017/10/11 | 80 | 50 - 130 | 98 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Benzo(k)fluoranthene | 2017/10/11 | 86 | 50 - 130 | 92 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Chrysene | 2017/10/11 | 87 | 50 - 130 | 92 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Dibenz(a,h)anthracene | 2017/10/11 | 76 | 50 - 130 | 90 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Fluoranthene | 2017/10/11 | 81 | 50 - 130 | 88 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Fluorene | 2017/10/11 | 94 | 50 - 130 | 97 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Indeno(1,2,3-cd)pyrene | 2017/10/11 | 76 | 50 - 130 | 91 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Naphthalene | 2017/10/11 | 76 | 50 - 130 | 87 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Phenanthrene | 2017/10/11 | 85 | 50 - 130 | 92 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204510 | Pyrene | 2017/10/11 | 85 | 50 - 130 | 88 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5204524 | F2 (C10-C16 Hydrocarbons) | 2017/10/11 | 91 | 50 - 130 | 96 | 80 - 120 | <10 | ug/g | NC | 30 |
| 5204524 | F3 (C16-C34 Hydrocarbons) | 2017/10/11 | 95 | 50 - 130 | 93 | 80 - 120 | <50 | ug/g | NC | 30 |
| 5204524 | F4 (C34-C50 Hydrocarbons) | 2017/10/11 | 96 | 50 - 130 | 90 | 80 - 120 | <50 | ug/g | NC | 30 |



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Maxxam Job #: B7M2127
Report Date: 2017/10/17

## QUALITY ASSURANCE REPORT(CONT'D)

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5205275 | F2 (C10-C16 Hydrocarbons) | 2017/10/11 | 96 | 50 - 130 | 93 | 80 - 120 | <10 | ug/g | NC | 30 |
| 5205275 | F3 (C16-C34 Hydrocarbons) | 2017/10/11 | 99 | 50 - 130 | 95 | 80 - 120 | <50 | ug/g | NC | 30 |
| 5205275 | F4 (C34-C50 Hydrocarbons) | 2017/10/11 | 99 | 50 - 130 | 95 | 80 - 120 | <50 | ug/g | NC | 30 |
| 5205509 | Benzene | 2017/10/11 | 100 | 60 - 140 | 101 | 60 - 130 | <0.0060 | ug/g | NC | 50 |
| 5205509 | Ethylbenzene | 2017/10/11 | 99 | 60 - 140 | 100 | 60 - 130 | <0.010 | ug/g | NC | 50 |
| 5205509 | F1 (C6-C10) - BTEX | 2017/10/11 | | | | | <10 | ug/g | NC | 30 |
| 5205509 | F1 (C6-C10) | 2017/10/11 | 108 | 60 - 140 | 99 | 80 - 120 | <10 | ug/g | NC | 30 |
| 5205509 | o-Xylene | 2017/10/11 | 100 | 60 - 140 | 101 | 60 - 130 | <0.020 | ug/g | NC | 50 |
| 5205509 | p+m-Xylene | 2017/10/11 | 105 | 60 - 140 | 105 | 60 - 130 | <0.020 | ug/g | NC | 50 |
| 5205509 | Toluene | 2017/10/11 | 95 | 60 - 140 | 96 | 60 - 130 | <0.020 | ug/g | NC | 50 |
| 5205509 | Total Xylenes | 2017/10/11 | | | | | <0.020 | ug/g | NC | 50 |
| 5206258 | Moisture | 2017/10/11 | | | | | | | 1.1 | 20 |
| 5208409 | Moisture | 2017/10/12 | | | | | | | 2.0 | 20 |
| 5211410 | Aroclor 1242 | 2017/10/13 | | | | | <0.010 | ug/g | NC | 50 |
| 5211410 | Aroclor 1248 | 2017/10/13 | | | | | <0.010 | ug/g | NC | 50 |
| 5211410 | Aroclor 1254 | 2017/10/13 | | | | | <0.010 | ug/g | 29 | 50 |
| 5211410 | Aroclor 1260 | 2017/10/13 | 118 | 60 - 130 | 105 | 60 - 130 | <0.010 | ug/g | NC | 50 |
| 5211410 | Total PCB | 2017/10/13 | 118 | 60 - 130 | 105 | 60 - 130 | <0.010 | ug/g | 29 | 50 |
| 5212315 | Diethylene Glycol | 2017/10/14 | 83 | 60 - 140 | 74 | 60 - 140 | <10 | mg/kg | NC | 50 |
| 5212315 | Ethylene Glycol | 2017/10/14 | 95 | 60 - 140 | 83 | 60 - 140 | <10 | mg/kg | NC | 50 |
| 5212315 | Propylene Glycol | 2017/10/14 | 98 | 60 - 140 | 87 | 60 - 140 | <10 | mg/kg | NC | 50 |
| 5212315 | Total Glycol | 2017/10/14 | | | | | <10 | mg/kg | NC | 50 |

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



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Maxxam Job #: B7M2127
Report Date: 2017/10/17

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC IQALUIT
Sampler Initials: RF

## VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Cristina Carriere

Cristina Carriere, Scientific Service Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



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CHAIN

06-Oct-17 23:05
Alison Cameron
B7M2127
KES ENV-1157
C#629077-04-01

Page 1 of 1

| INVOICE TO: | | REPORT TO: | | PROJECT INFORMATION: | |
|---|---|---|---|---|---|
| Company Name: | #10988 ARCADIS Canada Inc | Company Name: | Arcadis | Quotation #: | B54416 |
| Attention: | Invoices Attention | Attention: | Rob Austins / Ryan Fletcher / Ryan Janzen | P.O. #: | |
| Address: | 329 Churchill Ave N Suite 200<br>Ottawa ON K1Z 5B8 | Address: | | Project: | ~~102654 Iqaluit Airport~~ 102153-000 |
| Tel: | (613) 721-0555 x Fax: (613) 721-0029 x | Tel: | Fax: | Project Name: | IC Iqaluit |
| Email: | invoicesottawa@arcadis.com, barb.adelman@arcadis-c | Email: | rob.austins@arcadis.com | Site #: | |
| | | | | Sampled By: | RF |

**MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY**

**Regulation 153 (2011)**
- [ ] Table 1 [ ] Res/Park [ ] Medium/Fine
- [ ] Table 2 [X] Ind/Comm [ ] Coarse
- [ ] Table 3 [ ] Agri/Other [ ] For RSC
- [ ] Table ___

**Other Regulations**
- [X] CCME [ ] Sanitary Sewer Bylaw
- [ ] Reg 558 [ ] Storm Sewer Bylaw
- [ ] MISA Municipality ___
- [ ] PWQO
- [ ] Other ___

**Special Instructions**
TBD

*Include Criteria on Certificate of Analysis (Y/N)?* ___

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

| | Sample Barcode Label | Sample (Location) Identification | Date Sampled | Time Sampled | Matrix | Field Filtered (please circle): Metals / Hg / Cr VI | CCME Petroleum Hydrocarbons Soil F1-F4 / BTEX | O.Reg 153 PAHs (Soil) | O.Reg 153 PCBs (Soil) | Salinity Package 4 | PCB | PAH | Glycol | | | # of Bottles | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | TWA5-20171004 | 17/10/04 | 1300 | Soil | NA | X | | | | | | | | | 3 | |
| 2 | | TWA6-20171004 | " | 1315 | Soil | ↓ | X | | | | | | | | | 3 | |
| 3 | | TWA7-20171004 | " | 1330 | Soil | ↓ | X | | | | X | X | X | | | 6 | |
| 4 | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | ON SK |

**Turnaround Time (TAT) Required:**
Please provide advance notice for rush projects

**Regular (Standard) TAT:** [X]
*(will be applied if Rush TAT is not specified):*
*Standard TAT = 5-7 Working days for most tests..*
*Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.*

**Job Specific Rush TAT (If applies to entire submission)**
Date Required: ___ Time Required: ___ [ ]
Rush Confirmation Number: ___
** (call lab for #)*

| * RELINQUISHED BY: (Signature/Print) | Date: (YY/MM/DD) | Time | RECEIVED BY: (Signature/Print) | Date: (YY/MM/DD) | Time | # jars used and not submitted |
|---|---|---|---|---|---|---|
| Ryan Fletcher | Oct 05/17 | 900 | Kevin Jamieson | 17/10/06 | 15:45 | |

**Laboratory Use Only**

| Time Sensitive | Temperature (°C) on Recei | Custody Seal | Yes | No |
|---|---|---|---|---|
| | 3.3 \| 3.7 | Present | X | |
| | | Intact | X | |

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT HTTP://MAXXAM.CA/WP-CONTENT/UPLOADS/ONTARIO-COC.PDF.

SAMPLES MUST BE KEPT COOL ( < 10° C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

White: Maxxa Yellow: Client

GC Gurpa 2017/10/06 23:05

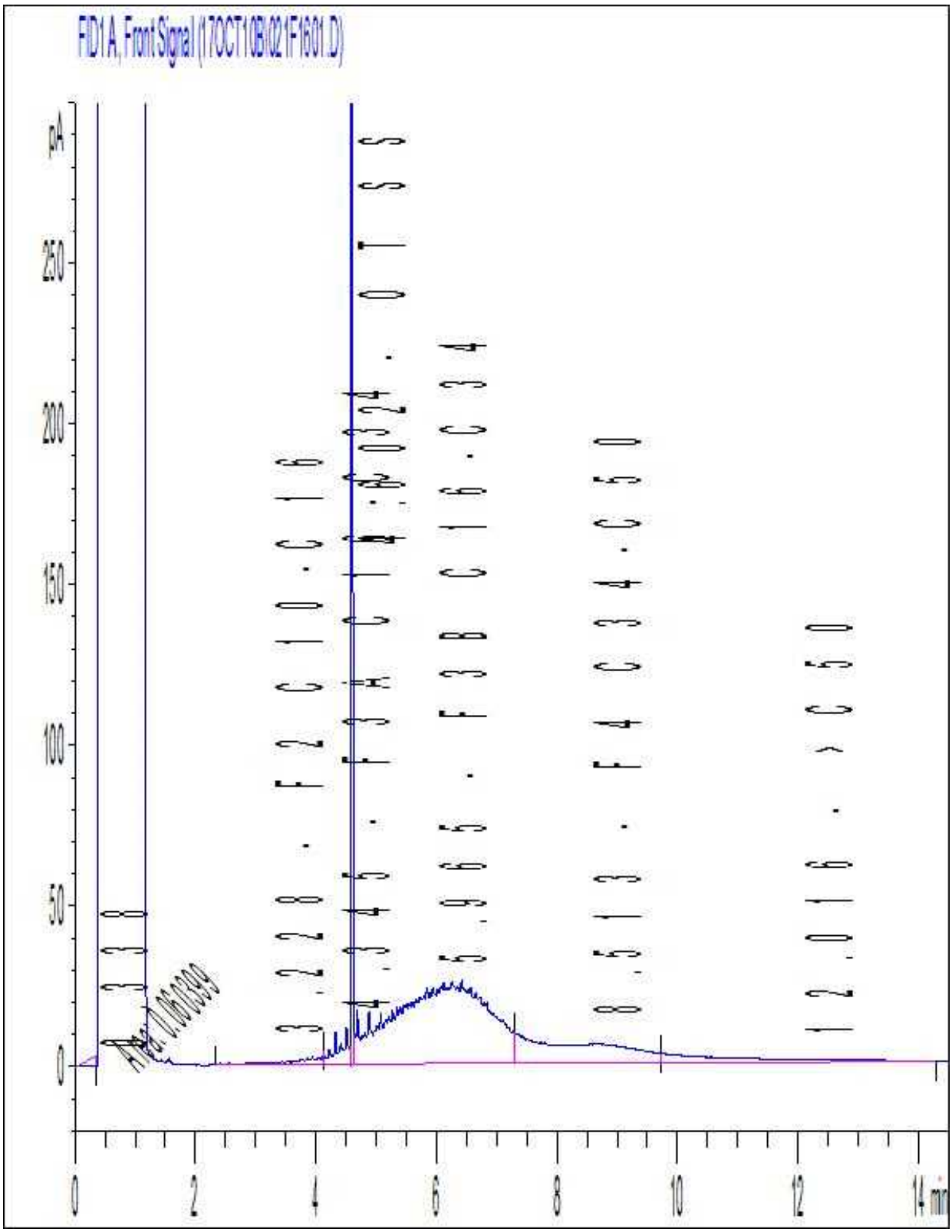
Maxxam Analytics International Corporation o/a Maxxam Analytics

2,3,3 / 2,3,3
1|1|1 2|1|1 0|1|3

Maxxam Job #: B7M2127
Report Date: 2017/10/17
Maxxam Sample: FHA097

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: TWA5-20171004

**Petroleum Hydrocarbons F2-F4 in Soil Chromatogram**

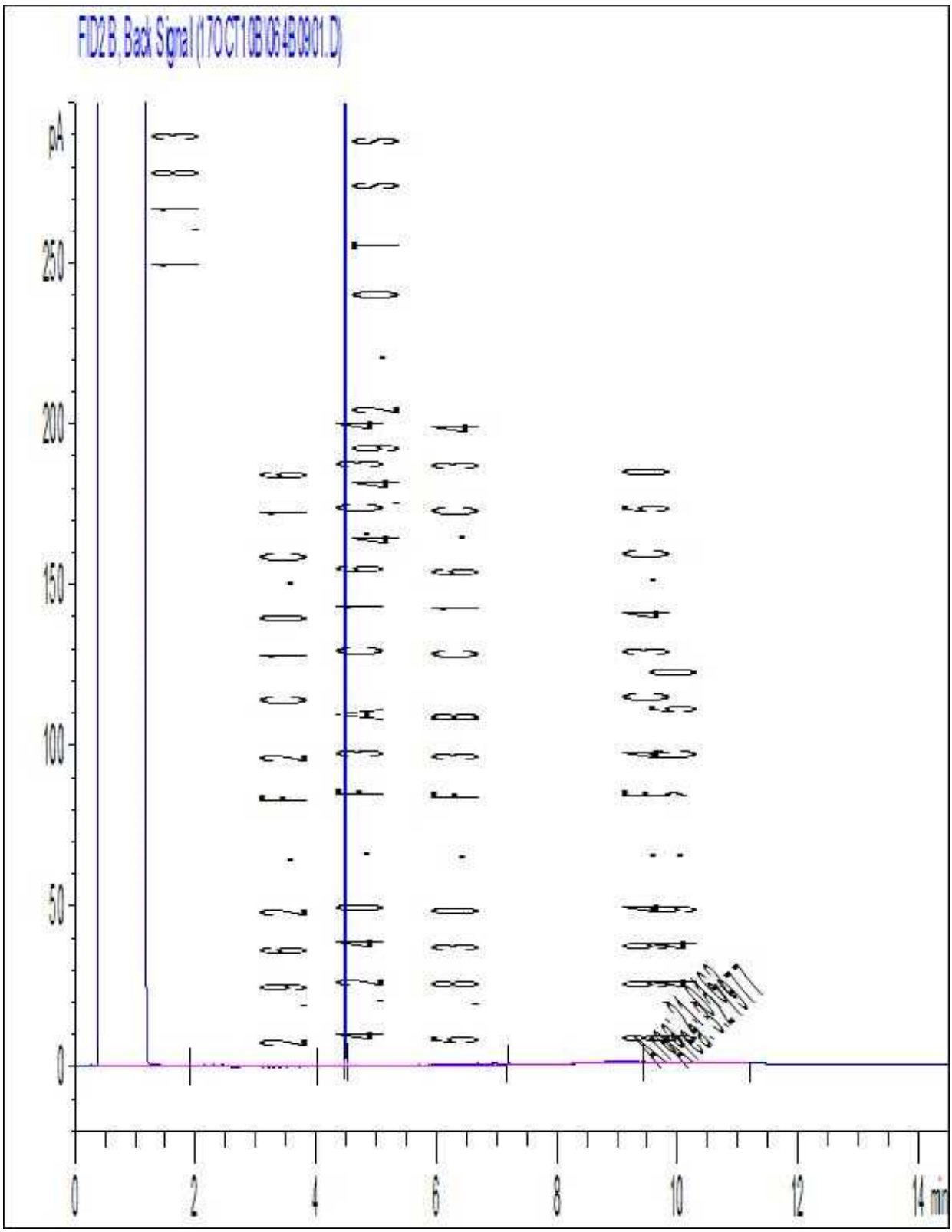



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7M2127
Report Date: 2017/10/17
Maxxam Sample: FHA098

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: TWA6-20171004

**Petroleum Hydrocarbons F2-F4 in Soil Chromatogram**

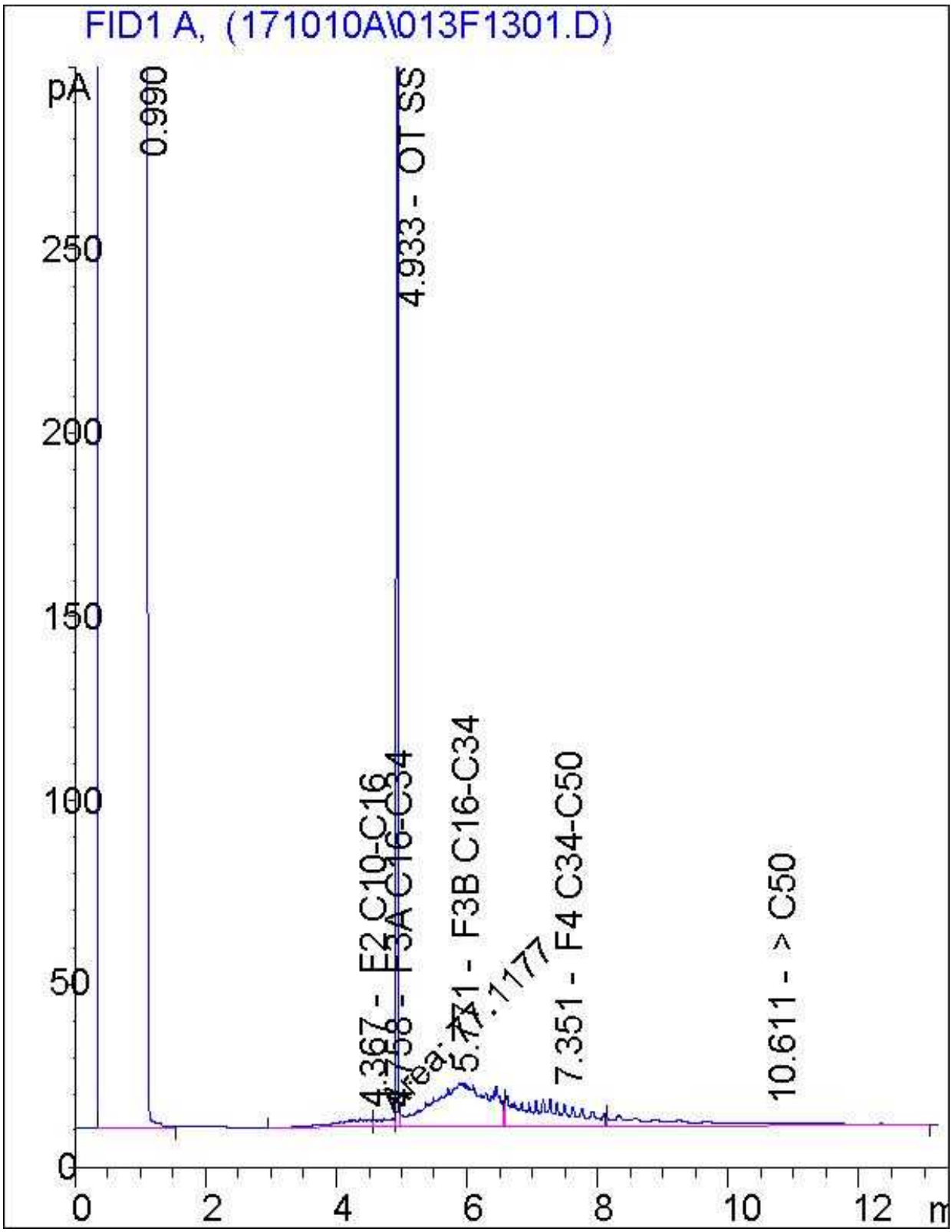



**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam Job #: B7M2127
Report Date: 2017/10/17
Maxxam Sample: FHA099

ARCADIS Canada Inc
Client Project #: 102153-000
Project name: TC IQALUIT
Client ID: TWA7-20171004

**Petroleum Hydrocarbons F2-F4 in Soil Chromatogram**




**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

Maxxam
A Bureau Veritas Group Company

Your Project #: 102153-000
Site Location: TC - IQALUIT
Your C.O.C. #: 629077-03-01

**Attention:Ryan Fletcher**

ARCADIS Canada Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

**Report Date: 2017/10/16**
Report #: R4786184
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B7M6160**
**Received: 2017/10/12, 22:20**

Sample Matrix: Soil
# Samples Received: 6

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Reference |
|---|---|---|---|---|---|
| Methylnaphthalene Sum (1) | 2 | N/A | 2017/10/16 | CAM SOP-00301 | EPA 8270D m |
| Strong Acid Leachable Metals by ICPMS (1) | 4 | 2017/10/14 | 2017/10/16 | CAM SOP-00447 | EPA 6020B m |
| Moisture (1) | 2 | N/A | 2017/10/13 | CAM SOP-00445 | Carter 2nd ed 51.2 m |
| PAH Compounds in Soil by GC/MS (SIM) (1) | 2 | 2017/10/13 | 2017/10/13 | CAM SOP-00318 | EPA 8270D m |

**Remarks:**

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Maxxam Analytics Mississauga

Your Project #: 102153-000
Site Location: TC - IQALUIT
Your C.O.C. #: 629077-03-01

**Attention:Ryan Fletcher**

ARCADIS Canada Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

**Report Date: 2017/10/16**
Report #: R4786184
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B7M6160**
**Received: 2017/10/12, 22:20**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Alison Cameron, Project Manager
Email: ACameron@maxxam.ca
Phone# (613) 274-0573

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B7M6160
Report Date: 2017/10/16

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC - IQALUIT
Sampler Initials: RF

## O.REG 153 ICPMS METALS (SOIL)

| Maxxam ID | | FHV440 | FHV441 | FHV441 | FHV442 | FHV443 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/10 09:30 | 2017/10/10 09:45 | 2017/10/10 09:45 | 2017/10/10 10:00 | 2017/10/10 10:15 | | |
| COC Number | | 629077-03-01 | 629077-03-01 | 629077-03-01 | 629077-03-01 | 629077-03-01 | | |
| | **UNITS** | **TWA10** | **TWA11** | **TWA11 Lab-Dup** | **TWA12** | **TWA13** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | |
| Acid Extractable Aluminum (Al) | ug/g | 4400 | 3800 | 3800 | 4000 | 4000 | 50 | 5212301 |
| Acid Extractable Antimony (Sb) | ug/g | <0.20 | <0.20 | <0.20 | 0.28 | 2.2 | 0.20 | 5212301 |
| Acid Extractable Arsenic (As) | ug/g | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5212301 |
| Acid Extractable Barium (Ba) | ug/g | 30 | 21 | 20 | 25 | 35 | 0.50 | 5212301 |
| Acid Extractable Beryllium (Be) | ug/g | 0.24 | 0.20 | <0.20 | 0.20 | 0.20 | 0.20 | 5212301 |
| Acid Extractable Bismuth (Bi) | ug/g | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5212301 |
| Acid Extractable Boron (B) | ug/g | 26 | 25 | 27 | 38 | 51 | 5.0 | 5212301 |
| Acid Extractable Cadmium (Cd) | ug/g | 0.51 | 0.16 | 0.15 | 0.29 | 1.8 | 0.10 | 5212301 |
| Acid Extractable Calcium (Ca) | ug/g | 8500 | 9100 | 9300 | 8400 | 7900 | 50 | 5212301 |
| Acid Extractable Chromium (Cr) | ug/g | 13 | 10 | 10 | 11 | 21 | 1.0 | 5212301 |
| Acid Extractable Cobalt (Co) | ug/g | 4.5 | 2.9 | 2.9 | 3.4 | 4.2 | 0.10 | 5212301 |
| Acid Extractable Copper (Cu) | ug/g | 11 | 7.6 | 7.8 | 10 | 19 | 0.50 | 5212301 |
| Acid Extractable Iron (Fe) | ug/g | 30000 | 25000 | 25000 | 27000 | 30000 | 50 | 5212301 |
| Acid Extractable Lead (Pb) | ug/g | 16 | 4.1 | 4.3 | 16 | 170 | 1.0 | 5212301 |
| Acid Extractable Lithium (Li) | ug/g | 6.7 | 6.2 | 6.1 | 6.9 | 6.6 | 1.0 | 5212301 |
| Acid Extractable Magnesium (Mg) | ug/g | 3500 | 3300 | 3100 | 3600 | 3300 | 50 | 5212301 |
| Acid Extractable Manganese (Mn) | ug/g | 510 | 320 | 300 | 330 | 330 | 1.0 | 5212301 |
| Acid Extractable Molybdenum (Mo) | ug/g | 2.0 | 1.7 | 1.6 | 1.7 | 2.2 | 0.50 | 5212301 |
| Acid Extractable Nickel (Ni) | ug/g | 5.8 | 4.3 | 4.2 | 4.8 | 6.6 | 0.50 | 5212301 |
| Acid Extractable Phosphorus (P) | ug/g | 1000 | 1000 | 1100 | 1100 | 1100 | 50 | 5212301 |
| Acid Extractable Potassium (K) | ug/g | 680 | 650 | 600 | 800 | 720 | 200 | 5212301 |
| Acid Extractable Selenium (Se) | ug/g | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5212301 |
| Acid Extractable Silver (Ag) | ug/g | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5212301 |
| Acid Extractable Sodium (Na) | ug/g | 300 | 290 | 280 | 300 | 300 | 50 | 5212301 |
| Acid Extractable Strontium (Sr) | ug/g | 12 | 11 | 10 | 11 | 11 | 1.0 | 5212301 |
| Acid Extractable Thallium (Tl) | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5212301 |
| Acid Extractable Tin (Sn) | ug/g | 1.0 | <1.0 | <1.0 | <1.0 | 3.0 | 1.0 | 5212301 |
| Acid Extractable Titanium (Ti) | ug/g | 430 | 400 | 390 | 420 | 370 | 5.0 | 5212301 |
| Acid Extractable Uranium (U) | ug/g | 0.64 | 0.56 | 0.78 (1) | 0.59 | 0.57 | 0.050 | 5212301 |
| Acid Extractable Vanadium (V) | ug/g | 23 | 18 | 17 | 19 | 22 | 5.0 | 5212301 |
| Acid Extractable Zinc (Zn) | ug/g | 84 | 68 | 65 | 79 | 190 | 5.0 | 5212301 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.



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Maxxam Job #: B7M6160
Report Date: 2017/10/16

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC - IQALUIT
Sampler Initials: RF

## O.REG 153 ICPMS METALS (SOIL)

| Maxxam ID | | FHV440 | FHV441 | FHV441 | FHV442 | FHV443 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/10 09:30 | 2017/10/10 09:45 | 2017/10/10 09:45 | 2017/10/10 10:00 | 2017/10/10 10:15 | | |
| COC Number | | 629077-03-01 | 629077-03-01 | 629077-03-01 | 629077-03-01 | 629077-03-01 | | |
| | **UNITS** | **TWA10** | **TWA11** | **TWA11 Lab-Dup** | **TWA12** | **TWA13** | **RDL** | **QC Batch** |
| Acid Extractable Mercury (Hg) | ug/g | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5212301 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B7M6160
Report Date: 2017/10/16

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC - IQALUIT
Sampler Initials: RF

## O.REG 153 PAHS (SOIL)

| Maxxam ID | | FHV438 | FHV439 | | |
|---|---|---|---|---|---|
| Sampling Date | | 2017/10/10 09:00 | 2017/10/10 09:15 | | |
| COC Number | | 629077-03-01 | 629077-03-01 | | |
| | **UNITS** | **TWA8** | **TWA9** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | |
| Moisture | % | 8.0 | 10 | 1.0 | 5210691 |
| **Calculated Parameters** | | | | | |
| Methylnaphthalene, 2-(1-) | ug/g | <0.0071 | <0.0071 | 0.0071 | 5210385 |
| **Polyaromatic Hydrocarbons** | | | | | |
| Acenaphthene | ug/g | <0.0050 | <0.0050 | 0.0050 | 5211103 |
| Acenaphthylene | ug/g | <0.0050 | <0.0050 | 0.0050 | 5211103 |
| Anthracene | ug/g | <0.0050 | <0.0050 | 0.0050 | 5211103 |
| Benzo(a)anthracene | ug/g | <0.0050 | 0.010 | 0.0050 | 5211103 |
| Benzo(a)pyrene | ug/g | <0.0050 | 0.0092 | 0.0050 | 5211103 |
| Benzo(b/j)fluoranthene | ug/g | <0.0050 | 0.018 | 0.0050 | 5211103 |
| Benzo(g,h,i)perylene | ug/g | <0.0050 | 0.045 | 0.0050 | 5211103 |
| Benzo(k)fluoranthene | ug/g | <0.0050 | <0.0050 | 0.0050 | 5211103 |
| Chrysene | ug/g | <0.0050 | 0.035 | 0.0050 | 5211103 |
| Dibenz(a,h)anthracene | ug/g | <0.0050 | <0.0050 | 0.0050 | 5211103 |
| Fluoranthene | ug/g | <0.0050 | 0.0056 | 0.0050 | 5211103 |
| Fluorene | ug/g | <0.0050 | <0.0050 | 0.0050 | 5211103 |
| Indeno(1,2,3-cd)pyrene | ug/g | <0.0050 | 0.011 | 0.0050 | 5211103 |
| 1-Methylnaphthalene | ug/g | <0.0050 | <0.0050 | 0.0050 | 5211103 |
| 2-Methylnaphthalene | ug/g | <0.0050 | <0.0050 | 0.0050 | 5211103 |
| Naphthalene | ug/g | <0.0050 | <0.0050 | 0.0050 | 5211103 |
| Phenanthrene | ug/g | <0.0050 | <0.0050 | 0.0050 | 5211103 |
| Pyrene | ug/g | <0.0050 | 0.031 | 0.0050 | 5211103 |
| **Surrogate Recovery (%)** | | | | | |
| D10-Anthracene | % | 101 | 98 | | 5211103 |
| D14-Terphenyl (FS) | % | 94 | 93 | | 5211103 |
| D8-Acenaphthylene | % | 105 | 104 | | 5211103 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7M6160
Report Date: 2017/10/16

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC - IQALUIT
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** FHV438
**Sample ID:** TWA8
**Matrix:** Soil

**Collected:** 2017/10/10
**Shipped:**
**Received:** 2017/10/12

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | CALC | 5210385 | N/A | 2017/10/16 | Automated Statchk |
| Moisture | BAL | 5210691 | N/A | 2017/10/13 | Nimarta Singh |
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5211103 | 2017/10/13 | 2017/10/13 | Mitesh Raj |

**Maxxam ID:** FHV439
**Sample ID:** TWA9
**Matrix:** Soil

**Collected:** 2017/10/10
**Shipped:**
**Received:** 2017/10/12

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Methylnaphthalene Sum | CALC | 5210385 | N/A | 2017/10/16 | Automated Statchk |
| Moisture | BAL | 5210691 | N/A | 2017/10/13 | Nimarta Singh |
| PAH Compounds in Soil by GC/MS (SIM) | GC/MS | 5211103 | 2017/10/13 | 2017/10/13 | Mitesh Raj |

**Maxxam ID:** FHV440
**Sample ID:** TWA10
**Matrix:** Soil

**Collected:** 2017/10/10
**Shipped:**
**Received:** 2017/10/12

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5212301 | 2017/10/14 | 2017/10/16 | Viviana Canzonieri |

**Maxxam ID:** FHV441
**Sample ID:** TWA11
**Matrix:** Soil

**Collected:** 2017/10/10
**Shipped:**
**Received:** 2017/10/12

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5212301 | 2017/10/14 | 2017/10/16 | Viviana Canzonieri |

**Maxxam ID:** FHV441 Dup
**Sample ID:** TWA11
**Matrix:** Soil

**Collected:** 2017/10/10
**Shipped:**
**Received:** 2017/10/12

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5212301 | 2017/10/14 | 2017/10/16 | Viviana Canzonieri |

**Maxxam ID:** FHV442
**Sample ID:** TWA12
**Matrix:** Soil

**Collected:** 2017/10/10
**Shipped:**
**Received:** 2017/10/12

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5212301 | 2017/10/14 | 2017/10/16 | Viviana Canzonieri |



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Maxxam Job #: B7M6160
Report Date: 2017/10/16

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC - IQALUIT
Sampler Initials: RF

## TEST SUMMARY

**Maxxam ID:** FHV443
**Sample ID:** TWA13
**Matrix:** Soil

**Collected:** 2017/10/10
**Shipped:**
**Received:** 2017/10/12

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Strong Acid Leachable Metals by ICPMS | ICP/MS | 5212301 | 2017/10/14 | 2017/10/16 | Viviana Canzonieri |



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Maxxam Job #: B7M6160
Report Date: 2017/10/16

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC - IQALUIT
Sampler Initials: RF

## GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

| | |
|---|---|
| Package 1 | 4.3°C |

**Results relate only to the items tested.**



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Maxxam Job #: B7M6160
Report Date: 2017/10/16

## QUALITY ASSURANCE REPORT

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC - IQALUIT
Sampler Initials: RF

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5211103 | D10-Anthracene | 2017/10/13 | 101 | 50 - 130 | 93 | 50 - 130 | 93 | % | | |
| 5211103 | D14-Terphenyl (FS) | 2017/10/13 | 96 | 50 - 130 | 91 | 50 - 130 | 90 | % | | |
| 5211103 | D8-Acenaphthylene | 2017/10/13 | 105 | 50 - 130 | 97 | 50 - 130 | 96 | % | | |
| 5210691 | Moisture | 2017/10/13 | | | | | | | 3.6 | 20 |
| 5211103 | 1-Methylnaphthalene | 2017/10/13 | 93 | 50 - 130 | 90 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5211103 | 2-Methylnaphthalene | 2017/10/13 | 85 | 50 - 130 | 83 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5211103 | Acenaphthene | 2017/10/13 | 87 | 50 - 130 | 86 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5211103 | Acenaphthylene | 2017/10/13 | 93 | 50 - 130 | 82 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5211103 | Anthracene | 2017/10/13 | 87 | 50 - 130 | 79 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5211103 | Benzo(a)anthracene | 2017/10/13 | 87 | 50 - 130 | 81 | 50 - 130 | <0.0050 | ug/g | 18 | 40 |
| 5211103 | Benzo(a)pyrene | 2017/10/13 | 80 | 50 - 130 | 80 | 50 - 130 | <0.0050 | ug/g | 22 | 40 |
| 5211103 | Benzo(b/j)fluoranthene | 2017/10/13 | 70 | 50 - 130 | 79 | 50 - 130 | <0.0050 | ug/g | 23 | 40 |
| 5211103 | Benzo(g,h,i)perylene | 2017/10/13 | 71 | 50 - 130 | 80 | 50 - 130 | <0.0050 | ug/g | 21 | 40 |
| 5211103 | Benzo(k)fluoranthene | 2017/10/13 | 72 | 50 - 130 | 80 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5211103 | Chrysene | 2017/10/13 | 81 | 50 - 130 | 80 | 50 - 130 | <0.0050 | ug/g | 22 | 40 |
| 5211103 | Dibenz(a,h)anthracene | 2017/10/13 | 85 | 50 - 130 | 78 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5211103 | Fluoranthene | 2017/10/13 | 86 | 50 - 130 | 81 | 50 - 130 | <0.0050 | ug/g | 23 | 40 |
| 5211103 | Fluorene | 2017/10/13 | 87 | 50 - 130 | 81 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5211103 | Indeno(1,2,3-cd)pyrene | 2017/10/13 | 79 | 50 - 130 | 83 | 50 - 130 | <0.0050 | ug/g | 21 | 40 |
| 5211103 | Naphthalene | 2017/10/13 | 83 | 50 - 130 | 81 | 50 - 130 | <0.0050 | ug/g | NC | 40 |
| 5211103 | Phenanthrene | 2017/10/13 | 84 | 50 - 130 | 80 | 50 - 130 | <0.0050 | ug/g | 5.9 | 40 |
| 5211103 | Pyrene | 2017/10/13 | 87 | 50 - 130 | 82 | 50 - 130 | <0.0050 | ug/g | 20 | 40 |
| 5212301 | Acid Extractable Aluminum (Al) | 2017/10/16 | NC | 75 - 125 | 103 | 80 - 120 | <50 | ug/g | 0.26 | 30 |
| 5212301 | Acid Extractable Antimony (Sb) | 2017/10/16 | 93 | 75 - 125 | 101 | 80 - 120 | <0.20 | ug/g | NC | 30 |
| 5212301 | Acid Extractable Arsenic (As) | 2017/10/16 | 98 | 75 - 125 | 103 | 80 - 120 | <1.0 | ug/g | NC | 30 |
| 5212301 | Acid Extractable Barium (Ba) | 2017/10/16 | 104 | 75 - 125 | 102 | 80 - 120 | <0.50 | ug/g | 1.8 | 30 |
| 5212301 | Acid Extractable Beryllium (Be) | 2017/10/16 | 102 | 75 - 125 | 102 | 80 - 120 | <0.20 | ug/g | 0.43 | 30 |
| 5212301 | Acid Extractable Bismuth (Bi) | 2017/10/16 | 101 | 75 - 125 | 102 | 80 - 120 | <1.0 | ug/g | NC | 30 |
| 5212301 | Acid Extractable Boron (B) | 2017/10/16 | 107 | 75 - 125 | 101 | 80 - 120 | <5.0 | ug/g | 9.4 | 30 |
| 5212301 | Acid Extractable Cadmium (Cd) | 2017/10/16 | 98 | 75 - 125 | 98 | 80 - 120 | <0.10 | ug/g | 7.6 | 30 |
| 5212301 | Acid Extractable Calcium (Ca) | 2017/10/16 | NC | 75 - 125 | 105 | 80 - 120 | <50 | ug/g | 2.3 | 30 |



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Maxxam Job #: B7M6160
Report Date: 2017/10/16

## QUALITY ASSURANCE REPORT(CONT'D)

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC - IQALUIT
Sampler Initials: RF

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5212301 | Acid Extractable Chromium (Cr) | 2017/10/16 | 92 | 75 - 125 | 100 | 80 - 120 | <1.0 | ug/g | 1.5 | 30 |
| 5212301 | Acid Extractable Cobalt (Co) | 2017/10/16 | 98 | 75 - 125 | 99 | 80 - 120 | <0.10 | ug/g | 2.2 | 30 |
| 5212301 | Acid Extractable Copper (Cu) | 2017/10/16 | 100 | 75 - 125 | 101 | 80 - 120 | <0.50 | ug/g | 2.0 | 30 |
| 5212301 | Acid Extractable Iron (Fe) | 2017/10/16 | NC | 75 - 125 | 102 | 80 - 120 | <50 | ug/g | 0.51 | 30 |
| 5212301 | Acid Extractable Lead (Pb) | 2017/10/16 | 102 | 75 - 125 | 103 | 80 - 120 | <1.0 | ug/g | 4.5 | 30 |
| 5212301 | Acid Extractable Lithium (Li) | 2017/10/16 | 102 | 75 - 125 | 103 | 80 - 120 | <1.0 | ug/g | 1.2 | 30 |
| 5212301 | Acid Extractable Magnesium (Mg) | 2017/10/16 | NC | 75 - 125 | 104 | 80 - 120 | <50 | ug/g | 5.5 | 30 |
| 5212301 | Acid Extractable Manganese (Mn) | 2017/10/16 | NC | 75 - 125 | 99 | 80 - 120 | <1.0 | ug/g | 4.4 | 30 |
| 5212301 | Acid Extractable Mercury (Hg) | 2017/10/16 | 100 | 75 - 125 | 99 | 80 - 120 | <0.050 | ug/g | NC | 30 |
| 5212301 | Acid Extractable Molybdenum (Mo) | 2017/10/16 | 101 | 75 - 125 | 100 | 80 - 120 | <0.50 | ug/g | 4.0 | 30 |
| 5212301 | Acid Extractable Nickel (Ni) | 2017/10/16 | 99 | 75 - 125 | 102 | 80 - 120 | <0.50 | ug/g | 2.5 | 30 |
| 5212301 | Acid Extractable Phosphorus (P) | 2017/10/16 | NC | 75 - 125 | 105 | 80 - 120 | <50 | ug/g | 8.5 | 30 |
| 5212301 | Acid Extractable Potassium (K) | 2017/10/16 | NC | 75 - 125 | 107 | 80 - 120 | <200 | ug/g | 8.0 | 30 |
| 5212301 | Acid Extractable Selenium (Se) | 2017/10/16 | 104 | 75 - 125 | 105 | 80 - 120 | <0.50 | ug/g | NC | 30 |
| 5212301 | Acid Extractable Silver (Ag) | 2017/10/16 | 102 | 75 - 125 | 99 | 80 - 120 | <0.20 | ug/g | NC | 30 |
| 5212301 | Acid Extractable Sodium (Na) | 2017/10/16 | NC | 75 - 125 | 101 | 80 - 120 | <50 | ug/g | 2.1 | 30 |
| 5212301 | Acid Extractable Strontium (Sr) | 2017/10/16 | 99 | 75 - 125 | 102 | 80 - 120 | <1.0 | ug/g | 2.5 | 30 |
| 5212301 | Acid Extractable Thallium (Tl) | 2017/10/16 | 98 | 75 - 125 | 102 | 80 - 120 | <0.050 | ug/g | NC | 30 |
| 5212301 | Acid Extractable Tin (Sn) | 2017/10/16 | 102 | 75 - 125 | 100 | 80 - 120 | <1.0 | ug/g | NC | 30 |
| 5212301 | Acid Extractable Titanium (Ti) | 2017/10/16 | NC | 75 - 125 | 104 | 80 - 120 | <5.0 | ug/g | 1.9 | 30 |
| 5212301 | Acid Extractable Uranium (U) | 2017/10/16 | 106 | 75 - 125 | 105 | 80 - 120 | <0.050 | ug/g | 34 (1) | 30 |
| 5212301 | Acid Extractable Vanadium (V) | 2017/10/16 | 95 | 75 - 125 | 100 | 80 - 120 | <5.0 | ug/g | 4.0 | 30 |



Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Maxxam Job #: B7M6160
Report Date: 2017/10/16

## QUALITY ASSURANCE REPORT(CONT'D)

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC - IQALUIT
Sampler Initials: RF

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5212301 | Acid Extractable Zinc (Zn) | 2017/10/16 | NC | 75 - 125 | 100 | 80 - 120 | <5.0 | ug/g | 4.9 | 30 |

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.



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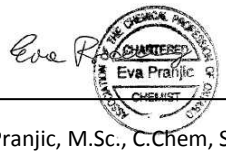
Maxxam Job #: B7M6160
Report Date: 2017/10/16

ARCADIS Canada Inc
Client Project #: 102153-000
Site Location: TC - IQALUIT
Sampler Initials: RF

## VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).




Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



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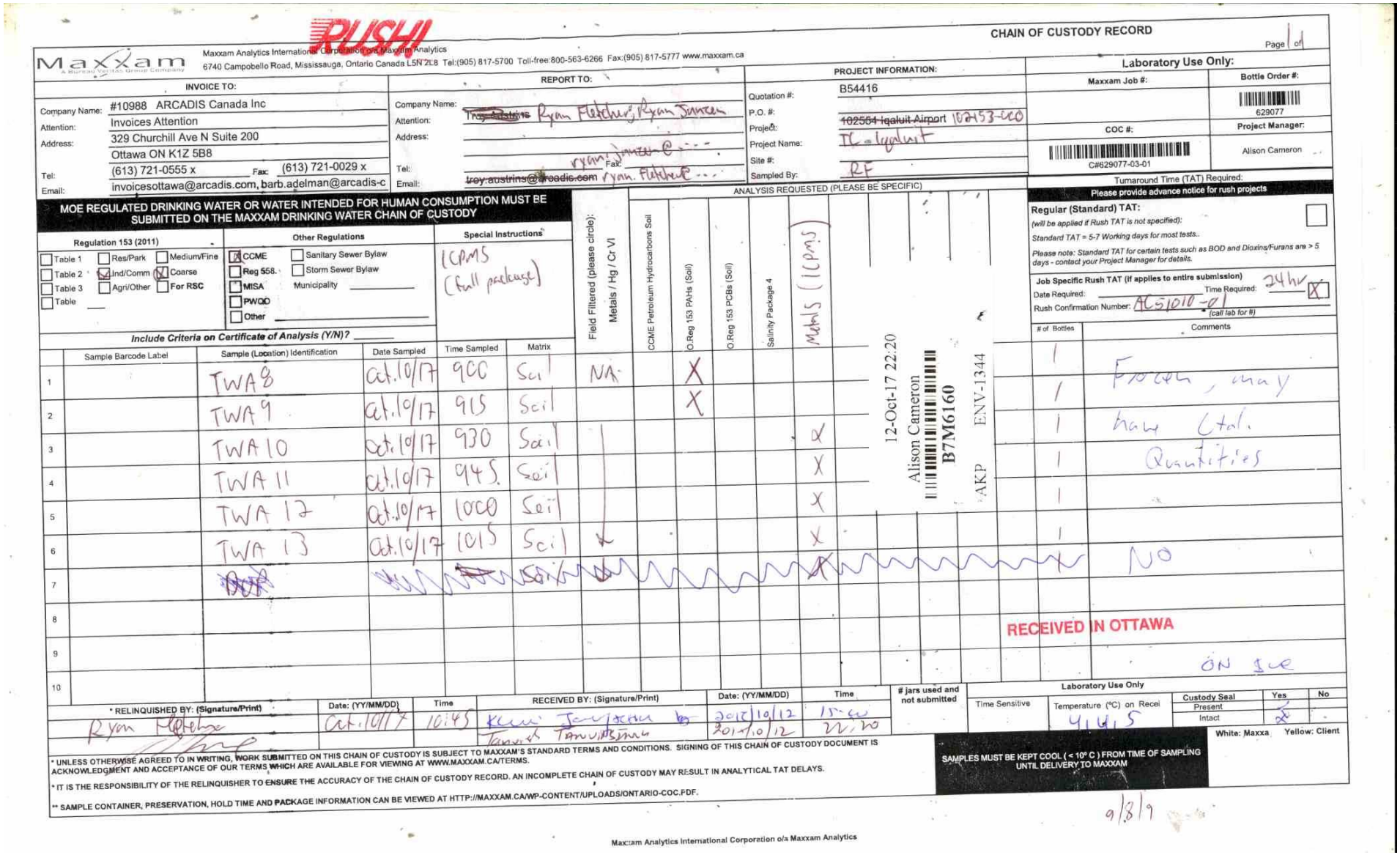

RUSH

Maxxam
A Bureau Veritas Group Company

Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page 1 of

INVOICE TO:
Company Name: #10988 ARCADIS Canada Inc
Attention: Invoices Attention
Address: 329 Churchill Ave N Suite 200, Ottawa ON K1Z 5B8
Tel: (613) 721-0555 x Fax: (613) 721-0029 x
Email: invoicesottawa@arcadis.com, barb.adelman@arcadis-c

REPORT TO:
Company Name:
Attention: ~~Troy Austrins~~ Ryan Fletcher, Ryan Janzen
Address:
Tel: Fax:
Email: troy.austrins@arcadis.com ryan.janzen@... ryan.fletcher@...

PROJECT INFORMATION:
Quotation #: B54416
P.O. #:
Project: ~~102554 Iqaluit Airport~~ 102453-000
Project Name: IL - Iqaluit
Site #:
Sampled By: RF

Laboratory Use Only:
Maxxam Job #:
Bottle Order #: 629077
COC #: C#629077-03-01
Project Manager: Alison Cameron

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011): Table 1, Res/Park, Medium/Fine; Table 2, Ind/Comm, Coarse; Table 3, Agri/Other, For RSC; Table ___
Other Regulations: CCME, Sanitary Sewer Bylaw; Reg 558, Storm Sewer Bylaw; MISA, Municipality ___; PWQO; Other ___
Special Instructions: ICPMS (full package)

Include Criteria on Certificate of Analysis (Y/N)? ___

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

| | Sample Barcode Label | Sample (Location) Identification | Date Sampled | Time Sampled | Matrix | Field Filtered (please circle): Metals / Hg / Cr VI | CCME Petroleum Hydrocarbons Soil | O.Reg 153 PAHs (Soil) | O.Reg 153 PCBs (Soil) | Salinity Package 4 | Metals (ICPMS) | # of Bottles | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | TWA8 | Oct.10/17 | 900 | Soil | NA | | X | | | | 1 | |
| 2 | | TWA9 | Oct.10/17 | 915 | Soil | | | X | | | | 1 | Frozen, may |
| 3 | | TWA10 | Oct.10/17 | 930 | Soil | | | | | | X | 1 | have Ctal. |
| 4 | | TWA11 | Oct.10/17 | 945 | Soil | | | | | | X | 1 | Quantities |
| 5 | | TWA12 | Oct.10/17 | 1000 | Soil | | | | | | X | 1 | |
| 6 | | TWA13 | Oct.10/17 | 1015 | Soil | | | | | | X | 1 | |
| 7 | | ~~DUP~~ | ~~Oct.10/17~~ | ~~1015~~ | ~~Soil~~ | | | | | | X | 1 | NO |
| 8 | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | |

12-Oct-17 22:20
Alison Cameron
B7M6160
AKP ENV-1344

RECEIVED IN OTTAWA

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects
Regular (Standard) TAT:
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.
Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: 24hr X
Rush Confirmation Number: AC51010-01 (call lab for #)

| * RELINQUISHED BY: (Signature/Print) | Date: (YY/MM/DD) | Time | RECEIVED BY: (Signature/Print) | Date: (YY/MM/DD) | Time | # jars used and not submitted |
|---|---|---|---|---|---|---|
| Ryan Fletcher | Oct.10/17 | 10:45 | Kevin Jacobs / Tanvir Tanvir | 2017/10/12 | 15:00 / 22:20 | |

Laboratory Use Only
Time Sensitive
Temperature (°C) on Recei: 4.1 4.5
Custody Seal: Present Yes, Intact Yes; No

White: Maxxa Yellow: Client

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.
** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT HTTP://MAXXAM.CA/WP-CONTENT/UPLOADS/ONTARIO-COC.PDF.

SAMPLES MUST BE KEPT COOL ( < 10° C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

9/3/19

Maxxam Analytics International Corporation o/a Maxxam Analytics

# APPENDIX J

## Kudlik Daily Truck and Material Logs

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-13 | 0m³ | | |
| | | | |
| **TOTAL** | **0m³** | **0m³** | **0,0m³** |
| **AEC-2 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-13 | 53,3m³ | | |
| | | | |
| **TOTAL** | **53,3m³** | **0m³** | **53,3m³** |
| **AEC-3 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-13 | | | |
| | | | |
| **TOTAL** | **0m³** | **0m³** | **0,0m³** |
| **TOTAL** | **53,3m³** | **0,0m³** | **53,3m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | | |
| | | | | | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **0m³** | **0,0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| | | | | | |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **32,0m³** | **32,0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | | |
| | | | | | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **0m³** | **0,0m³** |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **32,0m³** | **32,0m³** |

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-13 | 0m³ | | |
| | | | |
| **TOTAL** | **0m³** | **0m³** | **0,0m³** |
| **AEC-2 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-13 | 53,3m³ | | |
| | | | |
| **TOTAL** | **53,3m³** | **0m³** | **53,3m³** |
| **AEC-3 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-13 | | | |
| | | | |
| **TOTAL** | **0m³** | **0m³** | **0,0m³** |
| **TOTAL** | **53,3m³** | **0,0m³** | **53,3m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | | |
| | | | | | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **0m³** | **0,0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| | | | | | |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **32,0m³** | **32,0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | | |
| | | | | | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **0m³** | **0,0m³** |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **32,0m³** | **32,0m³** |

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| | | | |
| | | | |
| **TOTAL** | **0m³** | **0m³** | **0,0m³** |
| **AEC-2 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-13 | 53,3m³ | | |
| | | | |
| **TOTAL** | **53,3m³** | **0m³** | **53,3m³** |
| **AEC-3 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-14 | 95m³ | | |
| | | | |
| **TOTAL** | **95m³** | **0m³** | **94,9m³** |
| **TOTAL** | **148,2m³** | **0,0m³** | **148,2m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| | | | | | |
| | | | | | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **0m³** | **0,0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| | | | | | |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **32,0m³** | **32,0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 13m³ | |
| | | | | | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **13m³** | **13,0m³** |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **45,0m³** | **45,0m³** |

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-15 | 20m³ | | |
| | | | |
| **TOTAL** | **20m³** | **0m³** | **20,0m³** |
| **AEC-2 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-15 | 78,4m³ | | |
| | | | |
| **TOTAL** | **78,4m³** | **0m³** | **78,4m³** |
| **AEC-3 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-14 | | 94,9m³ | |
| 2017-08-15 | | 491m³ | |
| **TOTAL** | **0m³** | **586m³** | **586,2m³** |
| **TOTAL** | **98,4m³** | **586,2m³** | **684,6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| | | | | | |
| | | | | | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **0m³** | **0,0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| | | | | | |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **32,0m³** | **32,0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **73m³** | **73,3m³** |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **105,3m³** | **105,3m³** |

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| **TOTAL** | **50m³** | **0m³** | **50,0m³** |
| **AEC-2 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-15 | 78,4m³ | | |
| | | | |
| **TOTAL** | **78,4m³** | **0m³** | **78,4m³** |
| **AEC-3 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-14 | | 94,9m³ | |
| 2017-08-15 | | 491m³ | |
| **TOTAL** | **0m³** | **586m³** | **586,2m³** |
| **TOTAL** | **128,4m³** | **586,2m³** | **714,6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| | | | | | |
| | | | | | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **0m³** | **0,0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| | | | | | |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **32,0m³** | **32,0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **73m³** | **73,3m³** |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **105,3m³** | **105,3m³** |

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| **TOTAL** | **50m³** | **0m³** | **50,0m³** |
| **AEC-2 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-15 | 78,4m³ | | |
| 2014-08-17 | 35m³ | | |
| **TOTAL** | **113,4m³** | **0m³** | **113,4m³** |
| **AEC-3 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-14 | | 94,9m³ | |
| 2017-08-15 | | 491m³ | |
| 2017-08-17 | | 16m³ | |
| **TOTAL** | **0m³** | **586m³** | **586,2m³** |
| **TOTAL** | **163,4m³** | **586,2m³** | **749,6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| | | | | | |
| | | | | | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **0m³** | **0,0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| 2017-08-17 | | | | 20m³ | |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **52,0m³** | **52,0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **73m³** | **73,3m³** |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **125,3m³** | **125,3m³** |

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| **TOTAL** | **50m³** | **0m³** | **50,0m³** |
| **AEC-2 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-15 | 78,4m³ | | |
| 2014-08-17 | 35m³ | | |
| **TOTAL** | **113,4m³** | **0m³** | **113,4m³** |
| **AEC-3 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-14 | | 94,9m³ | |
| 2017-08-15 | | 491m³ | |
| 2017-08-17 | | 16m³ | |
| 2017-08-18 | | 96m³ | |
| **TOTAL** | **0m³** | **698m³** | **698,2m³** |
| **TOTAL** | **163,4m³** | **698,2m³** | **861,6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| | | | | | |
| | | | | | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **0m³** | **0,0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| 2017-08-17 | | | | 20m³ | |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **52,0m³** | **52,0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| 2017-08-18 | | | | 12m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **85m³** | **85,3m³** |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **137,3m³** | **137,3m³** |

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**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| **TOTAL** | **50m³** | **0m³** | **50,0m³** |
| **AEC-2 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-15 | 78,4m³ | | |
| 2014-08-17 | 35m³ | | |
| **TOTAL** | **113,4m³** | **0m³** | **113,4m³** |
| **AEC-3 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-14 | | 94,9m³ | |
| 2017-08-15 | | 491m³ | |
| 2017-08-17 | | 16m³ | |
| 2017-08-18 | | 96m³ | |
| 2017-08-19 | | 96m³ | |
| **TOTAL** | **0m³** | **794m³** | **794,2m³** |
| **TOTAL** | **163,4m³** | **794,2m³** | **957,6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| | | | | | |
| | | | | | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **0m³** | **0,0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| 2017-08-17 | | | | 20m³ | |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **52,0m³** | **52,0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| 2017-08-18 | | | | 12m³ | |
| 2017-08-19 | | | | 4m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **89m³** | **89,3m³** |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **141,3m³** | **141,3m³** |

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**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| **TOTAL** | **50m³** | **0m³** | **50,0m³** |
| **AEC-2 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-15 | 78,4m³ | | |
| 2014-08-17 | 35m³ | | |
| **TOTAL** | **113,4m³** | **0m³** | **113,4m³** |
| **AEC-3 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-14 | | 94,9m³ | |
| 2017-08-15 | | 491m³ | |
| 2017-08-17 | | 16m³ | |
| 2017-08-18 | | 96m³ | |
| 2017-08-19 | | 96m³ | |
| 2017-08-20 | | 128m³ | |
| **TOTAL** | **0m³** | **922m³** | **922,2m³** |
| **TOTAL** | **163,4m³** | **922,2m³** | **1 085,6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| | | | | | |
| | | | | | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **0m³** | **0,0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| 2017-08-17 | | | | 20m³ | |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **52,0m³** | **52,0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| 2017-08-18 | | | | 12m³ | |
| 2017-08-19 | | | | 4m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **89m³** | **89,3m³** |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **141,3m³** | **141,3m³** |

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**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| **TOTAL** | **50m³** | **0m³** | **50,0m³** |
| **AEC-2 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-13 | 32,0m³ | | |
| 2017-08-15 | 78,4m³ | | |
| 2014-08-17 | 55m³ | | |
| **TOTAL** | **165,4m³** | **0m³** | **165,4m³** |
| **AEC-3 to LAYDOWN AREA 1 or MAIN LANDFILL** | | | |
| 2017-08-14 | | 100,3m³ | |
| 2017-08-15 | | 559m³ | |
| 2017-08-17 | | 16m³ | |
| 2017-08-18 | | 108m³ | |
| 2017-08-19 | | 100m³ | |
| 2017-08-20 | | 128m³ | |
| **TOTAL** | **0m³** | **1 011m³** | **1 011,3m³** |
| **TOTAL** | **215,4m³** | **1 011,3m³** | **1 226,7m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| | | | | | |
| | | | | | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **0m³** | **0,0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| | | | | | |
| | | | | | |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **0,0m³** | **0,0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| | | | | | |
| | | | | | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **0m³** | **0,0m³** |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **0,0m³** | **0,0m³** |

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**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| 2017-08-22 | 47m³ | | |
| **TOTAL** | **97m³** | **0m³** | **97,0m³** |
| **AEC-2 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 78,4m³ | | |
| 2014-08-17 | 35m³ | | |
| **TOTAL** | **113,4m³** | **0m³** | **113,4m³** |
| **AEC-3 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-14 | | 94,9m³ | |
| 2017-08-15 | | 491m³ | |
| 2017-08-17 | | 16m³ | |
| 2017-08-18 | | 96m³ | |
| 2017-08-19 | | 96m³ | |
| 2017-08-20 | | 128m³ | |
| 2017-08-21 | | 32m³ | |
| **TOTAL** | **0m³** | **954m³** | **954,2m³** |
| **TOTAL** | **210,4m³** | **954,2m³** | **1 164,6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| | | | | | |
| | | | | | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **0m³** | **0,0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| 2017-08-17 | | | | 20m³ | |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **52,0m³** | **52,0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| 2017-08-18 | | | | 12m³ | |
| 2017-08-19 | | | | 4m³ | |
| 2017-08-22 | | | | 8m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **97m³** | **97,0m³** |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **149,0m³** | **149,0m³** |

***VOLUMES NEED CONFIRMATION WITH AMOUNT OF CONTAINERS SHIPPED SOUTH (M³) FOR PAYMENT***

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| 2017-08-22 | 47m³ | | |
| **TOTAL** | **97m³** | **0m³** | **97,0m³** |
| **AEC-2 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 78,4m³ | | |
| 2014-08-17 | 35m³ | | |
| **TOTAL** | **113,4m³** | **0m³** | **113,4m³** |
| **AEC-3 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-14 | | 94,9m³ | |
| 2017-08-15 | | 491m³ | |
| 2017-08-17 | | 16m³ | |
| 2017-08-18 | | 96m³ | |
| 2017-08-19 | | 96m³ | |
| 2017-08-20 | | 128m³ | |
| 2017-08-21 | | 32m³ | |
| **TOTAL** | **0m³** | **954m³** | **954,2m³** |
| **TOTAL** | **210,4m³** | **954,2m³** | **1 164,6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| | | | | | |
| | | | | | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **0m³** | **0,0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| 2017-08-17 | | | | 20m³ | |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **52,0m³** | **52,0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| 2017-08-18 | | | | 12m³ | |
| 2017-08-19 | | | | 4m³ | |
| 2017-08-22 | | | | 8m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **97m³** | **97,0m³** |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **149,0m³** | **149,0m³** |

***VOLUMES NEED CONFIRMATION WITH AMOUNT OF CONTAINERS SHIPPED SOUTH (M³) FOR PAYMENT***

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| 2017-08-22 | 47m³ | | |
| **TOTAL** | **97m³** | **0m³** | **97,0m³** |
| **AEC-2 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 78,4m³ | | |
| 2014-08-17 | 35m³ | | |
| **TOTAL** | **113,4m³** | **0m³** | **113,4m³** |
| **AEC-3 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-14 | | 94,9m³ | |
| 2017-08-15 | | 491m³ | |
| 2017-08-17 | | 16m³ | |
| 2017-08-18 | | 96m³ | |
| 2017-08-19 | | 96m³ | |
| 2017-08-20 | | 128m³ | |
| 2017-08-21 | | 32m³ | |
| **TOTAL** | **0m³** | **954m³** | **954,2m³** |
| **TOTAL** | **210,4m³** | **954,2m³** | **1 164,6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| | | | | | |
| | | | | | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **0m³** | **0,0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| 2017-08-17 | | | | 20m³ | |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **52,0m³** | **52,0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| 2017-08-18 | | | | 12m³ | |
| 2017-08-19 | | | | 4m³ | |
| 2017-08-22 | | | | 8m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **97m³** | **97,0m³** |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **149,0m³** | **149,0m³** |

***VOLUMES NEED CONFIRMATION WITH AMOUNT OF CONTAINERS SHIPPED SOUTH (M³) FOR PAYMENT***

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| 2017-08-22 | 47m³ | | |
| **TOTAL** | **97m³** | **0m³** | **97,0m³** |
| **AEC-2 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 78,4m³ | | |
| 2014-08-17 | 35m³ | | |
| **TOTAL** | **113,4m³** | **0m³** | **113,4m³** |
| **AEC-3 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-14 | | 94,9m³ | |
| 2017-08-15 | | 491m³ | |
| 2017-08-17 | | 16m³ | |
| 2017-08-18 | | 96m³ | |
| 2017-08-19 | | 96m³ | |
| 2017-08-20 | | 128m³ | |
| 2017-08-21 | | 32m³ | |
| **TOTAL** | **0m³** | **954m³** | **954,2m³** |
| **TOTAL** | **210,4m³** | **954,2m³** | **1 164,6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| | | | | | |
| | | | | | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **0m³** | **0,0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| 2017-08-17 | | | | 20m³ | |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **52,0m³** | **52,0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| 2017-08-18 | | | | 12m³ | |
| 2017-08-19 | | | | 4m³ | |
| 2017-08-22 | | | | 8m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **97m³** | **97,0m³** |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **149,0m³** | **149,0m³** |

***VOLUMES NEED CONFIRMATION WITH AMOUNT OF CONTAINERS SHIPPED SOUTH (M³) FOR PAYMENT***

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| 2017-08-22 | 47m³ | | |
| 2017-08-26 | 32m³ | | |
| **TOTAL** | **129m³** | **0m³** | **129.0m³** |
| **AEC-2 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 78.4m³ | | |
| 2014-08-17 | 35m³ | | |
| **TOTAL** | **113.4m³** | **0m³** | **113.4m³** |
| **AEC-3 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-14 | | 94.9m³ | |
| 2017-08-15 | | 491m³ | |
| 2017-08-17 | | 16m³ | |
| 2017-08-18 | | 96m³ | |
| 2017-08-19 | | 96m³ | |
| 2017-08-20 | | 128m³ | |
| 2017-08-21 | | 32m³ | |
| **TOTAL** | **0m³** | **954m³** | **954.2m³** |
| **TOTAL** | **242.4m³** | **954.2m³** | **1,196.6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| 2017-08-26 | 32m³ | | | | |
| **TOTAL** | **32m³** | **0m³** | **0m³** | **0m³** | **32.0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| 2017-08-17 | | | | 20m³ | |
| **TOTAL** | **0.0m³** | **0.0m³** | **0.0m³** | **52.0m³** | **52.0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| 2017-08-18 | | | | 12m³ | |
| 2017-08-19 | | | | 4m³ | |
| 2017-08-22 | | | | 8m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **97m³** | **97.0m³** |
| **TOTAL** | **32.0m³** | **0.0m³** | **0.0m³** | **149.0m³** | **181.0m³** |

***VOLUMES NEED CONFIRMATION WITH AMOUNT OF CONTAINERS SHIPPED SOUTH (M³) FOR PAYMENT***

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| 2017-08-22 | 47m³ | | |
| 2017-08-26 | 32m³ | | |
| **TOTAL** | **129m³** | **0m³** | **129.0m³** |
| **AEC-2 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 78.4m³ | | |
| 2014-08-17 | 35m³ | | |
| **TOTAL** | **113.4m³** | **0m³** | **113.4m³** |
| **AEC-3 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-14 | | 94.9m³ | |
| 2017-08-15 | | 491m³ | |
| 2017-08-17 | | 16m³ | |
| 2017-08-18 | | 96m³ | |
| 2017-08-19 | | 96m³ | |
| 2017-08-20 | | 128m³ | |
| 2017-08-21 | | 32m³ | |
| **TOTAL** | **0m³** | **954m³** | **954.2m³** |
| **TOTAL** | **242.4m³** | **954.2m³** | **1,196.6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| 2017-08-26 | 32m³ | | | | |
| 2017-08-27 | | 64m³ | | | |
| **TOTAL** | **32m³** | **64m³** | **0m³** | **0m³** | **96.0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| 2017-08-17 | | | | 20m³ | |
| **TOTAL** | **0.0m³** | **0.0m³** | **0.0m³** | **52.0m³** | **52.0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| 2017-08-18 | | | | 12m³ | |
| 2017-08-19 | | | | 4m³ | |
| 2017-08-22 | | | | 8m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **97m³** | **97.0m³** |
| **TOTAL** | **32.0m³** | **64.0m³** | **0.0m³** | **149.0m³** | **245.0m³** |

***VOLUMES NEED CONFIRMATION WITH AMOUNT OF CONTAINERS SHIPPED SOUTH (M³) FOR PAYMENT***

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| 2017-08-22 | 47m³ | | |
| 2017-08-26 | 32m³ | | |
| 2017-08-28 | 32m³ | | |
| **TOTAL** | **161m³** | **0m³** | **161.0m³** |
| **AEC-2 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 78.4m³ | | |
| 2014-08-17 | 35m³ | | |
| **TOTAL** | **113.4m³** | **0m³** | **113.4m³** |
| **AEC-3 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-14 | | 94.9m³ | |
| 2017-08-15 | | 491m³ | |
| 2017-08-17 | | 16m³ | |
| 2017-08-18 | | 96m³ | |
| 2017-08-19 | | 96m³ | |
| 2017-08-20 | | 128m³ | |
| 2017-08-21 | | 32m³ | |
| **TOTAL** | **0m³** | **954m³** | **954.2m³** |
| **TOTAL** | **274.4m³** | **954.2m³** | **1,228.6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| 2017-08-26 | 32m³ | | | | |
| 2017-08-27 | | 64m³ | | | |
| **TOTAL** | **32m³** | **64m³** | **0m³** | **0m³** | **96.0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| 2017-08-17 | | | | 20m³ | |
| **TOTAL** | **0.0m³** | **0.0m³** | **0.0m³** | **52.0m³** | **52.0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| 2017-08-18 | | | | 12m³ | |
| 2017-08-19 | | | | 4m³ | |
| 2017-08-22 | | | | 8m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **97m³** | **97.0m³** |
| **TOTAL** | **32.0m³** | **64.0m³** | **0.0m³** | **149.0m³** | **245.0m³** |

***VOLUMES NEED CONFIRMATION WITH AMOUNT OF CONTAINERS SHIPPED SOUTH (M³) FOR PAYMENT***

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| 2017-08-22 | 47m³ | | |
| 2017-08-26 | 32m³ | | |
| 2017-08-29 | 15m³ | | |
| **TOTAL** | **144m³** | **0m³** | **144.0m³** |
| **AEC-2 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 78.4m³ | | |
| 2014-08-17 | 35m³ | | |
| 2017-08-28 | 32m³ | | |
| 2017-08-29 | 16m³ | | |
| **TOTAL** | **113.4m³** | **0m³** | **113.4m³** |
| **AEC-3 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-14 | | 94.9m³ | |
| 2017-08-15 | | 491m³ | |
| 2017-08-17 | | 16m³ | |
| 2017-08-18 | | 96m³ | |
| 2017-08-19 | | 96m³ | |
| 2017-08-20 | | 128m³ | |
| 2017-08-21 | | 32m³ | |
| **TOTAL** | **0m³** | **954m³** | **954.2m³** |
| **TOTAL** | **257.4m³** | **954.2m³** | **1,211.6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| 2017-08-26 | 32m³ | | | | |
| 2017-08-27 | | 64m³ | | | |
| **TOTAL** | **32m³** | **64m³** | **0m³** | **0m³** | **96.0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| 2017-08-17 | | | | 20m³ | |
| **TOTAL** | **0.0m³** | **0.0m³** | **0.0m³** | **52.0m³** | **52.0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| 2017-08-18 | | | | 12m³ | |
| 2017-08-19 | | | | 4m³ | |
| 2017-08-22 | | | | 8m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **97m³** | **97.0m³** |
| **TOTAL** | **32.0m³** | **64.0m³** | **0.0m³** | **149.0m³** | **245.0m³** |

***VOLUMES NEED CONFIRMATION WITH AMOUNT OF CONTAINERS SHIPPED SOUTH (M³) FOR PAYMENT***

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| 2017-08-22 | 47m³ | | |
| 2017-08-26 | 32m³ | | |
| 2017-08-29 | 15m³ | | |
| **TOTAL** | **144m³** | **0m³** | **144.0m³** |
| **AEC-2 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 78.4m³ | | |
| 2014-08-17 | 35m³ | | |
| 2017-08-28 | 32m³ | | |
| 2017-08-29 | 16m³ | | |
| 2017-08-30 | 32m³ | | |
| **TOTAL** | **193.4m³** | **0m³** | **193.4m³** |
| **AEC-3 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-14 | | 94.9m³ | |
| 2017-08-15 | | 491m³ | |
| 2017-08-17 | | 16m³ | |
| 2017-08-18 | | 96m³ | |
| 2017-08-19 | | 96m³ | |
| 2017-08-20 | | 128m³ | |
| 2017-08-21 | | 32m³ | |
| **TOTAL** | **0m³** | **954m³** | **954.2m³** |
| **TOTAL** | **337.4m³** | **954.2m³** | **1,291.6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| 2017-08-26 | 32m³ | | | | |
| 2017-08-27 | | 64m³ | | | |
| **TOTAL** | **32m³** | **64m³** | **0m³** | **0m³** | **96.0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| 2017-08-17 | | | | 20m³ | |
| 2017-08-30 | | | | 16m³ | |
| **TOTAL** | **0.0m³** | **0.0m³** | **0.0m³** | **68.0m³** | **68.0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| 2017-08-18 | | | | 12m³ | |
| 2017-08-19 | | | | 4m³ | |
| 2017-08-22 | | | | 8m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **97m³** | **97.0m³** |
| **TOTAL** | **32.0m³** | **64.0m³** | **0.0m³** | **165.0m³** | **261.0m³** |

***VOLUMES NEED CONFIRMATION WITH AMOUNT OF CONTAINERS SHIPPED SOUTH (M³) FOR PAYMENT***

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| 2017-08-22 | 47m³ | | |
| 2017-08-26 | 32m³ | | |
| 2017-08-29 | 15m³ | | |
| 2017-08-31 | 16m³ | | |
| **TOTAL** | **160m³** | **0m³** | **160.0m³** |
| **AEC-2 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 78.4m³ | | |
| 2014-08-17 | 35m³ | | |
| 2017-08-28 | 32m³ | | |
| 2017-08-29 | 16m³ | | |
| 2017-08-30 | 32m³ | | |
| 2017-08-31 | 16m³ | | |
| **TOTAL** | **209.4m³** | **0m³** | **209.4m³** |
| **AEC-3 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-14 | | 94.9m³ | |
| 2017-08-15 | | 491m³ | |
| 2017-08-17 | | 16m³ | |
| 2017-08-18 | | 96m³ | |
| 2017-08-19 | | 96m³ | |
| 2017-08-20 | | 128m³ | |
| 2017-08-21 | | 32m³ | |
| **TOTAL** | **0m³** | **954m³** | **954.2m³** |
| **TOTAL** | **369.4m³** | **954.2m³** | **1,323.6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| 2017-08-26 | 32m³ | | | | |
| 2017-08-27 | | 64m³ | | | |
| 2017-08-31 | | 4m³ | | | |
| **TOTAL** | **32m³** | **68m³** | **0m³** | **0m³** | **100.0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| 2017-08-17 | | | | 20m³ | |
| 2017-08-30 | | | | 16m³ | |
| **TOTAL** | **0.0m³** | **0.0m³** | **0.0m³** | **68.0m³** | **68.0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| 2017-08-18 | | | | 12m³ | |
| 2017-08-19 | | | | 4m³ | |
| 2017-08-22 | | | | 8m³ | |
| 2017-08-31 | | | | 4m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **101m³** | **101.0m³** |
| **TOTAL** | **32.0m³** | **68.0m³** | **0.0m³** | **169.0m³** | **269.0m³** |

***VOLUMES NEED CONFIRMATION WITH AMOUNT OF CONTAINERS SHIPPED SOUTH (M³) FOR PAYMENT***

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| 2017-08-22 | 47m³ | | |
| 2017-08-26 | 32m³ | | |
| 2017-08-29 | 15m³ | | |
| 2017-08-31 | 16m³ | | |
| **TOTAL** | **160m³** | **0m³** | **160.0m³** |
| **AEC-2 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 78.4m³ | | |
| 2014-08-17 | 35m³ | | |
| 2017-08-28 | 32m³ | | |
| 2017-08-29 | 16m³ | | |
| 2017-08-30 | 32m³ | | |
| 2017-08-31 | 16m³ | | |
| **TOTAL** | **209.4m³** | **0m³** | **209.4m³** |
| **AEC-3 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-14 | | 94.9m³ | |
| 2017-08-15 | | 491m³ | |
| 2017-08-17 | | 16m³ | |
| 2017-08-18 | | 96m³ | |
| 2017-08-19 | | 96m³ | |
| 2017-08-20 | | 128m³ | |
| 2017-08-21 | | 32m³ | |
| **TOTAL** | **0m³** | **954m³** | **954.2m³** |
| **TOTAL** | **369.4m³** | **954.2m³** | **1,323.6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| 2017-08-26 | 32m³ | | | | |
| 2017-08-27 | | 64m³ | | | |
| 2017-08-31 | | 4m³ | | | |
| **TOTAL** | **32m³** | **68m³** | **0m³** | **0m³** | **100.0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| 2017-08-17 | | | | 20m³ | |
| 2017-08-30 | | | | 16m³ | |
| **TOTAL** | **0.0m³** | **0.0m³** | **0.0m³** | **68.0m³** | **68.0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| 2017-08-18 | | | | 12m³ | |
| 2017-08-19 | | | | 4m³ | |
| 2017-08-22 | | | | 8m³ | |
| 2017-08-31 | | | | 4m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **101m³** | **101.0m³** |
| **TOTAL** | **32.0m³** | **68.0m³** | **0.0m³** | **169.0m³** | **269.0m³** |

***VOLUMES NEED CONFIRMATION WITH AMOUNT OF CONTAINERS SHIPPED SOUTH (M³) FOR PAYMENT***

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| 2017-08-22 | 47m³ | | |
| 2017-08-26 | 32m³ | | |
| 2017-08-29 | 15m³ | | |
| 2017-08-31 | 16m³ | | |
| **TOTAL** | **160m³** | **0m³** | **160.0m³** |
| **AEC-2 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 78.4m³ | | |
| 2014-08-17 | 35m³ | | |
| 2017-08-28 | 32m³ | | |
| 2017-08-29 | 16m³ | | |
| 2017-08-30 | 32m³ | | |
| 2017-08-31 | 16m³ | | |
| **TOTAL** | **209.4m³** | **0m³** | **209.4m³** |
| **AEC-3 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-14 | | 94.9m³ | |
| 2017-08-15 | | 491m³ | |
| 2017-08-17 | | 16m³ | |
| 2017-08-18 | | 96m³ | |
| 2017-08-19 | | 96m³ | |
| 2017-08-20 | | 128m³ | |
| 2017-08-21 | | 32m³ | |
| **TOTAL** | **0m³** | **954m³** | **954.2m³** |
| **TOTAL** | **369.4m³** | **954.2m³** | **1,323.6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| 2017-08-26 | 32m³ | | | | |
| 2017-08-27 | | 64m³ | | | |
| 2017-08-31 | | 4m³ | | | |
| **TOTAL** | **32m³** | **68m³** | **0m³** | **0m³** | **100.0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| 2017-08-17 | | | | 20m³ | |
| 2017-08-30 | | | | 16m³ | |
| **TOTAL** | **0.0m³** | **0.0m³** | **0.0m³** | **68.0m³** | **68.0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| 2017-08-18 | | | | 12m³ | |
| 2017-08-19 | | | | 4m³ | |
| 2017-08-22 | | | | 8m³ | |
| 2017-08-31 | | | | 4m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **101m³** | **101.0m³** |
| **TOTAL** | **32.0m³** | **68.0m³** | **0.0m³** | **169.0m³** | **269.0m³** |

***VOLUMES NEED CONFIRMATION WITH AMOUNT OF CONTAINERS SHIPPED SOUTH (M³) FOR PAYMENT***

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| 2017-08-22 | 47m³ | | |
| 2017-08-26 | 32m³ | | |
| 2017-08-29 | 15m³ | | |
| 2017-08-31 | 16m³ | | |
| **TOTAL** | **160m³** | **0m³** | **160.0m³** |
| **AEC-2 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 78.4m³ | | |
| 2014-08-17 | 35m³ | | |
| 2017-08-28 | 32m³ | | |
| 2017-08-29 | 16m³ | | |
| 2017-08-30 | 32m³ | | |
| 2017-08-31 | 16m³ | | |
| **TOTAL** | **209.4m³** | **0m³** | **209.4m³** |
| **AEC-3 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-14 | | 94.9m³ | |
| 2017-08-15 | | 491m³ | |
| 2017-08-17 | | 16m³ | |
| 2017-08-18 | | 96m³ | |
| 2017-08-19 | | 96m³ | |
| 2017-08-20 | | 128m³ | |
| 2017-08-21 | | 32m³ | |
| **TOTAL** | **0m³** | **954m³** | **954.2m³** |
| **TOTAL** | **369.4m³** | **954.2m³** | **1,323.6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| 2017-08-26 | 32m³ | | | | |
| 2017-08-27 | | 64m³ | | | |
| 2017-08-31 | | 4m³ | | | |
| **TOTAL** | **32m³** | **68m³** | **0m³** | **0m³** | **100.0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| 2017-08-17 | | | | 20m³ | |
| 2017-08-30 | | | | 16m³ | |
| **TOTAL** | **0.0m³** | **0.0m³** | **0.0m³** | **68.0m³** | **68.0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| 2017-08-18 | | | | 12m³ | |
| 2017-08-19 | | | | 4m³ | |
| 2017-08-22 | | | | 8m³ | |
| 2017-08-31 | | | | 4m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **101m³** | **101.0m³** |
| **TOTAL** | **32.0m³** | **68.0m³** | **0.0m³** | **169.0m³** | **269.0m³** |

***VOLUMES NEED CONFIRMATION WITH AMOUNT OF CONTAINERS SHIPPED SOUTH (M³) FOR PAYMENT***

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| 2017-08-22 | 47m³ | | |
| 2017-08-26 | 32m³ | | |
| 2017-08-29 | 15m³ | | |
| 2017-08-31 | 16m³ | | |
| **TOTAL** | **160m³** | **0m³** | **160.0m³** |
| **AEC-2 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 78.4m³ | | |
| 2014-08-17 | 35m³ | | |
| 2017-08-28 | 32m³ | | |
| 2017-08-29 | 16m³ | | |
| 2017-08-30 | 32m³ | | |
| 2017-08-31 | 16m³ | | |
| **TOTAL** | **209.4m³** | **0m³** | **209.4m³** |
| **AEC-3 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-14 | | 94.9m³ | |
| 2017-08-15 | | 491m³ | |
| 2017-08-17 | | 16m³ | |
| 2017-08-18 | | 96m³ | |
| 2017-08-19 | | 96m³ | |
| 2017-08-20 | | 128m³ | |
| 2017-08-21 | | 32m³ | |
| **TOTAL** | **0m³** | **954m³** | **954.2m³** |
| **TOTAL** | **369.4m³** | **954.2m³** | **1,323.6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| 2017-08-26 | 32m³ | | | | |
| 2017-08-27 | | 64m³ | | | |
| 2017-08-31 | | 4m³ | | | |
| **TOTAL** | **32m³** | **68m³** | **0m³** | **0m³** | **100.0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| 2017-08-17 | | | | 20m³ | |
| 2017-08-30 | | | | 16m³ | |
| **TOTAL** | **0.0m³** | **0.0m³** | **0.0m³** | **68.0m³** | **68.0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| 2017-08-18 | | | | 12m³ | |
| 2017-08-19 | | | | 4m³ | |
| 2017-08-22 | | | | 8m³ | |
| 2017-08-31 | | | | 4m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **101m³** | **101.0m³** |
| **TOTAL** | **32.0m³** | **68.0m³** | **0.0m³** | **169.0m³** | **269.0m³** |

***VOLUMES NEED CONFIRMATION WITH AMOUNT OF CONTAINERS SHIPPED SOUTH (M³) FOR PAYMENT***

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| 2017-08-22 | 47m³ | | |
| 2017-08-26 | 32m³ | | |
| 2017-08-29 | 15m³ | | |
| 2017-08-31 | 16m³ | | |
| **TOTAL** | **160m³** | **0m³** | **160,0m³** |
| **AEC-2 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 78,4m³ | | |
| 2014-08-17 | 35m³ | | |
| 2017-08-28 | 32m³ | | |
| 2017-08-29 | 16m³ | | |
| 2017-08-30 | 32m³ | | |
| 2017-08-31 | 16m³ | | |
| 2017-09-12 | 304m³ | | |
| **TOTAL** | **513,4m³** | **0m³** | **513,4m³** |
| **AEC-3 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-14 | | 94,9m³ | |
| 2017-08-15 | | 491m³ | |
| 2017-08-17 | | 16m³ | |
| 2017-08-18 | | 96m³ | |
| 2017-08-19 | | 96m³ | |
| 2017-08-20 | | 128m³ | |
| 2017-08-21 | | 32m³ | |
| **TOTAL** | **0m³** | **954m³** | **954,2m³** |
| **TOTAL** | **673,4m³** | **954,2m³** | **1 627,6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| 2017-08-26 | 32m³ | | | | |
| 2017-08-27 | | 64m³ | | | |
| 2017-08-31 | | 4m³ | | | |
| **TOTAL** | **32m³** | **68m³** | **0m³** | **0m³** | **100,0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| 2017-08-17 | | | | 20m³ | |
| 2017-08-30 | | | | 16m³ | |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **68,0m³** | **68,0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| 2017-08-18 | | | | 12m³ | |
| 2017-08-19 | | | | 4m³ | |
| 2017-08-22 | | | | 8m³ | |
| 2017-08-31 | | | | 4m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **101m³** | **101,0m³** |
| **TOTAL** | **32,0m³** | **68,0m³** | **0,0m³** | **169,0m³** | **269,0m³** |

***VOLUMES NEED CONFIRMATION WITH AMOUNT OF CONTAINERS SHIPPED SOUTH (M³) FOR PAYMENT***

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| 2017-08-22 | 47m³ | | |
| 2017-08-26 | 32m³ | | |
| 2017-08-29 | 15m³ | | |
| 2017-08-31 | 16m³ | | |
| **TOTAL** | **160m³** | **0m³** | **160,0m³** |
| **AEC-2 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 78,4m³ | | |
| 2014-08-17 | 35m³ | | |
| 2017-08-28 | 32m³ | | |
| 2017-08-29 | 16m³ | | |
| 2017-08-30 | 32m³ | | |
| 2017-08-31 | 16m³ | | |
| 2017-09-12 | 304m³ | | |
| **TOTAL** | **513,4m³** | **0m³** | **513,4m³** |
| **AEC-3 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-14 | | 94,9m³ | |
| 2017-08-15 | | 491m³ | |
| 2017-08-17 | | 16m³ | |
| 2017-08-18 | | 96m³ | |
| 2017-08-19 | | 96m³ | |
| 2017-08-20 | | 128m³ | |
| 2017-08-21 | | 32m³ | |
| **TOTAL** | **0m³** | **954m³** | **954,2m³** |
| **TOTAL** | **673,4m³** | **954,2m³** | **1 627,6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| 2017-08-26 | 32m³ | | | | |
| 2017-08-27 | | 64m³ | | | |
| 2017-08-31 | | 4m³ | | | |
| **TOTAL** | **32m³** | **68m³** | **0m³** | **0m³** | **100,0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| 2017-08-17 | | | | 20m³ | |
| 2017-08-30 | | | | 16m³ | |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **68,0m³** | **68,0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| 2017-08-18 | | | | 12m³ | |
| 2017-08-19 | | | | 4m³ | |
| 2017-08-22 | | | | 8m³ | |
| 2017-08-31 | | | | 4m³ | |
| 2017-09-14 | | | | 12m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **113m³** | **113,0m³** |
| **TOTAL** | **32,0m³** | **68,0m³** | **0,0m³** | **181,0m³** | **281,0m³** |

***VOLUMES NEED CONFIRMATION WITH AMOUNT OF CONTAINERS SHIPPED SOUTH (M³) FOR PAYMENT***

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| 2017-08-22 | 47m³ | | |
| 2017-08-26 | 32m³ | | |
| 2017-08-29 | 15m³ | | |
| 2017-08-31 | 16m³ | | |
| **TOTAL** | **160m³** | **0m³** | **160,0m³** |
| **AEC-2 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 78,4m³ | | |
| 2014-08-17 | 35m³ | | |
| 2017-08-28 | 32m³ | | |
| 2017-08-29 | 16m³ | | |
| 2017-08-30 | 32m³ | | |
| 2017-08-31 | 16m³ | | |
| 2017-09-12 | 304m³ | | |
| **TOTAL** | **513,4m³** | **0m³** | **513,4m³** |
| **AEC-3 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-14 | | 94,9m³ | |
| 2017-08-15 | | 491m³ | |
| 2017-08-17 | | 16m³ | |
| 2017-08-18 | | 96m³ | |
| 2017-08-19 | | 96m³ | |
| 2017-08-20 | | 128m³ | |
| 2017-08-21 | | 32m³ | |
| 2017-09-17 | | 90m³ | |
| **TOTAL** | **0m³** | **1 044m³** | **1 044,2m³** |
| **TOTAL** | **673,4m³** | **1 044,2m³** | **1 717,6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| 2017-08-26 | 32m³ | | | | |
| 2017-08-27 | | 64m³ | | | |
| 2017-08-31 | | 4m³ | | | |
| **TOTAL** | **32m³** | **68m³** | **0m³** | **0m³** | **100,0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| 2017-08-17 | | | | 20m³ | |
| 2017-08-30 | | | | 16m³ | |
| **TOTAL** | **0,0m³** | **0,0m³** | **0,0m³** | **68,0m³** | **68,0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| 2017-08-18 | | | | 12m³ | |
| 2017-08-19 | | | | 4m³ | |
| 2017-08-22 | | | | 8m³ | |
| 2017-08-31 | | | | 4m³ | |
| 2017-09-14 | | | | 12m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **113m³** | **113,0m³** |
| **TOTAL** | **32,0m³** | **68,0m³** | **0,0m³** | **181,0m³** | **281,0m³** |

***VOLUMES NEED CONFIRMATION WITH AMOUNT OF CONTAINERS SHIPPED SOUTH (M³) FOR PAYMENT***

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Sorting pad | TOTAL |
|---|---|---|---|
| **MG56** | | | |
| 2017-07-25 | | 324m³ | 324m³ |
| **Total MG56** | | **324m³** | **324m³** |
| **Type 2** | | | |
| 2017-07-25 | 249m³ | | 249m³ |
| **Total Type 2** | **249m³** | | **249m³** |
| **TOTAL** | **249m³** | **324m³** | **573m³** |

File updated: 2017-07-26

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Sorting pad | TOTAL |
|---|---|---|---|
| **MG56** | | | |
| 2017-07-25 | | 324m³ | 324m³ |
| **Total MG56** | | **324m³** | **324m³** |
| **Type 2** | | | |
| 2017-07-25 | 249m³ | | 249m³ |
| 2017-07-26 | 291m³ | | 291m³ |
| **Total Type 2** | **540m³** | | **540m³** |
| **Type 4** | | | |
| 2017-07-26 | 60m³ | | 60m³ |
| **Total Type 4** | **60m³** | | **60m³** |
| **TOTAL** | **600m³** | **324m³** | **924m³** |

File updated: 2017-07-27

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Sorting pad | TOTAL |
|---|---|---|---|
| **MG56** | | | |
| 2017-07-25 | | 324m³ | 324m³ |
| **Total MG56** | | **324m³** | **324m³** |
| **Type 2** | | | |
| 2017-07-25 | 249m³ | | 249m³ |
| 2017-07-26 | 291m³ | | 291m³ |
| 2017-07-27 | 465m³ | | 465m³ |
| **Total Type 2** | **1 005m³** | | **1 005m³** |
| **Type 4** | | | |
| 2017-07-26 | 60m³ | | 60m³ |
| 2017-07-27 | 150m³ | | 150m³ |
| **Total Type 4** | **210m³** | | **210m³** |
| **TOTAL** | **1 215m³** | **324m³** | **1 539m³** |

File updated: 2017-07-28

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | TOTAL |
|---|---|---|
| **Type 2** | | |
| 2017-07-25 | 249m³ | 249m³ |
| 2017-07-26 | 291m³ | 291m³ |
| 2017-07-27 | 465m³ | 465m³ |
| **Total Type 2** | **1 005m³** | **1 005m³** |
| **Type 4** | | |
| 2017-07-26 | 60m³ | 60m³ |
| 2017-07-27 | 150m³ | 150m³ |
| **Total Type 4** | **210m³** | **210m³** |
| **TOTAL** | **1 215m³** | **1 215m³** |

File updated: 2017-07-29

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | TOTAL |
|---|---|---|
| **Type 2** | | |
| 2017-07-25 | 249m³ | 249m³ |
| 2017-07-26 | 291m³ | 291m³ |
| 2017-07-27 | 465m³ | 465m³ |
| 2017-07-29 | 411m³ | 411m³ |
| **Total Type 2** | **1 416m³** | **1 416m³** |
| **Type 4** | | |
| 2017-07-26 | 60m³ | 60m³ |
| 2017-07-27 | 150m³ | 150m³ |
| 2017-07-29 | 36m³ | 36m³ |
| **Total Type 4** | **246m³** | **246m³** |
| **TOTAL** | **1 662m³** | **1 662m³** |

File updated: 2017-07-30

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | TOTAL |
|---|---|---|
| **Type 2** | | |
| 2017-07-25 | 249m³ | 249m³ |
| 2017-07-26 | 291m³ | 291m³ |
| 2017-07-27 | 465m³ | 465m³ |
| 2017-07-29 | 411m³ | 411m³ |
| 2017-07-30 | 636m³ | 636m³ |
| **Total Type 2** | **2 052m³** | **2 052m³** |
| **Type 4** | | |
| 2017-07-26 | 60m³ | 60m³ |
| 2017-07-27 | 150m³ | 150m³ |
| 2017-07-29 | 36m³ | 36m³ |
| **Total Type 4** | **246m³** | **246m³** |
| **TOTAL** | **2 298m³** | **2 298m³** |

File updated: 2017-07-31

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | TOTAL |
|---|---|---|
| **Type 2** | | |
| 2017-07-25 | 249m³ | 249m³ |
| 2017-07-26 | 291m³ | 291m³ |
| 2017-07-27 | 465m³ | 465m³ |
| 2017-07-29 | 411m³ | 411m³ |
| 2017-07-30 | 636m³ | 636m³ |
| 2017-07-31 | 891m³ | 891m³ |
| **Total Type 2** | **2 943m³** | **2 943m³** |
| **Type 4** | | |
| 2017-07-26 | 60m³ | 60m³ |
| 2017-07-27 | 150m³ | 150m³ |
| 2017-07-29 | 36m³ | 36m³ |
| **Total Type 4** | **246m³** | **246m³** |
| **TOTAL** | **3 189m³** | **3 189m³** |

File updated: 2017-08-01

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | TOTAL |
|---|---|---|
| **Type 2** | | |
| 2017-07-25 | 249m³ | 249m³ |
| 2017-07-26 | 291m³ | 291m³ |
| 2017-07-27 | 465m³ | 465m³ |
| 2017-07-29 | 411m³ | 411m³ |
| 2017-07-30 | 636m³ | 636m³ |
| 2017-07-31 | 891m³ | 891m³ |
| 2017-07-01 | 996m³ | 996m³ |
| **Total Type 2** | **3 939m³** | **3 939m³** |
| **Type 4** | | |
| 2017-07-26 | 60m³ | 60m³ |
| 2017-07-27 | 150m³ | 150m³ |
| 2017-07-29 | 36m³ | 36m³ |
| **Total Type 4** | **246m³** | **246m³** |
| **TOTAL** | **4 185m³** | **4 185m³** |

File updated: 2017-08-02

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | TOTAL |
|---|---|---|
| **Type 2** | | |
| 2017-07-25 | 249m³ | 249m³ |
| 2017-07-26 | 291m³ | 291m³ |
| 2017-07-27 | 465m³ | 465m³ |
| 2017-07-29 | 411m³ | 411m³ |
| 2017-07-30 | 636m³ | 636m³ |
| 2017-07-31 | 891m³ | 891m³ |
| 2017-07-01 | 996m³ | 996m³ |
| 2017-07-02 | 1 005m³ | 1 005m³ |
| **Total Type 2** | **4 944m³** | **4 944m³** |
| **Type 4** | | |
| 2017-07-26 | 60m³ | 60m³ |
| 2017-07-27 | 150m³ | 150m³ |
| 2017-07-29 | 36m³ | 36m³ |
| **Total Type 4** | **246m³** | **246m³** |
| **TOTAL** | **5 190m³** | **5 190m³** |

File updated: 2017-08-03

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | TOTAL |
|---|---|---|
| **Type 2** | | |
| 2017-07-25 | 249m³ | 249m³ |
| 2017-07-26 | 291m³ | 291m³ |
| 2017-07-27 | 465m³ | 465m³ |
| 2017-07-29 | 411m³ | 411m³ |
| 2017-07-30 | 636m³ | 636m³ |
| 2017-07-31 | 891m³ | 891m³ |
| 2017-08-01 | 996m³ | 996m³ |
| 2017-08-02 | 1 005m³ | 1 005m³ |
| 2017-08-03 | 1 059m³ | 1 059m³ |
| **Total Type 2** | **6 003m³** | **6 003m³** |
| **Type 4** | | |
| 2017-07-26 | 60m³ | 60m³ |
| 2017-07-27 | 150m³ | 150m³ |
| 2017-07-29 | 36m³ | 36m³ |
| **Total Type 4** | **246m³** | **246m³** |
| **TOTAL** | **6 249m³** | **6 249m³** |

File updated: 2017-08-04

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | TOTAL |
|---|---|---|
| **Type 2** | | |
| 2017-07-25 | 249m³ | 249m³ |
| 2017-07-26 | 291m³ | 291m³ |
| 2017-07-27 | 465m³ | 465m³ |
| 2017-07-29 | 411m³ | 411m³ |
| 2017-07-30 | 636m³ | 636m³ |
| 2017-07-31 | 891m³ | 891m³ |
| 2017-08-01 | 996m³ | 996m³ |
| 2017-08-02 | 1 005m³ | 1 005m³ |
| 2017-08-03 | 1 059m³ | 1 059m³ |
| 2017-08-04 | 969m³ | 969m³ |
| **Total Type 2** | **6 972m³** | **6 972m³** |
| **Type 4** | | |
| 2017-07-26 | 60m³ | 60m³ |
| 2017-07-27 | 150m³ | 150m³ |
| 2017-07-29 | 36m³ | 36m³ |
| **Total Type 4** | **246m³** | **246m³** |
| **TOTAL** | **7 218m³** | **7 218m³** |

File updated: 2017-08-05

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | TOTAL |
|---|---|---|
| **Type 2** | | |
| 2017-07-25 | 249m³ | 249m³ |
| 2017-07-26 | 291m³ | 291m³ |
| 2017-07-27 | 465m³ | 465m³ |
| 2017-07-29 | 411m³ | 411m³ |
| 2017-07-30 | 636m³ | 636m³ |
| 2017-07-31 | 891m³ | 891m³ |
| 2017-08-01 | 996m³ | 996m³ |
| 2017-08-02 | 1 005m³ | 1 005m³ |
| 2017-08-03 | 1 059m³ | 1 059m³ |
| 2017-08-04 | 969m³ | 969m³ |
| 2017-08-05 | 930m³ | 930m³ |
| **Total Type 2** | **7 902m³** | **7 902m³** |
| **Type 4** | | |
| 2017-07-26 | 60m³ | 60m³ |
| 2017-07-27 | 150m³ | 150m³ |
| 2017-07-29 | 36m³ | 36m³ |
| 2017-08-05 | 48m³ | 48m³ |
| **Total Type 4** | **294m³** | **294m³** |
| **TOTAL** | **8 196m³** | **8 196m³** |

File updated: 2017-08-06

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | TOTAL |
|---|---|---|
| **Type 2** | | |
| 2017-07-25 | 249m³ | 249m³ |
| 2017-07-26 | 291m³ | 291m³ |
| 2017-07-27 | 465m³ | 465m³ |
| 2017-07-29 | 411m³ | 411m³ |
| 2017-07-30 | 636m³ | 636m³ |
| 2017-07-31 | 891m³ | 891m³ |
| 2017-08-01 | 996m³ | 996m³ |
| 2017-08-02 | 1 005m³ | 1 005m³ |
| 2017-08-03 | 1 059m³ | 1 059m³ |
| 2017-08-04 | 969m³ | 969m³ |
| 2017-08-05 | 930m³ | 930m³ |
| 2017-08-06 | 1 005m³ | 1 005m³ |
| **Total Type 2** | **8 907m³** | **8 907m³** |
| **Type 4** | | |
| 2017-07-26 | 60m³ | 60m³ |
| 2017-07-27 | 150m³ | 150m³ |
| 2017-07-29 | 36m³ | 36m³ |
| 2017-08-05 | 48m³ | 48m³ |
| 2017-08-06 | 9m³ | 9m³ |
| **Total Type 4** | **303m³** | **303m³** |
| **TOTAL** | **9 210m³** | **9 210m³** |

File updated: 2017-08-07

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | TOTAL |
|---|---|---|
| **Type 2** | | |
| 2017-07-25 | 249m³ | 249m³ |
| 2017-07-26 | 291m³ | 291m³ |
| 2017-07-27 | 465m³ | 465m³ |
| 2017-07-29 | 411m³ | 411m³ |
| 2017-07-30 | 636m³ | 636m³ |
| 2017-07-31 | 891m³ | 891m³ |
| 2017-08-01 | 996m³ | 996m³ |
| 2017-08-02 | 1 005m³ | 1 005m³ |
| 2017-08-03 | 1 059m³ | 1 059m³ |
| 2017-08-04 | 969m³ | 969m³ |
| 2017-08-05 | 930m³ | 930m³ |
| 2017-08-06 | 1 005m³ | 1 005m³ |
| 2017-08-07 | 891m³ | 891m³ |
| **Total Type 2** | **9 798m³** | **9 798m³** |
| **Type 4** | | |
| 2017-07-26 | 60m³ | 60m³ |
| 2017-07-27 | 150m³ | 150m³ |
| 2017-07-29 | 36m³ | 36m³ |
| 2017-08-05 | 48m³ | 48m³ |
| 2017-08-06 | 9m³ | 9m³ |
| **Total Type 4** | **303m³** | **303m³** |
| **TOTAL** | **10 101m³** | **10 101m³** |

File updated: 2017-08-08

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | TOTAL |
|---|---|---|
| **Type 2** | | |
| 2017-07-25 | 249m³ | 249m³ |
| 2017-07-26 | 291m³ | 291m³ |
| 2017-07-27 | 465m³ | 465m³ |
| 2017-07-29 | 411m³ | 411m³ |
| 2017-07-30 | 636m³ | 636m³ |
| 2017-07-31 | 891m³ | 891m³ |
| 2017-08-01 | 996m³ | 996m³ |
| 2017-08-02 | 1 005m³ | 1 005m³ |
| 2017-08-03 | 1 059m³ | 1 059m³ |
| 2017-08-04 | 969m³ | 969m³ |
| 2017-08-05 | 930m³ | 930m³ |
| 2017-08-06 | 1 005m³ | 1 005m³ |
| 2017-08-07 | 891m³ | 891m³ |
| 2017-08-08 | 126m³ | 126m³ |
| **Total Type 2** | **9 924m³** | **9 924m³** |
| **Type 4** | | |
| 2017-07-26 | 60m³ | 60m³ |
| 2017-07-27 | 150m³ | 150m³ |
| 2017-07-29 | 36m³ | 36m³ |
| 2017-08-05 | 48m³ | 48m³ |
| 2017-08-06 | 9m³ | 9m³ |
| **Total Type 4** | **303m³** | **303m³** |
| **TOTAL** | **10 227m³** | **10 227m³** |

File updated: 2017-08-09

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | TOTAL |
|---|---|---|
| **Type 2** | | |
| 2017-07-25 | 249m³ | 249m³ |
| 2017-07-26 | 291m³ | 291m³ |
| 2017-07-27 | 465m³ | 465m³ |
| 2017-07-29 | 411m³ | 411m³ |
| 2017-07-30 | 636m³ | 636m³ |
| 2017-07-31 | 891m³ | 891m³ |
| 2017-08-01 | 996m³ | 996m³ |
| 2017-08-02 | 1 005m³ | 1 005m³ |
| 2017-08-03 | 1 059m³ | 1 059m³ |
| 2017-08-04 | 969m³ | 969m³ |
| 2017-08-05 | 930m³ | 930m³ |
| 2017-08-06 | 1 005m³ | 1 005m³ |
| 2017-08-07 | 891m³ | 891m³ |
| 2017-08-08 | 126m³ | 126m³ |
| 2017-08-09 | 66m³ | 66m³ |
| **Total Type 2** | **9 990m³** | **9 990m³** |
| **Type 4** | | |
| 2017-07-26 | 60m³ | 60m³ |
| 2017-07-27 | 150m³ | 150m³ |
| 2017-07-29 | 36m³ | 36m³ |
| 2017-08-05 | 48m³ | 48m³ |
| 2017-08-06 | 9m³ | 9m³ |
| 2017-08-09 | 366m³ | 366m³ |
| **Total Type 4** | **669m³** | **669m³** |
| **TOTAL** | **10 659m³** | **10 659m³** |

File updated: 2017-08-10

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to Veh. Dump | TOTAL |
|---|---|---|---|
| **Type 2** | | | |
| 2017-07-25 | 249m³ | | 249m³ |
| 2017-07-26 | 291m³ | | 291m³ |
| 2017-07-27 | 465m³ | | 465m³ |
| 2017-07-29 | 411m³ | | 411m³ |
| 2017-07-30 | 636m³ | | 636m³ |
| 2017-07-31 | 891m³ | | 891m³ |
| 2017-08-01 | 996m³ | | 996m³ |
| 2017-08-02 | 1 005m³ | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | 1 059m³ |
| 2017-08-04 | 969m³ | | 969m³ |
| 2017-08-05 | 930m³ | | 930m³ |
| 2017-08-06 | 1 005m³ | | 1 005m³ |
| 2017-08-07 | 891m³ | | 891m³ |
| 2017-08-08 | 126m³ | | 126m³ |
| 2017-08-09 | 66m³ | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | 644m³ |
| **Total Type 2** | **10 080m³** | **554m³** | **10 634m³** |
| **Type 4** | | | |
| 2017-07-26 | 60m³ | | 60m³ |
| 2017-07-27 | 150m³ | | 150m³ |
| 2017-07-29 | 36m³ | | 36m³ |
| 2017-08-05 | 48m³ | | 48m³ |
| 2017-08-06 | 9m³ | | 9m³ |
| 2017-08-09 | 366m³ | | 366m³ |
| 2017-08-10 | 295m³ | | 295m³ |
| **Total Type 4** | **964m³** | | **964m³** |
| **TOTAL** | **11 044m³** | **554m³** | **11 598m³** |

File updated: 2017-08-11

Kudlik Construction Ltd.

**METAL DUMP REMEDIATION - QAUNTITY SHIPPED ON SITE**

| | Route "A" | Access to Veh. Dump | AEC 3 Main Landfill | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | 0m³ | | 1 026m³ | 1 026m³ |
| **Total Type 2** | **11 660m³** | **554m³** | **1 026m³** | **11 660m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 99m³ | | | 99m³ |
| **Total Type 4** | **1 063m³** | | | **1 063m³** |
| **TOTAL** | **12 723m³** | **554m³** | **1 026m³** | **12 723m³** |

Kudlik Construction Ltd.

**METAL DUMP REMEDIATION - QAUNTITY SHIPPED ON SITE**

| | Route "A" | Access to Veh. Dump | AEC 3 Main Landfill | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | 0m³ | | 1 026m³ | 1 026m³ |
| 2017-08-12 | 0m³ | | 657m³ | 657m³ |
| **Total Type 2** | **10 080m³** | **554m³** | **1 683m³** | **12 317m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 99m³ | | | 99m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1 294m³** | | | **1 294m³** |
| **TOTAL** | **11 374m³** | **554m³** | **1 683m³** | **13 611m³** |

Kudlik Construction Ltd.

**METAL DUMP REMEDIATION - QAUNTITY SHIPPED ON SITE**

| | Route "A" | Access to Veh. Dump | Accès to AEC-1 | AEC 3 Main Landfill | TOTAL |
|---|---|---|---|---|---|
| **Type 2** | | | | | |
| 2017-07-25 | 249m³ | | | | 249m³ |
| 2017-07-26 | 291m³ | | | | 291m³ |
| 2017-07-27 | 465m³ | | | | 465m³ |
| 2017-07-29 | 411m³ | | | | 411m³ |
| 2017-07-30 | 636m³ | | | | 636m³ |
| 2017-07-31 | 891m³ | | | | 891m³ |
| 2017-08-01 | 996m³ | | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | | 969m³ |
| 2017-08-05 | 930m³ | | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | | 891m³ |
| 2017-08-08 | 126m³ | | | | 126m³ |
| 2017-08-09 | 66m³ | | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | | 644m³ |
| 2017-08-11 | 0m³ | | | 1 026m³ | 1 026m³ |
| 2017-08-12 | 0m³ | | | 657m³ | 657m³ |
| 2017-08-13 | | | 372m³ | 111m³ | 483m³ |
| **Total Type 2** | **10 080m³** | **554m³** | **372m³** | **1 794m³** | **12 800m³** |
| **Type 4** | | | | | |
| 2017-07-26 | 60m³ | | | | 60m³ |
| 2017-07-27 | 150m³ | | | | 150m³ |
| 2017-07-29 | 36m³ | | | | 36m³ |
| 2017-08-05 | 48m³ | | | | 48m³ |
| 2017-08-06 | 9m³ | | | | 9m³ |
| 2017-08-09 | 366m³ | | | | 366m³ |
| 2017-08-10 | 295m³ | | | | 295m³ |
| 2017-08-11 | 99m³ | | | | 99m³ |
| 2017-08-12 | 231m³ | | | | 231m³ |
| 2017-08-13 | 0m³ | | | | 0m³ |
| **Total Type 4** | **1 294m³** | | | | **1 294m³** |
| **TOTAL** | **11 374m³** | **554m³** | **372m³** | **1 794m³** | **14 094m³** |

Kudlik Construction Ltd.

## Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | AEC1 | TOTAL |
|---|---|---|---|---|---|
| **Type 2** | | | | | |
| 2017-07-25 | 249m³ | | | | 249m³ |
| 2017-07-26 | 291m³ | | | | 291m³ |
| 2017-07-27 | 465m³ | | | | 465m³ |
| 2017-07-29 | 411m³ | | | | 411m³ |
| 2017-07-30 | 636m³ | | | | 636m³ |
| 2017-07-31 | 891m³ | | | | 891m³ |
| 2017-08-01 | 996m³ | | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | | 969m³ |
| 2017-08-05 | 930m³ | | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | | 891m³ |
| 2017-08-08 | 126m³ | | | | 126m³ |
| 2017-08-09 | 66m³ | | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | | 644m³ |
| 2017-08-11 | | | 1 053m³ | | 1 053m³ |
| 2017-08-12 | | | 657m³ | | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | | 519m³ |
| 2017-08-14 | | | 9m³ | | 9m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **1 875m³** | | **12 872m³** |
| **Type 4** | | | | | |
| 2017-07-26 | 60m³ | | | | 60m³ |
| 2017-07-27 | 150m³ | | | | 150m³ |
| 2017-07-29 | 36m³ | | | | 36m³ |
| 2017-08-05 | 48m³ | | | | 48m³ |
| 2017-08-06 | 9m³ | | | | 9m³ |
| 2017-08-09 | 366m³ | | | | 366m³ |
| 2017-08-10 | 295m³ | | | | 295m³ |
| 2017-08-11 | 126m³ | | | | 126m³ |
| 2017-08-12 | 231m³ | | | | 231m³ |
| **Total Type 4** | **1 321m³** | | | | **1 321m³** |
| **Type 1** | | | | | |
| 2017-08-14 | | | 111m³ | 63m³ | 174m³ |
| **Total Type 1** | | | **111m³** | **63m³** | **174m³** |
| **TOTAL** | **11 401m³** | **917m³** | **1 986m³** | **63m³** | **14 367m³** |

File updated: 2017-08-15

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **1 875m³** | **12 872m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1 321m³** | | | **1 321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| **Total Type 1** | | | **174m³** | **174m³** |
| **TOTAL** | **11 401m³** | **917m³** | **2 049m³** | **14 367m³** |

File updated: 2017-08-16

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **1 875m³** | **12 872m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1 321m³** | | | **1 321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| **Total Type 1** | | | **228m³** | **228m³** |
| **TOTAL** | **11 401m³** | **917m³** | **2 103m³** | **14 421m³** |

File updated: 2017-08-17

Kudlik Construction Ltd.

## Metal Dump Remediation - Quantities shipped on site

| | Route ''A'' | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **1 875m³** | **12 872m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1 321m³** | | | **1 321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| 2017-08-17 | | | 261m³ | 261m³ |
| 2017-08-18 | | | 81m³ | 81m³ |
| **Total Type 1** | | | **570m³** | **570m³** |
| **TOTAL** | **11 401m³** | **917m³** | **2 445m³** | **14 763m³** |

File updated: 2017-08-19

Kudlik Construction Ltd.

## Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **1 875m³** | **12 872m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1 321m³** | | | **1 321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| 2017-08-17 | | | 261m³ | 261m³ |
| 2017-08-18 | | | 81m³ | 81m³ |
| 2017-08-19 | | | 9m³ | 9m³ |
| **Total Type 1** | | | **579m³** | **579m³** |
| **Type 3** | | | | |
| 2017-08-19 | | | 63m³ | 63m³ |
| **Total Type 3** | | | **63m³** | **63m³** |
| **TOTAL** | **11 401m³** | **917m³** | **2 517m³** | **14 835m³** |

File updated: 2017-08-20

Kudlik Construction Ltd.

## Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **2 073m³** | **13 070m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1 321m³** | | | **1 321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| 2017-08-17 | | | 261m³ | 261m³ |
| 2017-08-18 | | | 81m³ | 81m³ |
| 2017-08-19 | | | 9m³ | 9m³ |
| **Total Type 1** | | | **579m³** | **579m³** |
| **Type 3** | | | | |
| 2017-08-19 | | | 63m³ | 63m³ |
| 2017-08-20 | | | 27m³ | 27m³ |
| **Total Type 3** | | | **90m³** | **90m³** |
| **TOTAL** | **11 401m³** | **917m³** | **2 742m³** | **15 060m³** |

File updated: 2017-08-21

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **2 634m³** | **13 631m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1 321m³** | | | **1 321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| 2017-08-17 | | | 261m³ | 261m³ |
| 2017-08-18 | | | 81m³ | 81m³ |
| 2017-08-19 | | | 9m³ | 9m³ |
| **Total Type 1** | | | **579m³** | **579m³** |
| **Type 3** | | | | |
| 2017-08-19 | | | 63m³ | 63m³ |
| 2017-08-20 | | | 27m³ | 27m³ |
| **Total Type 3** | | | **90m³** | **90m³** |
| **TOTAL** | **11 401m³** | **917m³** | **3 303m³** | **15 621m³** |

File updated: 2017-08-22

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **3 111m³** | **14 108m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1 321m³** | | | **1 321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| 2017-08-17 | | | 261m³ | 261m³ |
| 2017-08-18 | | | 81m³ | 81m³ |
| 2017-08-19 | | | 9m³ | 9m³ |
| 2017-08-22 | | | 72m³ | 72m³ |
| **Total Type 1** | | | **651m³** | **651m³** |
| **Type 3** | | | | |
| 2017-08-19 | | | 63m³ | 63m³ |
| 2017-08-20 | | | 27m³ | 27m³ |
| **Total Type 3** | | | **90m³** | **90m³** |
| **TOTAL** | **11 401m³** | **917m³** | **3 852m³** | **16 170m³** |

File updated: 2017-08-23

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **3 759m³** | **14 756m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1 321m³** | | | **1 321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| 2017-08-17 | | | 261m³ | 261m³ |
| 2017-08-18 | | | 81m³ | 81m³ |
| 2017-08-19 | | | 9m³ | 9m³ |
| 2017-08-22 | | | 72m³ | 72m³ |
| 2017-08-23 | | | 9m³ | 9m³ |
| **Total Type 1** | | | **660m³** | **660m³** |
| **Type 3** | | | | |
| 2017-08-19 | | | 63m³ | 63m³ |
| 2017-08-20 | | | 27m³ | 27m³ |
| **Total Type 3** | | | **90m³** | **90m³** |
| **TOTAL** | **11 401m³** | **917m³** | **4 509m³** | **16 827m³** |

File updated: 2017-08-24

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **4 254m³** | **15 251m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1 321m³** | | | **1 321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| 2017-08-17 | | | 261m³ | 261m³ |
| 2017-08-18 | | | 81m³ | 81m³ |
| 2017-08-19 | | | 9m³ | 9m³ |
| 2017-08-22 | | | 72m³ | 72m³ |
| 2017-08-23 | | | 9m³ | 9m³ |
| **Total Type 1** | | | **660m³** | **660m³** |
| **Type 3** | | | | |
| 2017-08-19 | | | 63m³ | 63m³ |
| 2017-08-20 | | | 27m³ | 27m³ |
| 2017-08-24 | | | 153m³ | 153m³ |
| **Total Type 3** | | | **243m³** | **243m³** |
| **TOTAL** | **11 401m³** | **917m³** | **5 157m³** | **17 475m³** |

File updated: 2017-08-25

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1,005m³ | | | 1,005m³ |
| 2017-08-03 | 1,059m³ | | | 1,059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1,005m³ | | | 1,005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1,053m³ | 1,053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| **Total Type 2** | **10,080m³** | **917m³** | **4,599m³** | **15,596m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1,321m³** | | | **1,321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| 2017-08-17 | | | 261m³ | 261m³ |
| 2017-08-18 | | | 81m³ | 81m³ |
| 2017-08-19 | | | 9m³ | 9m³ |
| 2017-08-22 | | | 72m³ | 72m³ |
| 2017-08-23 | | | 9m³ | 9m³ |
| **Total Type 1** | | | **660m³** | **660m³** |
| **Type 3** | | | | |
| 2017-08-19 | | | 63m³ | 63m³ |
| 2017-08-20 | | | 27m³ | 27m³ |
| 2017-08-24 | | | 153m³ | 153m³ |
| 2017-08-25 | | | 252m³ | 252m³ |
| **Total Type 3** | | | **495m³** | **495m³** |
| **TOTAL** | **11,401m³** | **917m³** | **5,754m³** | **18,072m³** |

File updated: 2017-08-26

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1,005m³ | | | 1,005m³ |
| 2017-08-03 | 1,059m³ | | | 1,059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1,005m³ | | | 1,005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1,053m³ | 1,053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| **Total Type 2** | **10,080m³** | **917m³** | **5,220m³** | **16,217m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1,321m³** | | | **1,321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| 2017-08-17 | | | 261m³ | 261m³ |
| 2017-08-18 | | | 81m³ | 81m³ |
| 2017-08-19 | | | 9m³ | 9m³ |
| 2017-08-22 | | | 72m³ | 72m³ |
| 2017-08-23 | | | 9m³ | 9m³ |
| **Total Type 1** | | | **660m³** | **660m³** |
| **Type 3** | | | | |
| 2017-08-19 | | | 63m³ | 63m³ |
| 2017-08-20 | | | 27m³ | 27m³ |
| 2017-08-24 | | | 153m³ | 153m³ |
| 2017-08-25 | | | 252m³ | 252m³ |
| **Total Type 3** | | | **495m³** | **495m³** |
| **TOTAL** | **11,401m³** | **917m³** | **6,375m³** | **18,693m³** |

File updated: 2017-08-27

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1,005m³ | | | 1,005m³ |
| 2017-08-03 | 1,059m³ | | | 1,059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1,005m³ | | | 1,005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1,053m³ | 1,053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| **Total Type 2** | **10,080m³** | **917m³** | **5,970m³** | **16,967m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1,321m³** | | | **1,321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| 2017-08-17 | | | 261m³ | 261m³ |
| 2017-08-18 | | | 81m³ | 81m³ |
| 2017-08-19 | | | 9m³ | 9m³ |
| 2017-08-22 | | | 72m³ | 72m³ |
| 2017-08-23 | | | 9m³ | 9m³ |
| **Total Type 1** | | | **660m³** | **660m³** |
| **Type 3** | | | | |
| 2017-08-19 | | | 63m³ | 63m³ |
| 2017-08-20 | | | 27m³ | 27m³ |
| 2017-08-24 | | | 153m³ | 153m³ |
| 2017-08-25 | | | 252m³ | 252m³ |
| **Total Type 3** | | | **495m³** | **495m³** |
| **TOTAL** | **11,401m³** | **917m³** | **7,125m³** | **19,443m³** |

File updated: 2017-08-28

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1,005m³ | | | 1,005m³ |
| 2017-08-03 | 1,059m³ | | | 1,059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1,005m³ | | | 1,005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1,053m³ | 1,053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| 2017-08-28 | | | 267m³ | 267m³ |
| **Total Type 2** | **10,080m³** | **917m³** | **6,237m³** | **17,234m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1,321m³** | | | **1,321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| 2017-08-17 | | | 261m³ | 261m³ |
| 2017-08-18 | | | 81m³ | 81m³ |
| 2017-08-19 | | | 9m³ | 9m³ |
| 2017-08-22 | | | 72m³ | 72m³ |
| 2017-08-23 | | | 9m³ | 9m³ |
| **Total Type 1** | | | **660m³** | **660m³** |
| **Type 3** | | | | |
| 2017-08-19 | | | 63m³ | 63m³ |
| 2017-08-20 | | | 27m³ | 27m³ |
| 2017-08-24 | | | 153m³ | 153m³ |
| 2017-08-25 | | | 252m³ | 252m³ |
| 2017-08-28 | | | 480m³ | 480m³ |
| **Total Type 3** | | | **975m³** | **975m³** |
| **TOTAL** | **11,401m³** | **917m³** | **7,872m³** | **20,190m³** |

File updated: 2017-08-29

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1,005m³ | | | 1,005m³ |
| 2017-08-03 | 1,059m³ | | | 1,059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1,005m³ | | | 1,005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1,053m³ | 1,053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| 2017-08-28 | | | 267m³ | 267m³ |
| 2017-08-29 | | | 864m³ | 864m³ |
| **Total Type 2** | **10,080m³** | **917m³** | **7,101m³** | **18,098m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1,321m³** | | | **1,321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| 2017-08-17 | | | 261m³ | 261m³ |
| 2017-08-18 | | | 81m³ | 81m³ |
| 2017-08-19 | | | 9m³ | 9m³ |
| 2017-08-22 | | | 72m³ | 72m³ |
| 2017-08-23 | | | 9m³ | 9m³ |
| **Total Type 1** | | | **660m³** | **660m³** |
| **Type 3** | | | | |
| 2017-08-19 | | | 63m³ | 63m³ |
| 2017-08-20 | | | 27m³ | 27m³ |
| 2017-08-24 | | | 153m³ | 153m³ |
| 2017-08-25 | | | 252m³ | 252m³ |
| 2017-08-28 | | | 480m³ | 480m³ |
| **Total Type 3** | | | **975m³** | **975m³** |
| **TOTAL** | **11,401m³** | **917m³** | **8,736m³** | **21,054m³** |

File updated: 2017-08-30

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1,005m³ | | | 1,005m³ |
| 2017-08-03 | 1,059m³ | | | 1,059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1,005m³ | | | 1,005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1,053m³ | 1,053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| 2017-08-28 | | | 267m³ | 267m³ |
| 2017-08-29 | | | 864m³ | 864m³ |
| 2017-08-30 | | | 963m³ | 963m³ |
| **Total Type 2** | **10,080m³** | **917m³** | **8,064m³** | **19,061m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1,321m³** | | | **1,321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| 2017-08-17 | | | 261m³ | 261m³ |
| 2017-08-18 | | | 81m³ | 81m³ |
| 2017-08-19 | | | 9m³ | 9m³ |
| 2017-08-22 | | | 72m³ | 72m³ |
| 2017-08-23 | | | 9m³ | 9m³ |
| **Total Type 1** | | | **660m³** | **660m³** |
| **Type 3** | | | | |
| 2017-08-19 | | | 63m³ | 63m³ |
| 2017-08-20 | | | 27m³ | 27m³ |
| 2017-08-24 | | | 153m³ | 153m³ |
| 2017-08-25 | | | 252m³ | 252m³ |
| 2017-08-28 | | | 480m³ | 480m³ |
| **Total Type 3** | | | **975m³** | **975m³** |
| **TOTAL** | **11,401m³** | **917m³** | **9,699m³** | **22,017m³** |

File updated: 2017-08-31

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1,005m³ | | | 1,005m³ |
| 2017-08-03 | 1,059m³ | | | 1,059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1,005m³ | | | 1,005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1,053m³ | 1,053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| 2017-08-28 | | | 267m³ | 267m³ |
| 2017-08-29 | | | 864m³ | 864m³ |
| 2017-08-30 | | | 963m³ | 963m³ |
| 2017-08-31 | | | 519m³ | 519m³ |
| **Total Type 2** | **10,080m³** | **917m³** | **8,583m³** | **19,580m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1,321m³** | | | **1,321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| 2017-08-17 | | | 261m³ | 261m³ |
| 2017-08-18 | | | 81m³ | 81m³ |
| 2017-08-19 | | | 9m³ | 9m³ |
| 2017-08-22 | | | 72m³ | 72m³ |
| 2017-08-23 | | | 9m³ | 9m³ |
| 2017-08-31 | | | 501m³ | 501m³ |
| **Total Type 1** | | | **1,161m³** | **1,161m³** |
| **Type 3** | | | | |
| 2017-08-19 | | | 63m³ | 63m³ |
| 2017-08-20 | | | 27m³ | 27m³ |
| 2017-08-24 | | | 153m³ | 153m³ |
| 2017-08-25 | | | 252m³ | 252m³ |
| 2017-08-28 | | | 480m³ | 480m³ |
| **Total Type 3** | | | **975m³** | **975m³** |
| **TOTAL** | **11,401m³** | **917m³** | **10,719m³** | **23,037m³** |

File updated: 2017-09-01

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1,005m³ | | | 1,005m³ |
| 2017-08-03 | 1,059m³ | | | 1,059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1,005m³ | | | 1,005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1,053m³ | 1,053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| 2017-08-28 | | | 267m³ | 267m³ |
| 2017-08-29 | | | 864m³ | 864m³ |
| 2017-08-30 | | | 963m³ | 963m³ |
| 2017-08-31 | | | 519m³ | 519m³ |
| 2017-09-01 | | | 582m³ | 582m³ |
| **Total Type 2** | **10,080m³** | **917m³** | **9,165m³** | **20,162m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1,321m³** | | | **1,321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| 2017-08-17 | | | 261m³ | 261m³ |
| 2017-08-18 | | | 81m³ | 81m³ |
| 2017-08-19 | | | 9m³ | 9m³ |
| 2017-08-22 | | | 72m³ | 72m³ |
| 2017-08-23 | | | 9m³ | 9m³ |
| 2017-08-31 | | | 501m³ | 501m³ |
| 2017-09-01 | | | 87m³ | 87m³ |
| **Total Type 1** | | | **1,248m³** | **1,248m³** |

File updated: 2017-09-02

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | | | | |
|---|---|---|---|---|
| **Type 3** | | | | |
| 2017-08-19 | | | 63m³ | 63m³ |
| 2017-08-20 | | | 27m³ | 27m³ |
| 2017-08-24 | | | 153m³ | 153m³ |
| 2017-08-25 | | | 252m³ | 252m³ |
| 2017-08-28 | | | 480m³ | 480m³ |
| 2017-09-01 | | | 195m³ | 195m³ |
| **Total Type 3** | | | **1,170m³** | **1,170m³** |
| **TOTAL** | **11,401m³** | **917m³** | **11,583m³** | **23,901m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1,005m³ | | | 1,005m³ |
| 2017-08-03 | 1,059m³ | | | 1,059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1,005m³ | | | 1,005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1,053m³ | 1,053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| 2017-08-28 | | | 267m³ | 267m³ |
| 2017-08-29 | | | 864m³ | 864m³ |
| 2017-08-30 | | | 963m³ | 963m³ |
| 2017-08-31 | | | 519m³ | 519m³ |
| 2017-09-01 | | | 582m³ | 582m³ |
| 2017-09-02 | | | 513m³ | 513m³ |
| **Total Type 2** | **10,080m³** | **917m³** | **9,678m³** | **20,675m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1,321m³** | | | **1,321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| 2017-08-17 | | | 261m³ | 261m³ |
| 2017-08-18 | | | 81m³ | 81m³ |
| 2017-08-19 | | | 9m³ | 9m³ |
| 2017-08-22 | | | 72m³ | 72m³ |
| 2017-08-23 | | | 9m³ | 9m³ |
| 2017-08-31 | | | 501m³ | 501m³ |
| 2017-09-01 | | | 87m³ | 87m³ |
| **Total Type 1** | | | **1,248m³** | **1,248m³** |

File updated: 2017-09-03

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | | | | |
|---|---|---|---|---|
| **Type 3** | | | | |
| 2017-08-19 | | | 63m³ | 63m³ |
| 2017-08-20 | | | 27m³ | 27m³ |
| 2017-08-24 | | | 153m³ | 153m³ |
| 2017-08-25 | | | 252m³ | 252m³ |
| 2017-08-28 | | | 480m³ | 480m³ |
| 2017-09-01 | | | 195m³ | 195m³ |
| 2017-09-02 | | | 220m³ | 220m³ |
| **Total Type 3** | | | **1,390m³** | **1,390m³** |
| **TOTAL** | **11,401m³** | **917m³** | **12,316m³** | **24,634m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1,005m³ | | | 1,005m³ |
| 2017-08-03 | 1,059m³ | | | 1,059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1,005m³ | | | 1,005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1,053m³ | 1,053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| 2017-08-28 | | | 267m³ | 267m³ |
| 2017-08-29 | | | 864m³ | 864m³ |
| 2017-08-30 | | | 963m³ | 963m³ |
| 2017-08-31 | | | 519m³ | 519m³ |
| 2017-09-01 | | | 582m³ | 582m³ |
| 2017-09-02 | | | 513m³ | 513m³ |
| **Total Type 2** | **10,080m³** | **917m³** | **9,678m³** | **20,675m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1,321m³** | | | **1,321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| 2017-08-17 | | | 261m³ | 261m³ |
| 2017-08-18 | | | 81m³ | 81m³ |
| 2017-08-19 | | | 9m³ | 9m³ |
| 2017-08-22 | | | 72m³ | 72m³ |
| 2017-08-23 | | | 9m³ | 9m³ |
| 2017-08-31 | | | 501m³ | 501m³ |
| 2017-09-01 | | | 87m³ | 87m³ |
| **Total Type 1** | | | **1,248m³** | **1,248m³** |

File updated: 2017-09-03

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | | | | |
|---|---|---|---|---|
| **Type 3** | | | | |
| 2017-08-19 | | | 63m³ | 63m³ |
| 2017-08-20 | | | 27m³ | 27m³ |
| 2017-08-24 | | | 153m³ | 153m³ |
| 2017-08-25 | | | 252m³ | 252m³ |
| 2017-08-28 | | | 480m³ | 480m³ |
| 2017-09-01 | | | 195m³ | 195m³ |
| 2017-09-02 | | | 220m³ | 220m³ |
| **Total Type 3** | | | **1,390m³** | **1,390m³** |
| **TOTAL** | **11,401m³** | **917m³** | **12,316m³** | **24,634m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1,005m³ | | | 1,005m³ |
| 2017-08-03 | 1,059m³ | | | 1,059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1,005m³ | | | 1,005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1,053m³ | 1,053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| 2017-08-28 | | | 267m³ | 267m³ |
| 2017-08-29 | | | 864m³ | 864m³ |
| 2017-08-30 | | | 963m³ | 963m³ |
| 2017-08-31 | | | 519m³ | 519m³ |
| 2017-09-01 | | | 582m³ | 582m³ |
| 2017-09-02 | | | 513m³ | 513m³ |
| **Total Type 2** | **10,080m³** | **917m³** | **9,678m³** | **20,675m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1,321m³** | | | **1,321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| 2017-08-17 | | | 261m³ | 261m³ |
| 2017-08-18 | | | 81m³ | 81m³ |
| 2017-08-19 | | | 9m³ | 9m³ |
| 2017-08-22 | | | 72m³ | 72m³ |
| 2017-08-23 | | | 9m³ | 9m³ |
| 2017-08-31 | | | 501m³ | 501m³ |
| 2017-09-01 | | | 87m³ | 87m³ |
| **Total Type 1** | | | **1,248m³** | **1,248m³** |

File updated: 2017-09-03

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | | | | |
|---|---|---|---|---|
| **Type 3** | | | | |
| 2017-08-19 | | | 63m³ | 63m³ |
| 2017-08-20 | | | 27m³ | 27m³ |
| 2017-08-24 | | | 153m³ | 153m³ |
| 2017-08-25 | | | 252m³ | 252m³ |
| 2017-08-28 | | | 480m³ | 480m³ |
| 2017-09-01 | | | 195m³ | 195m³ |
| 2017-09-02 | | | 220m³ | 220m³ |
| **Total Type 3** | | | **1,390m³** | **1,390m³** |
| **TOTAL** | **11,401m³** | **917m³** | **12,316m³** | **24,634m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| 2017-08-28 | | | 267m³ | 267m³ |
| 2017-08-29 | | | 864m³ | 864m³ |
| 2017-08-30 | | | 963m³ | 963m³ |
| 2017-08-31 | | | 519m³ | 519m³ |
| 2017-09-01 | | | 582m³ | 582m³ |
| 2017-09-02 | | | 513m³ | 513m³ |
| 2017-09-05 | | | 1 092m³ | 1 092m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **10 770m³** | **21 767m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1 321m³** | | | **1 321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| 2017-08-17 | | | 261m³ | 261m³ |
| 2017-08-18 | | | 81m³ | 81m³ |
| 2017-08-19 | | | 9m³ | 9m³ |
| 2017-08-22 | | | 72m³ | 72m³ |
| 2017-08-23 | | | 9m³ | 9m³ |
| 2017-08-31 | | | 501m³ | 501m³ |
| 2017-09-01 | | | 87m³ | 87m³ |
| **Total Type 1** | | | **1 248m³** | **1 248m³** |
| **Type 3** | | | | |
| 2017-08-19 | | | 63m³ | 63m³ |
| 2017-08-20 | | | 27m³ | 27m³ |
| 2017-08-24 | | | 153m³ | 153m³ |
| 2017-08-25 | | | 252m³ | 252m³ |
| 2017-08-28 | | | 480m³ | 480m³ |
| 2017-09-01 | | | 195m³ | 195m³ |
| 2017-09-02 | | | 220m³ | 220m³ |
| **Total Type 3** | | | **1 390m³** | **1 390m³** |

File updated: 2017-09-06

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| 2017-08-28 | | | 267m³ | 267m³ |
| 2017-08-29 | | | 864m³ | 864m³ |
| 2017-08-30 | | | 963m³ | 963m³ |
| 2017-08-31 | | | 519m³ | 519m³ |
| 2017-09-01 | | | 582m³ | 582m³ |
| 2017-09-02 | | | 513m³ | 513m³ |
| 2017-09-05 | | | 1 092m³ | 1 092m³ |
| 2017-09-06 | | | 1 359m³ | 1 359m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **12 129m³** | **23 126m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1 321m³** | | | **1 321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| 2017-08-17 | | | 261m³ | 261m³ |
| 2017-08-18 | | | 81m³ | 81m³ |
| 2017-08-19 | | | 9m³ | 9m³ |
| 2017-08-22 | | | 72m³ | 72m³ |
| 2017-08-23 | | | 9m³ | 9m³ |
| 2017-08-31 | | | 501m³ | 501m³ |
| 2017-09-01 | | | 87m³ | 87m³ |
| **Total Type 1** | | | **1 248m³** | **1 248m³** |
| **Type 3** | | | | |
| 2017-08-19 | | | 63m³ | 63m³ |
| 2017-08-20 | | | 27m³ | 27m³ |
| 2017-08-24 | | | 153m³ | 153m³ |
| 2017-08-25 | | | 252m³ | 252m³ |
| 2017-08-28 | | | 480m³ | 480m³ |
| 2017-09-01 | | | 195m³ | 195m³ |
| 2017-09-02 | | | 220m³ | 220m³ |
| **Total Type 3** | | | **1 390m³** | **1 390m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| 2017-08-28 | | | 267m³ | 267m³ |
| 2017-08-29 | | | 864m³ | 864m³ |
| 2017-08-30 | | | 963m³ | 963m³ |
| 2017-08-31 | | | 519m³ | 519m³ |
| 2017-09-01 | | | 582m³ | 582m³ |
| 2017-09-02 | | | 513m³ | 513m³ |
| 2017-09-05 | | | 1 092m³ | 1 092m³ |
| 2017-09-06 | | | 1 359m³ | 1 359m³ |
| 2017-09-07 | | | 1 329m³ | 1 329m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **13 458m³** | **24 455m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1 321m³** | | | **1 321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| 2017-08-17 | | | 261m³ | 261m³ |
| 2017-08-18 | | | 81m³ | 81m³ |
| 2017-08-19 | | | 9m³ | 9m³ |
| 2017-08-22 | | | 72m³ | 72m³ |
| 2017-08-23 | | | 9m³ | 9m³ |
| 2017-08-31 | | | 501m³ | 501m³ |
| 2017-09-01 | | | 87m³ | 87m³ |
| **Total Type 1** | | | **1 248m³** | **1 248m³** |
| **Type 3** | | | | |
| 2017-08-19 | | | 63m³ | 63m³ |
| 2017-08-20 | | | 27m³ | 27m³ |
| 2017-08-24 | | | 153m³ | 153m³ |
| 2017-08-25 | | | 252m³ | 252m³ |
| 2017-08-28 | | | 480m³ | 480m³ |
| 2017-09-01 | | | 195m³ | 195m³ |
| 2017-09-02 | | | 220m³ | 220m³ |
| **Total Type 3** | | | **1 390m³** | **1 390m³** |

File updated: 2017-09-08

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| 2017-08-28 | | | 267m³ | 267m³ |
| 2017-08-29 | | | 864m³ | 864m³ |
| 2017-08-30 | | | 963m³ | 963m³ |
| 2017-08-31 | | | 519m³ | 519m³ |
| 2017-09-01 | | | 582m³ | 582m³ |
| 2017-09-02 | | | 513m³ | 513m³ |
| 2017-09-05 | | | 1 092m³ | 1 092m³ |
| 2017-09-06 | | | 1 359m³ | 1 359m³ |
| 2017-09-07 | | | 1 329m³ | 1 329m³ |
| 2017-09-08 | | | 219m³ | 219m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **13 677m³** | **24 674m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1 321m³** | | | **1 321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| 2017-08-17 | | | 261m³ | 261m³ |
| 2017-08-18 | | | 81m³ | 81m³ |
| 2017-08-19 | | | 9m³ | 9m³ |
| 2017-08-22 | | | 72m³ | 72m³ |
| 2017-08-23 | | | 9m³ | 9m³ |
| 2017-08-31 | | | 501m³ | 501m³ |
| 2017-09-01 | | | 87m³ | 87m³ |
| **Total Type 1** | | | **1 248m³** | **1 248m³** |
| **Type 3** | | | | |
| 2017-08-19 | | | 63m³ | 63m³ |
| 2017-08-20 | | | 27m³ | 27m³ |
| 2017-08-24 | | | 153m³ | 153m³ |
| 2017-08-25 | | | 252m³ | 252m³ |
| 2017-08-28 | | | 480m³ | 480m³ |
| 2017-09-01 | | | 195m³ | 195m³ |
| 2017-09-02 | | | 220m³ | 220m³ |
| 2017-09-08 | | | 1 065m³ | 1 065m³ |
| **Total Type 3** | | | **2 455m³** | **2 455m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| 2017-08-28 | | | 267m³ | 267m³ |
| 2017-08-29 | | | 864m³ | 864m³ |
| 2017-08-30 | | | 963m³ | 963m³ |
| 2017-08-31 | | | 519m³ | 519m³ |
| 2017-09-01 | | | 582m³ | 582m³ |
| 2017-09-02 | | | 513m³ | 513m³ |
| 2017-09-05 | | | 1 092m³ | 1 092m³ |
| 2017-09-06 | | | 1 359m³ | 1 359m³ |
| 2017-09-07 | | | 1 329m³ | 1 329m³ |
| 2017-09-08 | | | 219m³ | 219m³ |
| 2017-09-09 | | | 522m³ | 522m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **14 199m³** | **25 196m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1 321m³** | | | **1 321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | | 174m³ | 174m³ |
| 2017-08-16 | | | 54m³ | 54m³ |
| 2017-08-17 | | | 261m³ | 261m³ |
| 2017-08-18 | | | 81m³ | 81m³ |
| 2017-08-19 | | | 9m³ | 9m³ |
| 2017-08-22 | | | 72m³ | 72m³ |
| 2017-08-23 | | | 9m³ | 9m³ |
| 2017-08-31 | | | 501m³ | 501m³ |
| 2017-09-01 | | | 87m³ | 87m³ |
| **Total Type 1** | | | **1 248m³** | **1 248m³** |
| **Type 3** | | | | |
| 2017-08-19 | | | 63m³ | 63m³ |
| 2017-08-20 | | | 27m³ | 27m³ |
| 2017-08-24 | | | 153m³ | 153m³ |
| 2017-08-25 | | | 252m³ | 252m³ |
| 2017-08-28 | | | 480m³ | 480m³ |
| 2017-09-01 | | | 195m³ | 195m³ |
| 2017-09-02 | | | 220m³ | 220m³ |
| 2017-09-08 | | | 1 065m³ | 1 065m³ |
| 2017-09-09 | | | 723m³ | 723m³ |
| **Total Type 3** | | | **3 178m³** | **3 178m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| 2017-08-28 | | | 267m³ | 267m³ |
| 2017-08-29 | | | 864m³ | 864m³ |
| 2017-08-30 | | | 963m³ | 963m³ |
| 2017-08-31 | | | 519m³ | 519m³ |
| 2017-09-01 | | | 582m³ | 582m³ |
| 2017-09-02 | | | 513m³ | 513m³ |
| 2017-09-05 | | | 1 200m³ | 1 200m³ |
| 2017-09-06 | | | 1 359m³ | 1 359m³ |
| 2017-09-07 | | | 1 329m³ | 1 329m³ |
| 2017-09-08 | | | 219m³ | 219m³ |
| 2017-09-09 | | | 522m³ | 522m³ |
| 2017-09-10 | | | 1 434m³ | 1 434m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **15 741m³** | **26 738m³** |
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |

File updated: 2017-09-11

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | | | |
|---|---|---|---|
| 2017-08-06 | 9m³ | | 9m³ |
| 2017-08-09 | 366m³ | | 366m³ |
| 2017-08-10 | 295m³ | | 295m³ |
| 2017-08-11 | 126m³ | | 126m³ |
| 2017-08-12 | 231m³ | | 231m³ |
| **Total Type 4** | **1 321m³** | | **1 321m³** |
| **Type 1** | | | |
| 2017-08-14 | | 174m³ | 174m³ |
| 2017-08-16 | | 54m³ | 54m³ |
| 2017-08-17 | | 261m³ | 261m³ |
| 2017-08-18 | | 81m³ | 81m³ |
| 2017-08-19 | | 9m³ | 9m³ |
| 2017-08-22 | | 72m³ | 72m³ |
| 2017-08-23 | | 9m³ | 9m³ |
| 2017-08-31 | | 501m³ | 501m³ |
| 2017-09-01 | | 87m³ | 87m³ |
| **Total Type 1** | | **1 248m³** | **1 248m³** |
| **Type 3** | | | |
| 2017-08-19 | | 63m³ | 63m³ |
| 2017-08-20 | | 27m³ | 27m³ |
| 2017-08-24 | | 153m³ | 153m³ |
| 2017-08-25 | | 252m³ | 252m³ |
| 2017-08-28 | | 480m³ | 480m³ |
| 2017-09-01 | | 195m³ | 195m³ |
| 2017-09-02 | | 220m³ | 220m³ |
| 2017-09-08 | | 1 065m³ | 1 065m³ |
| 2017-09-09 | | 723m³ | 723m³ |
| **Total Type 3** | | **3 178m³** | **3 178m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| 2017-08-28 | | | 267m³ | 267m³ |
| 2017-08-29 | | | 864m³ | 864m³ |
| 2017-08-30 | | | 963m³ | 963m³ |
| 2017-08-31 | | | 519m³ | 519m³ |
| 2017-09-01 | | | 582m³ | 582m³ |
| 2017-09-02 | | | 513m³ | 513m³ |
| 2017-09-05 | | | 1 200m³ | 1 200m³ |
| 2017-09-06 | | | 1 359m³ | 1 359m³ |
| 2017-09-07 | | | 1 329m³ | 1 329m³ |
| 2017-09-08 | | | 219m³ | 219m³ |
| 2017-09-09 | | | 522m³ | 522m³ |
| 2017-09-10 | | | 1 434m³ | 1 434m³ |
| 2017-09-11 | | | 1 107m³ | 1 107m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **16 848m³** | **27 845m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | | | |
|---|---|---|---|
| **Type 4** | | | |
| 2017-07-26 | 60m³ | | 60m³ |
| 2017-07-27 | 150m³ | | 150m³ |
| 2017-07-29 | 36m³ | | 36m³ |
| 2017-08-05 | 48m³ | | 48m³ |
| 2017-08-06 | 9m³ | | 9m³ |
| 2017-08-09 | 366m³ | | 366m³ |
| 2017-08-10 | 295m³ | | 295m³ |
| 2017-08-11 | 126m³ | | 126m³ |
| 2017-08-12 | 231m³ | | 231m³ |
| **Total Type 4** | **1 321m³** | | **1 321m³** |
| **Type 1** | | | |
| 2017-08-14 | | 174m³ | 174m³ |
| 2017-08-16 | | 54m³ | 54m³ |
| 2017-08-17 | | 261m³ | 261m³ |
| 2017-08-18 | | 81m³ | 81m³ |
| 2017-08-19 | | 9m³ | 9m³ |
| 2017-08-22 | | 72m³ | 72m³ |
| 2017-08-23 | | 9m³ | 9m³ |
| 2017-08-31 | | 501m³ | 501m³ |
| 2017-09-01 | | 87m³ | 87m³ |
| **Total Type 1** | | **1 248m³** | **1 248m³** |
| **Type 3** | | | |
| 2017-08-19 | | 63m³ | 63m³ |
| 2017-08-20 | | 27m³ | 27m³ |
| 2017-08-24 | | 153m³ | 153m³ |
| 2017-08-25 | | 252m³ | 252m³ |
| 2017-08-28 | | 480m³ | 480m³ |
| 2017-09-01 | | 195m³ | 195m³ |
| 2017-09-02 | | 220m³ | 220m³ |
| 2017-09-08 | | 1 065m³ | 1 065m³ |
| 2017-09-09 | | 723m³ | 723m³ |
| **Total Type 3** | | **3 178m³** | **3 178m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| 2017-08-28 | | | 267m³ | 267m³ |
| 2017-08-29 | | | 864m³ | 864m³ |
| 2017-08-30 | | | 963m³ | 963m³ |
| 2017-08-31 | | | 519m³ | 519m³ |
| 2017-09-01 | | | 582m³ | 582m³ |
| 2017-09-02 | | | 513m³ | 513m³ |
| 2017-09-05 | | | 1 200m³ | 1 200m³ |
| 2017-09-06 | | | 1 359m³ | 1 359m³ |
| 2017-09-07 | | | 1 329m³ | 1 329m³ |
| 2017-09-08 | | | 219m³ | 219m³ |
| 2017-09-09 | | | 522m³ | 522m³ |
| 2017-09-10 | | | 1 434m³ | 1 434m³ |
| 2017-09-11 | | | 1 107m³ | 1 107m³ |
| 2017-09-12 | | | 917m³ | 917m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **17 765m³** | **28 762m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | | | |
|---|---|---|---|
| **Type 4** | | | |
| 2017-07-26 | 60m³ | | 60m³ |
| 2017-07-27 | 150m³ | | 150m³ |
| 2017-07-29 | 36m³ | | 36m³ |
| 2017-08-05 | 48m³ | | 48m³ |
| 2017-08-06 | 9m³ | | 9m³ |
| 2017-08-09 | 366m³ | | 366m³ |
| 2017-08-10 | 295m³ | | 295m³ |
| 2017-08-11 | 126m³ | | 126m³ |
| 2017-08-12 | 231m³ | | 231m³ |
| **Total Type 4** | **1 321m³** | | **1 321m³** |
| **Type 1** | | | |
| 2017-08-14 | | 174m³ | 174m³ |
| 2017-08-16 | | 54m³ | 54m³ |
| 2017-08-17 | | 261m³ | 261m³ |
| 2017-08-18 | | 81m³ | 81m³ |
| 2017-08-19 | | 9m³ | 9m³ |
| 2017-08-22 | | 72m³ | 72m³ |
| 2017-08-23 | | 9m³ | 9m³ |
| 2017-08-31 | | 501m³ | 501m³ |
| 2017-09-01 | | 87m³ | 87m³ |
| **Total Type 1** | | **1 248m³** | **1 248m³** |
| **Type 3** | | | |
| 2017-08-19 | | 63m³ | 63m³ |
| 2017-08-20 | | 27m³ | 27m³ |
| 2017-08-24 | | 153m³ | 153m³ |
| 2017-08-25 | | 252m³ | 252m³ |
| 2017-08-28 | | 480m³ | 480m³ |
| 2017-09-01 | | 195m³ | 195m³ |
| 2017-09-02 | | 220m³ | 220m³ |
| 2017-09-08 | | 1 065m³ | 1 065m³ |
| 2017-09-09 | | 723m³ | 723m³ |
| **Total Type 3** | | **3 178m³** | **3 178m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| 2017-08-28 | | | 267m³ | 267m³ |
| 2017-08-29 | | | 864m³ | 864m³ |
| 2017-08-30 | | | 963m³ | 963m³ |
| 2017-08-31 | | | 519m³ | 519m³ |
| 2017-09-01 | | | 582m³ | 582m³ |
| 2017-09-02 | | | 513m³ | 513m³ |
| 2017-09-05 | | | 1 200m³ | 1 200m³ |
| 2017-09-06 | | | 1 359m³ | 1 359m³ |
| 2017-09-07 | | | 1 329m³ | 1 329m³ |
| 2017-09-08 | | | 219m³ | 219m³ |
| 2017-09-09 | | | 522m³ | 522m³ |
| 2017-09-10 | | | 1 434m³ | 1 434m³ |
| 2017-09-11 | | | 1 107m³ | 1 107m³ |
| 2017-09-12 | | | 917m³ | 917m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **17 765m³** | **28 762m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | | | |
|---|---|---|---|
| **Type 4** | | | |
| 2017-07-26 | 60m³ | | 60m³ |
| 2017-07-27 | 150m³ | | 150m³ |
| 2017-07-29 | 36m³ | | 36m³ |
| 2017-08-05 | 48m³ | | 48m³ |
| 2017-08-06 | 9m³ | | 9m³ |
| 2017-08-09 | 366m³ | | 366m³ |
| 2017-08-10 | 295m³ | | 295m³ |
| 2017-08-11 | 126m³ | | 126m³ |
| 2017-08-12 | 231m³ | | 231m³ |
| **Total Type 4** | **1 321m³** | | **1 321m³** |
| **Type 1** | | | |
| 2017-08-14 | | 174m³ | 174m³ |
| 2017-08-16 | | 54m³ | 54m³ |
| 2017-08-17 | | 261m³ | 261m³ |
| 2017-08-18 | | 81m³ | 81m³ |
| 2017-08-19 | | 9m³ | 9m³ |
| 2017-08-22 | | 72m³ | 72m³ |
| 2017-08-23 | | 9m³ | 9m³ |
| 2017-08-31 | | 501m³ | 501m³ |
| 2017-09-01 | | 87m³ | 87m³ |
| **Total Type 1** | | **1 248m³** | **1 248m³** |
| **Type 3** | | | |
| 2017-08-19 | | 63m³ | 63m³ |
| 2017-08-20 | | 27m³ | 27m³ |
| 2017-08-24 | | 153m³ | 153m³ |
| 2017-08-25 | | 252m³ | 252m³ |
| 2017-08-28 | | 480m³ | 480m³ |
| 2017-09-01 | | 195m³ | 195m³ |
| 2017-09-02 | | 220m³ | 220m³ |
| 2017-09-08 | | 1 065m³ | 1 065m³ |
| 2017-09-09 | | 723m³ | 723m³ |
| 2017-09-14 | | 360m³ | 360m³ |
| **Total Type 3** | | **3 538m³** | **3 538m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| 2017-08-28 | | | 267m³ | 267m³ |
| 2017-08-29 | | | 864m³ | 864m³ |
| 2017-08-30 | | | 963m³ | 963m³ |
| 2017-08-31 | | | 519m³ | 519m³ |
| 2017-09-01 | | | 582m³ | 582m³ |
| 2017-09-02 | | | 513m³ | 513m³ |
| 2017-09-05 | | | 1 200m³ | 1 200m³ |
| 2017-09-06 | | | 1 359m³ | 1 359m³ |
| 2017-09-07 | | | 1 329m³ | 1 329m³ |
| 2017-09-08 | | | 219m³ | 219m³ |
| 2017-09-09 | | | 522m³ | 522m³ |
| 2017-09-10 | | | 1 434m³ | 1 434m³ |
| 2017-09-11 | | | 1 107m³ | 1 107m³ |
| 2017-09-12 | | | 917m³ | 917m³ |
| 2017-09-15 | | | 828m³ | 828m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **18 593m³** | **29 590m³** |

File updated: 2017-09-16

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | | | |
|---|---|---|---|
| **Type 4** | | | |
| 2017-07-26 | 60m³ | | 60m³ |
| 2017-07-27 | 150m³ | | 150m³ |
| 2017-07-29 | 36m³ | | 36m³ |
| 2017-08-05 | 48m³ | | 48m³ |
| 2017-08-06 | 9m³ | | 9m³ |
| 2017-08-09 | 366m³ | | 366m³ |
| 2017-08-10 | 295m³ | | 295m³ |
| 2017-08-11 | 126m³ | | 126m³ |
| 2017-08-12 | 231m³ | | 231m³ |
| **Total Type 4** | **1 321m³** | | **1 321m³** |
| **Type 1** | | | |
| 2017-08-14 | | 174m³ | 174m³ |
| 2017-08-16 | | 54m³ | 54m³ |
| 2017-08-17 | | 261m³ | 261m³ |
| 2017-08-18 | | 81m³ | 81m³ |
| 2017-08-19 | | 9m³ | 9m³ |
| 2017-08-22 | | 72m³ | 72m³ |
| 2017-08-23 | | 9m³ | 9m³ |
| 2017-08-31 | | 501m³ | 501m³ |
| 2017-09-01 | | 87m³ | 87m³ |
| **Total Type 1** | | **1 248m³** | **1 248m³** |
| **Type 3** | | | |
| 2017-08-19 | | 63m³ | 63m³ |
| 2017-08-20 | | 27m³ | 27m³ |
| 2017-08-24 | | 153m³ | 153m³ |
| 2017-08-25 | | 252m³ | 252m³ |
| 2017-08-28 | | 480m³ | 480m³ |
| 2017-09-01 | | 195m³ | 195m³ |
| 2017-09-02 | | 220m³ | 220m³ |
| 2017-09-08 | | 1 065m³ | 1 065m³ |
| 2017-09-09 | | 723m³ | 723m³ |
| 2017-09-14 | | 360m³ | 360m³ |
| 2017-09-15 | | 162m³ | 162m³ |
| **Total Type 3** | | **3 700m³** | **3 700m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| 2017-08-28 | | | 267m³ | 267m³ |
| 2017-08-29 | | | 864m³ | 864m³ |
| 2017-08-30 | | | 963m³ | 963m³ |
| 2017-08-31 | | | 519m³ | 519m³ |
| 2017-09-01 | | | 582m³ | 582m³ |
| 2017-09-02 | | | 513m³ | 513m³ |
| 2017-09-05 | | | 1 200m³ | 1 200m³ |
| 2017-09-06 | | | 1 359m³ | 1 359m³ |
| 2017-09-07 | | | 1 329m³ | 1 329m³ |
| 2017-09-08 | | | 219m³ | 219m³ |
| 2017-09-09 | | | 522m³ | 522m³ |
| 2017-09-10 | | | 1 434m³ | 1 434m³ |
| 2017-09-11 | | | 1 107m³ | 1 107m³ |
| 2017-09-12 | | | 917m³ | 917m³ |
| 2017-09-15 | | | 828m³ | 828m³ |
| 2017-09-16 | | | 1 341m³ | 1 341m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **19 934m³** | **30 931m³** |

File updated: 2017-09-17

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | | | |
|---|---|---|---|
| **Type 4** | | | |
| 2017-07-26 | 60m³ | | 60m³ |
| 2017-07-27 | 150m³ | | 150m³ |
| 2017-07-29 | 36m³ | | 36m³ |
| 2017-08-05 | 48m³ | | 48m³ |
| 2017-08-06 | 9m³ | | 9m³ |
| 2017-08-09 | 366m³ | | 366m³ |
| 2017-08-10 | 295m³ | | 295m³ |
| 2017-08-11 | 126m³ | | 126m³ |
| 2017-08-12 | 231m³ | | 231m³ |
| **Total Type 4** | **1 321m³** | | **1 321m³** |
| **Type 1** | | | |
| 2017-08-14 | | 174m³ | 174m³ |
| 2017-08-16 | | 54m³ | 54m³ |
| 2017-08-17 | | 261m³ | 261m³ |
| 2017-08-18 | | 81m³ | 81m³ |
| 2017-08-19 | | 9m³ | 9m³ |
| 2017-08-22 | | 72m³ | 72m³ |
| 2017-08-23 | | 9m³ | 9m³ |
| 2017-08-31 | | 501m³ | 501m³ |
| 2017-09-01 | | 87m³ | 87m³ |
| **Total Type 1** | | **1 248m³** | **1 248m³** |
| **Type 3** | | | |
| 2017-08-19 | | 63m³ | 63m³ |
| 2017-08-20 | | 27m³ | 27m³ |
| 2017-08-24 | | 153m³ | 153m³ |
| 2017-08-25 | | 252m³ | 252m³ |
| 2017-08-28 | | 480m³ | 480m³ |
| 2017-09-01 | | 195m³ | 195m³ |
| 2017-09-02 | | 220m³ | 220m³ |
| 2017-09-08 | | 1 065m³ | 1 065m³ |
| 2017-09-09 | | 723m³ | 723m³ |
| 2017-09-14 | | 360m³ | 360m³ |
| 2017-09-15 | | 162m³ | 162m³ |
| **Total Type 3** | | **3 700m³** | **3 700m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| 2017-08-28 | | | 267m³ | 267m³ |
| 2017-08-29 | | | 864m³ | 864m³ |
| 2017-08-30 | | | 963m³ | 963m³ |
| 2017-08-31 | | | 519m³ | 519m³ |
| 2017-09-01 | | | 582m³ | 582m³ |
| 2017-09-02 | | | 513m³ | 513m³ |
| 2017-09-05 | | | 1 200m³ | 1 200m³ |
| 2017-09-06 | | | 1 359m³ | 1 359m³ |
| 2017-09-07 | | | 1 329m³ | 1 329m³ |
| 2017-09-08 | | | 219m³ | 219m³ |
| 2017-09-09 | | | 522m³ | 522m³ |
| 2017-09-10 | | | 1 434m³ | 1 434m³ |
| 2017-09-11 | | | 1 107m³ | 1 107m³ |
| 2017-09-12 | | | 917m³ | 917m³ |
| 2017-09-15 | | | 828m³ | 828m³ |
| 2017-09-16 | | | 1 341m³ | 1 341m³ |
| 2017-09-17 | | | 987m³ | 987m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **20 921m³** | **31 918m³** |

File updated: 2017-09-18

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | | | |
|---|---|---|---|
| **Type 4** | | | |
| 2017-07-26 | 60m³ | | 60m³ |
| 2017-07-27 | 150m³ | | 150m³ |
| 2017-07-29 | 36m³ | | 36m³ |
| 2017-08-05 | 48m³ | | 48m³ |
| 2017-08-06 | 9m³ | | 9m³ |
| 2017-08-09 | 366m³ | | 366m³ |
| 2017-08-10 | 295m³ | | 295m³ |
| 2017-08-11 | 126m³ | | 126m³ |
| 2017-08-12 | 231m³ | | 231m³ |
| **Total Type 4** | **1 321m³** | | **1 321m³** |
| **Type 1** | | | |
| 2017-08-14 | | 174m³ | 174m³ |
| 2017-08-16 | | 54m³ | 54m³ |
| 2017-08-17 | | 261m³ | 261m³ |
| 2017-08-18 | | 81m³ | 81m³ |
| 2017-08-19 | | 9m³ | 9m³ |
| 2017-08-22 | | 72m³ | 72m³ |
| 2017-08-23 | | 9m³ | 9m³ |
| 2017-08-31 | | 501m³ | 501m³ |
| 2017-09-01 | | 87m³ | 87m³ |
| **Total Type 1** | | **1 248m³** | **1 248m³** |
| **Type 3** | | | |
| 2017-08-19 | | 63m³ | 63m³ |
| 2017-08-20 | | 27m³ | 27m³ |
| 2017-08-24 | | 153m³ | 153m³ |
| 2017-08-25 | | 252m³ | 252m³ |
| 2017-08-28 | | 480m³ | 480m³ |
| 2017-09-01 | | 195m³ | 195m³ |
| 2017-09-02 | | 220m³ | 220m³ |
| 2017-09-08 | | 1 065m³ | 1 065m³ |
| 2017-09-09 | | 723m³ | 723m³ |
| 2017-09-14 | | 360m³ | 360m³ |
| 2017-09-15 | | 162m³ | 162m³ |
| **Total Type 3** | | **3 700m³** | **3 700m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| 2017-08-28 | | | 267m³ | 267m³ |
| 2017-08-29 | | | 864m³ | 864m³ |
| 2017-08-30 | | | 963m³ | 963m³ |
| 2017-08-31 | | | 519m³ | 519m³ |
| 2017-09-01 | | | 582m³ | 582m³ |
| 2017-09-02 | | | 513m³ | 513m³ |
| 2017-09-05 | | | 1 200m³ | 1 200m³ |
| 2017-09-06 | | | 1 359m³ | 1 359m³ |
| 2017-09-07 | | | 1 329m³ | 1 329m³ |
| 2017-09-08 | | | 219m³ | 219m³ |
| 2017-09-09 | | | 522m³ | 522m³ |
| 2017-09-10 | | | 1 434m³ | 1 434m³ |
| 2017-09-11 | | | 1 107m³ | 1 107m³ |
| 2017-09-12 | | | 917m³ | 917m³ |
| 2017-09-15 | | | 828m³ | 828m³ |
| 2017-09-16 | | | 1 341m³ | 1 341m³ |
| 2017-09-17 | | | 987m³ | 987m³ |
| 2017-09-18 | | | 1 113m³ | 1 113m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **22 034m³** | **33 031m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | | | |
|---|---|---|---|
| **Type 4** | | | |
| 2017-07-26 | 60m³ | | 60m³ |
| 2017-07-27 | 150m³ | | 150m³ |
| 2017-07-29 | 36m³ | | 36m³ |
| 2017-08-05 | 48m³ | | 48m³ |
| 2017-08-06 | 9m³ | | 9m³ |
| 2017-08-09 | 366m³ | | 366m³ |
| 2017-08-10 | 295m³ | | 295m³ |
| 2017-08-11 | 126m³ | | 126m³ |
| 2017-08-12 | 231m³ | | 231m³ |
| **Total Type 4** | **1 321m³** | | **1 321m³** |
| **Type 1** | | | |
| 2017-08-14 | | 174m³ | 174m³ |
| 2017-08-16 | | 54m³ | 54m³ |
| 2017-08-17 | | 261m³ | 261m³ |
| 2017-08-18 | | 81m³ | 81m³ |
| 2017-08-19 | | 9m³ | 9m³ |
| 2017-08-22 | | 72m³ | 72m³ |
| 2017-08-23 | | 9m³ | 9m³ |
| 2017-08-31 | | 501m³ | 501m³ |
| 2017-09-01 | | 87m³ | 87m³ |
| **Total Type 1** | | **1 248m³** | **1 248m³** |
| **Type 3** | | | |
| 2017-08-19 | | 63m³ | 63m³ |
| 2017-08-20 | | 27m³ | 27m³ |
| 2017-08-24 | | 153m³ | 153m³ |
| 2017-08-25 | | 252m³ | 252m³ |
| 2017-08-28 | | 480m³ | 480m³ |
| 2017-09-01 | | 195m³ | 195m³ |
| 2017-09-02 | | 220m³ | 220m³ |
| 2017-09-08 | | 1 065m³ | 1 065m³ |
| 2017-09-09 | | 723m³ | 723m³ |
| 2017-09-14 | | 360m³ | 360m³ |
| 2017-09-15 | | 162m³ | 162m³ |
| 2017-09-18 | | 93m³ | 93m³ |
| **Total Type 3** | | **3 793m³** | **3 793m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| 2017-08-28 | | | 267m³ | 267m³ |
| 2017-08-29 | | | 864m³ | 864m³ |
| 2017-08-30 | | | 963m³ | 963m³ |
| 2017-08-31 | | | 519m³ | 519m³ |
| 2017-09-01 | | | 582m³ | 582m³ |
| 2017-09-02 | | | 513m³ | 513m³ |
| 2017-09-05 | | | 1 200m³ | 1 200m³ |
| 2017-09-06 | | | 1 359m³ | 1 359m³ |
| 2017-09-07 | | | 1 329m³ | 1 329m³ |
| 2017-09-08 | | | 219m³ | 219m³ |
| 2017-09-09 | | | 522m³ | 522m³ |
| 2017-09-10 | | | 1 434m³ | 1 434m³ |
| 2017-09-11 | | | 1 107m³ | 1 107m³ |
| 2017-09-12 | | | 917m³ | 917m³ |
| 2017-09-15 | | | 828m³ | 828m³ |
| 2017-09-16 | | | 1 341m³ | 1 341m³ |
| 2017-09-17 | | | 987m³ | 987m³ |
| 2017-09-18 | | | 1 113m³ | 1 113m³ |
| 2017-09-19 | | | 840m³ | 840m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **22 874m³** | **33 871m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | | | |
|---|---|---|---|
| **Type 4** | | | |
| 2017-07-26 | 60m³ | | 60m³ |
| 2017-07-27 | 150m³ | | 150m³ |
| 2017-07-29 | 36m³ | | 36m³ |
| 2017-08-05 | 48m³ | | 48m³ |
| 2017-08-06 | 9m³ | | 9m³ |
| 2017-08-09 | 366m³ | | 366m³ |
| 2017-08-10 | 295m³ | | 295m³ |
| 2017-08-11 | 126m³ | | 126m³ |
| 2017-08-12 | 231m³ | | 231m³ |
| **Total Type 4** | **1 321m³** | | **1 321m³** |
| **Type 1** | | | |
| 2017-08-14 | | 174m³ | 174m³ |
| 2017-08-16 | | 54m³ | 54m³ |
| 2017-08-17 | | 261m³ | 261m³ |
| 2017-08-18 | | 81m³ | 81m³ |
| 2017-08-19 | | 9m³ | 9m³ |
| 2017-08-22 | | 72m³ | 72m³ |
| 2017-08-23 | | 9m³ | 9m³ |
| 2017-08-31 | | 501m³ | 501m³ |
| 2017-09-01 | | 87m³ | 87m³ |
| **Total Type 1** | | **1 248m³** | **1 248m³** |
| **Type 3** | | | |
| 2017-08-19 | | 63m³ | 63m³ |
| 2017-08-20 | | 27m³ | 27m³ |
| 2017-08-24 | | 153m³ | 153m³ |
| 2017-08-25 | | 252m³ | 252m³ |
| 2017-08-28 | | 480m³ | 480m³ |
| 2017-09-01 | | 195m³ | 195m³ |
| 2017-09-02 | | 220m³ | 220m³ |
| 2017-09-08 | | 1 065m³ | 1 065m³ |
| 2017-09-09 | | 723m³ | 723m³ |
| 2017-09-14 | | 360m³ | 360m³ |
| 2017-09-15 | | 162m³ | 162m³ |
| 2017-09-18 | | 93m³ | 93m³ |
| **Total Type 3** | | **3 793m³** | **3 793m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | TOTAL |
|---|---|---|---|---|
| **Type 2** | | | | |
| 2017-07-25 | 249m³ | | | 249m³ |
| 2017-07-26 | 291m³ | | | 291m³ |
| 2017-07-27 | 465m³ | | | 465m³ |
| 2017-07-29 | 411m³ | | | 411m³ |
| 2017-07-30 | 636m³ | | | 636m³ |
| 2017-07-31 | 891m³ | | | 891m³ |
| 2017-08-01 | 996m³ | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | 969m³ |
| 2017-08-05 | 930m³ | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | 891m³ |
| 2017-08-08 | 126m³ | | | 126m³ |
| 2017-08-09 | 66m³ | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | 644m³ |
| 2017-08-11 | | | 1 053m³ | 1 053m³ |
| 2017-08-12 | | | 657m³ | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | 519m³ |
| 2017-08-14 | | | 9m³ | 9m³ |
| 2017-08-20 | | | 198m³ | 198m³ |
| 2017-08-21 | | | 561m³ | 561m³ |
| 2017-08-22 | | | 477m³ | 477m³ |
| 2017-08-23 | | | 648m³ | 648m³ |
| 2017-08-24 | | | 495m³ | 495m³ |
| 2017-08-25 | | | 345m³ | 345m³ |
| 2017-08-26 | | | 621m³ | 621m³ |
| 2017-08-27 | | | 750m³ | 750m³ |
| 2017-08-28 | | | 267m³ | 267m³ |
| 2017-08-29 | | | 864m³ | 864m³ |
| 2017-08-30 | | | 963m³ | 963m³ |
| 2017-08-31 | | | 519m³ | 519m³ |
| 2017-09-01 | | | 582m³ | 582m³ |
| 2017-09-02 | | | 513m³ | 513m³ |
| 2017-09-05 | | | 1 200m³ | 1 200m³ |
| 2017-09-06 | | | 1 359m³ | 1 359m³ |
| 2017-09-07 | | | 1 329m³ | 1 329m³ |
| 2017-09-08 | | | 219m³ | 219m³ |
| 2017-09-09 | | | 522m³ | 522m³ |
| 2017-09-10 | | | 1 434m³ | 1 434m³ |
| 2017-09-11 | | | 1 107m³ | 1 107m³ |
| 2017-09-12 | | | 917m³ | 917m³ |
| 2017-09-15 | | | 828m³ | 828m³ |
| 2017-09-16 | | | 1 341m³ | 1 341m³ |
| 2017-09-17 | | | 987m³ | 987m³ |
| 2017-09-18 | | | 1 113m³ | 1 113m³ |
| 2017-09-19 | | | 840m³ | 840m³ |
| 2017-09-20 | | | 867m³ | 867m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **23 741m³** | **34 738m³** |

File updated: 2017-09-21

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | | | |
|---|---|---|---|
| **Type 4** | | | |
| 2017-07-26 | 60m³ | | 60m³ |
| 2017-07-27 | 150m³ | | 150m³ |
| 2017-07-29 | 36m³ | | 36m³ |
| 2017-08-05 | 48m³ | | 48m³ |
| 2017-08-06 | 9m³ | | 9m³ |
| 2017-08-09 | 366m³ | | 366m³ |
| 2017-08-10 | 295m³ | | 295m³ |
| 2017-08-11 | 126m³ | | 126m³ |
| 2017-08-12 | 231m³ | | 231m³ |
| **Total Type 4** | **1 321m³** | | **1 321m³** |
| **Type 1** | | | |
| 2017-08-14 | | 174m³ | 174m³ |
| 2017-08-16 | | 54m³ | 54m³ |
| 2017-08-17 | | 261m³ | 261m³ |
| 2017-08-18 | | 81m³ | 81m³ |
| 2017-08-19 | | 9m³ | 9m³ |
| 2017-08-22 | | 72m³ | 72m³ |
| 2017-08-23 | | 9m³ | 9m³ |
| 2017-08-31 | | 501m³ | 501m³ |
| 2017-09-01 | | 87m³ | 87m³ |
| **Total Type 1** | | **1 248m³** | **1 248m³** |
| **Type 3** | | | |
| 2017-08-19 | | 63m³ | 63m³ |
| 2017-08-20 | | 27m³ | 27m³ |
| 2017-08-24 | | 153m³ | 153m³ |
| 2017-08-25 | | 252m³ | 252m³ |
| 2017-08-28 | | 480m³ | 480m³ |
| 2017-09-01 | | 195m³ | 195m³ |
| 2017-09-02 | | 220m³ | 220m³ |
| 2017-09-08 | | 1 065m³ | 1 065m³ |
| 2017-09-09 | | 723m³ | 723m³ |
| 2017-09-14 | | 360m³ | 360m³ |
| 2017-09-15 | | 162m³ | 162m³ |
| 2017-09-18 | | 93m³ | 93m³ |
| **Total Type 3** | | **3 793m³** | **3 793m³** |

Kudlik Construction Ltd.

## Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | AEC1 | Stockpile | TOTAL |
|---|---|---|---|---|---|---|
| **Type 2** | | | | | | |
| 2017-07-25 | 249m³ | | | | | 249m³ |
| 2017-07-26 | 291m³ | | | | | 291m³ |
| 2017-07-27 | 465m³ | | | | | 465m³ |
| 2017-07-29 | 411m³ | | | | | 411m³ |
| 2017-07-30 | 636m³ | | | | | 636m³ |
| 2017-07-31 | 891m³ | | | | | 891m³ |
| 2017-08-01 | 996m³ | | | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | | | 969m³ |
| 2017-08-05 | 930m³ | | | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | | | 891m³ |
| 2017-08-08 | 126m³ | | | | | 126m³ |
| 2017-08-09 | 66m³ | | | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | | | 644m³ |
| 2017-08-11 | | | 1 053m³ | | | 1 053m³ |
| 2017-08-12 | | | 657m³ | | | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | | | 519m³ |
| 2017-08-14 | | | 9m³ | | | 9m³ |
| 2017-08-20 | | | 198m³ | | | 198m³ |
| 2017-08-21 | | | 561m³ | | | 561m³ |
| 2017-08-22 | | | 477m³ | | | 477m³ |
| 2017-08-23 | | | 648m³ | | | 648m³ |
| 2017-08-24 | | | 495m³ | | | 495m³ |
| 2017-08-25 | | | 345m³ | | | 345m³ |
| 2017-08-26 | | | 621m³ | | | 621m³ |
| 2017-08-27 | | | 750m³ | | | 750m³ |
| 2017-08-28 | | | 267m³ | | | 267m³ |
| 2017-08-29 | | | 864m³ | | | 864m³ |
| 2017-08-30 | | | 963m³ | | | 963m³ |
| 2017-08-31 | | | 519m³ | | | 519m³ |
| 2017-09-01 | | | 582m³ | | | 582m³ |
| 2017-09-02 | | | 513m³ | | | 513m³ |
| 2017-09-05 | | | 1 200m³ | | | 1 200m³ |
| 2017-09-06 | | | 1 359m³ | | | 1 359m³ |
| 2017-09-07 | | | 1 329m³ | | | 1 329m³ |
| 2017-09-08 | | | 219m³ | | | 219m³ |
| 2017-09-09 | | | 522m³ | | | 522m³ |
| 2017-09-10 | | | 1 434m³ | | | 1 434m³ |
| 2017-09-11 | | | 1 107m³ | | | 1 107m³ |
| 2017-09-12 | | | 917m³ | | | 917m³ |
| 2017-09-15 | | | 828m³ | | | 828m³ |
| 2017-09-16 | | | 1 341m³ | | | 1 341m³ |
| 2017-09-17 | | | 987m³ | | | 987m³ |
| 2017-09-18 | | | 1 113m³ | | | 1 113m³ |
| 2017-09-19 | | | 840m³ | | | 840m³ |
| 2017-09-20 | | | 867m³ | | | 867m³ |
| 2017-09-21 | | | | 285m³ | 243m³ | 528m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **23 741m³** | **285m³** | **243m³** | **35 266m³** |

Kudlik Construction Ltd.

## Metal Dump Remediation - Quantities shipped on site

| | | | | |
|---|---|---|---|---|
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| **Total Type 4** | **1 321m³** | | | **1 321m³** |
| **Type 1** | | | | |
| 2017-08-14 | | 174m³ | | 174m³ |
| 2017-08-16 | | 54m³ | | 54m³ |
| 2017-08-17 | | 261m³ | | 261m³ |
| 2017-08-18 | | 81m³ | | 81m³ |
| 2017-08-19 | | 9m³ | | 9m³ |
| 2017-08-22 | | 72m³ | | 72m³ |
| 2017-08-23 | | 9m³ | | 9m³ |
| 2017-08-31 | | 501m³ | | 501m³ |
| 2017-09-01 | | 87m³ | | 87m³ |
| **Total Type 1** | | **1 248m³** | | **1 248m³** |
| **Type 3** | | | | |
| 2017-08-19 | | 63m³ | | 63m³ |
| 2017-08-20 | | 27m³ | | 27m³ |
| 2017-08-24 | | 153m³ | | 153m³ |
| 2017-08-25 | | 252m³ | | 252m³ |
| 2017-08-28 | | 480m³ | | 480m³ |
| 2017-09-01 | | 195m³ | | 195m³ |
| 2017-09-02 | | 220m³ | | 220m³ |
| 2017-09-08 | | 1 065m³ | | 1 065m³ |
| 2017-09-09 | | 723m³ | | 723m³ |
| 2017-09-14 | | 360m³ | | 360m³ |
| 2017-09-15 | | 162m³ | | 162m³ |
| 2017-09-18 | | 93m³ | | 93m³ |
| 2017-09-21 | | | 363m³ | 363m³ |
| **Total Type 3** | | **3 793m³** | **363m³** | **4 156m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | AEC1 | Stockpile | TOTAL |
|---|---|---|---|---|---|---|
| **Type 2** | | | | | | |
| 2017-07-25 | 249m³ | | | | | 249m³ |
| 2017-07-26 | 291m³ | | | | | 291m³ |
| 2017-07-27 | 465m³ | | | | | 465m³ |
| 2017-07-29 | 411m³ | | | | | 411m³ |
| 2017-07-30 | 636m³ | | | | | 636m³ |
| 2017-07-31 | 891m³ | | | | | 891m³ |
| 2017-08-01 | 996m³ | | | | | 996m³ |
| 2017-08-02 | 1 005m³ | | | | | 1 005m³ |
| 2017-08-03 | 1 059m³ | | | | | 1 059m³ |
| 2017-08-04 | 969m³ | | | | | 969m³ |
| 2017-08-05 | 930m³ | | | | | 930m³ |
| 2017-08-06 | 1 005m³ | | | | | 1 005m³ |
| 2017-08-07 | 891m³ | | | | | 891m³ |
| 2017-08-08 | 126m³ | | | | | 126m³ |
| 2017-08-09 | 66m³ | | | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | | | 644m³ |
| 2017-08-11 | | | 1 053m³ | | | 1 053m³ |
| 2017-08-12 | | | 657m³ | | | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | | | 519m³ |
| 2017-08-14 | | | 9m³ | | | 9m³ |
| 2017-08-20 | | | 198m³ | | | 198m³ |
| 2017-08-21 | | | 561m³ | | | 561m³ |
| 2017-08-22 | | | 477m³ | | | 477m³ |
| 2017-08-23 | | | 648m³ | | | 648m³ |
| 2017-08-24 | | | 495m³ | | | 495m³ |

File updated: 2017-09-23

Kudlik Construction Ltd.

## Metal Dump Remediation - Quantities shipped on site

| | | | | | | |
|---|---|---|---|---|---|---|
| 2017-08-25 | | | 345m³ | | | 345m³ |
| 2017-08-26 | | | 621m³ | | | 621m³ |
| 2017-08-27 | | | 750m³ | | | 750m³ |
| 2017-08-28 | | | 267m³ | | | 267m³ |
| 2017-08-29 | | | 864m³ | | | 864m³ |
| 2017-08-30 | | | 963m³ | | | 963m³ |
| 2017-08-31 | | | 519m³ | | | 519m³ |
| 2017-09-01 | | | 582m³ | | | 582m³ |
| 2017-09-02 | | | 513m³ | | | 513m³ |
| 2017-09-05 | | | 1 200m³ | | | 1 200m³ |
| 2017-09-06 | | | 1 359m³ | | | 1 359m³ |
| 2017-09-07 | | | 1 329m³ | | | 1 329m³ |
| 2017-09-08 | | | 219m³ | | | 219m³ |
| 2017-09-09 | | | 522m³ | | | 522m³ |
| 2017-09-10 | | | 1 434m³ | | | 1 434m³ |
| 2017-09-11 | | | 1 107m³ | | | 1 107m³ |
| 2017-09-12 | | | 917m³ | | | 917m³ |
| 2017-09-15 | | | 828m³ | | | 828m³ |
| 2017-09-16 | | | 1 341m³ | | | 1 341m³ |
| 2017-09-17 | | | 987m³ | | | 987m³ |
| 2017-09-18 | | | 1 113m³ | | | 1 113m³ |
| 2017-09-19 | | | 840m³ | | | 840m³ |
| 2017-09-20 | | | 867m³ | | | 867m³ |
| 2017-09-21 | | | | 285m³ | 243m³ | 528m³ |
| 2017-09-22 | | | | 474m³ | | 474m³ |
| **Total Type 2** | **10 080m³** | **917m³** | **23 741m³** | **759m³** | **243m³** | **35 740m³** |

File updated: 2017-09-23

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | | | |
|---|---|---|---|
| **Type 4** | | | |
| 2017-07-26 | 60m³ | | 60m³ |
| 2017-07-27 | 150m³ | | 150m³ |
| 2017-07-29 | 36m³ | | 36m³ |
| 2017-08-05 | 48m³ | | 48m³ |
| 2017-08-06 | 9m³ | | 9m³ |
| 2017-08-09 | 366m³ | | 366m³ |
| 2017-08-10 | 295m³ | | 295m³ |
| 2017-08-11 | 126m³ | | 126m³ |
| 2017-08-12 | 231m³ | | 231m³ |
| **Total Type 4** | **1 321m³** | | **1 321m³** |
| **Type 1** | | | |
| 2017-08-14 | | 174m³ | 174m³ |
| 2017-08-16 | | 54m³ | 54m³ |
| 2017-08-17 | | 261m³ | 261m³ |
| 2017-08-18 | | 81m³ | 81m³ |
| 2017-08-19 | | 9m³ | 9m³ |
| 2017-08-22 | | 72m³ | 72m³ |
| 2017-08-23 | | 9m³ | 9m³ |
| 2017-08-31 | | 501m³ | 501m³ |
| 2017-09-01 | | 87m³ | 87m³ |
| **Total Type 1** | | **1 248m³** | **1 248m³** |
| **Type 3** | | | |
| 2017-08-19 | | 63m³ | 63m³ |
| 2017-08-20 | | 27m³ | 27m³ |
| 2017-08-24 | | 153m³ | 153m³ |
| 2017-08-25 | | 252m³ | 252m³ |

File updated: 2017-09-23

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | | | |
|---|---|---|---|
| 2017-08-28 | 480m³ | | 480m³ |
| 2017-09-01 | 195m³ | | 195m³ |
| 2017-09-02 | 220m³ | | 220m³ |
| 2017-09-08 | 1 065m³ | | 1 065m³ |
| 2017-09-09 | 723m³ | | 723m³ |
| 2017-09-14 | 360m³ | | 360m³ |
| 2017-09-15 | 162m³ | | 162m³ |
| 2017-09-18 | 93m³ | | 93m³ |
| 2017-09-21 | | 363m³ | 363m³ |
| **Total Type 3** | **3 793m³** | **363m³** | **4 156m³** |

File updated: 2017-09-23

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | AEC1 | Stockpile | Route "B" | TOTAL |
|---|---|---|---|---|---|---|---|
| **Type 2** | | | | | | | |
| 2017-07-25 | 249m³ | | | | | | 249m³ |
| 2017-07-26 | 291m³ | | | | | | 291m³ |
| 2017-07-27 | 465m³ | | | | | | 465m³ |
| 2017-07-29 | 411m³ | | | | | | 411m³ |
| 2017-07-30 | 636m³ | | | | | | 636m³ |
| 2017-07-31 | 891m³ | | | | | | 891m³ |
| 2017-08-01 | 996m³ | | | | | | 996m³ |
| 2017-08-02 | 1,005m³ | | | | | | 1,005m³ |
| 2017-08-03 | 1,059m³ | | | | | | 1,059m³ |
| 2017-08-04 | 969m³ | | | | | | 969m³ |
| 2017-08-05 | 930m³ | | | | | | 930m³ |
| 2017-08-06 | 1,005m³ | | | | | | 1,005m³ |
| 2017-08-07 | 891m³ | | | | | | 891m³ |
| 2017-08-08 | 126m³ | | | | | | 126m³ |
| 2017-08-09 | 66m³ | | | | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | | | | 644m³ |
| 2017-08-11 | | | 1,053m³ | | | | 1,053m³ |
| 2017-08-12 | | | 657m³ | | | | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | | | | 519m³ |
| 2017-08-14 | | | 9m³ | | | | 9m³ |
| 2017-08-20 | | | 198m³ | | | | 198m³ |
| 2017-08-21 | | | 561m³ | | | | 561m³ |
| 2017-08-22 | | | 477m³ | | | | 477m³ |
| 2017-08-23 | | | 648m³ | | | | 648m³ |
| 2017-08-24 | | | 495m³ | | | | 495m³ |
| 2017-08-25 | | | 345m³ | | | | 345m³ |
| 2017-08-26 | | | 621m³ | | | | 621m³ |
| 2017-08-27 | | | 750m³ | | | | 750m³ |
| 2017-08-28 | | | 267m³ | | | | 267m³ |
| 2017-08-29 | | | 864m³ | | | | 864m³ |
| 2017-08-30 | | | 963m³ | | | | 963m³ |
| 2017-08-31 | | | 519m³ | | | | 519m³ |
| 2017-09-01 | | | 582m³ | | | | 582m³ |
| 2017-09-02 | | | 513m³ | | | | 513m³ |
| 2017-09-05 | | | 1,200m³ | | | | 1,200m³ |
| 2017-09-06 | | | 1,359m³ | | | | 1,359m³ |
| 2017-09-07 | | | 1,329m³ | | | | 1,329m³ |
| 2017-09-08 | | | 219m³ | | | | 219m³ |
| 2017-09-09 | | | 522m³ | | | | 522m³ |
| 2017-09-10 | | | 1,434m³ | | | | 1,434m³ |
| 2017-09-11 | | | 1,107m³ | | | | 1,107m³ |
| 2017-09-12 | | | 917m³ | | | | 917m³ |
| 2017-09-15 | | | 828m³ | | | | 828m³ |
| 2017-09-16 | | | 1,341m³ | | | | 1,341m³ |
| 2017-09-17 | | | 987m³ | | | | 987m³ |
| 2017-09-18 | | | 1,113m³ | | | | 1,113m³ |
| 2017-09-19 | | | 840m³ | | | | 840m³ |
| 2017-09-20 | | | 867m³ | | | | 867m³ |
| 2017-09-21 | | | | 285m³ | 243m³ | | 528m³ |
| 2017-09-22 | | | | 474m³ | | | 474m³ |
| **Total Type 2** | **10,080m³** | **917m³** | **23,741m³** | **759m³** | **243m³** | | **35,740m³** |

File updated: 2017-09-26

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | | | | |
|---|---|---|---|---|
| **Type 4** | | | | |
| 2017-07-26 | 60m³ | | | 60m³ |
| 2017-07-27 | 150m³ | | | 150m³ |
| 2017-07-29 | 36m³ | | | 36m³ |
| 2017-08-05 | 48m³ | | | 48m³ |
| 2017-08-06 | 9m³ | | | 9m³ |
| 2017-08-09 | 366m³ | | | 366m³ |
| 2017-08-10 | 295m³ | | | 295m³ |
| 2017-08-11 | 126m³ | | | 126m³ |
| 2017-08-12 | 231m³ | | | 231m³ |
| 2017-09-25 | | | 189m³ | 189m³ |
| **Total Type 4** | **1,321m³** | | **189m³** | **1,510m³** |
| **Type 1** | | | | |
| 2017-08-14 | | 174m³ | | 174m³ |
| 2017-08-16 | | 54m³ | | 54m³ |
| 2017-08-17 | | 261m³ | | 261m³ |
| 2017-08-18 | | 81m³ | | 81m³ |
| 2017-08-19 | | 9m³ | | 9m³ |
| 2017-08-22 | | 72m³ | | 72m³ |
| 2017-08-23 | | 9m³ | | 9m³ |
| 2017-08-31 | | 501m³ | | 501m³ |
| 2017-09-01 | | 87m³ | | 87m³ |
| **Total Type 1** | | **1,248m³** | | **1,248m³** |
| **Type 3** | | | | |
| 2017-08-19 | | 63m³ | | 63m³ |
| 2017-08-20 | | 27m³ | | 27m³ |
| 2017-08-24 | | 153m³ | | 153m³ |
| 2017-08-25 | | 252m³ | | 252m³ |
| 2017-08-28 | | 480m³ | | 480m³ |
| 2017-09-01 | | 195m³ | | 195m³ |
| 2017-09-02 | | 220m³ | | 220m³ |
| 2017-09-08 | | 1,065m³ | | 1,065m³ |
| 2017-09-09 | | 723m³ | | 723m³ |
| 2017-09-14 | | 360m³ | | 360m³ |
| 2017-09-15 | | 162m³ | | 162m³ |
| 2017-09-18 | | 93m³ | | 93m³ |
| 2017-09-21 | | | 363m³ | 363m³ |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | AEC1 | Stockpile | Route "B" | TOTAL |
|---|---|---|---|---|---|---|---|
| **Type 2** | | | | | | | |
| 2017-07-25 | 249m³ | | | | | | 249m³ |
| 2017-07-26 | 291m³ | | | | | | 291m³ |
| 2017-07-27 | 465m³ | | | | | | 465m³ |
| 2017-07-29 | 411m³ | | | | | | 411m³ |
| 2017-07-30 | 636m³ | | | | | | 636m³ |
| 2017-07-31 | 891m³ | | | | | | 891m³ |
| 2017-08-01 | 996m³ | | | | | | 996m³ |
| 2017-08-02 | 1,005m³ | | | | | | 1,005m³ |
| 2017-08-03 | 1,059m³ | | | | | | 1,059m³ |
| 2017-08-04 | 969m³ | | | | | | 969m³ |
| 2017-08-05 | 930m³ | | | | | | 930m³ |
| 2017-08-06 | 1,005m³ | | | | | | 1,005m³ |
| 2017-08-07 | 891m³ | | | | | | 891m³ |
| 2017-08-08 | 126m³ | | | | | | 126m³ |
| 2017-08-09 | 66m³ | | | | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | | | | 644m³ |
| 2017-08-11 | | | 1,053m³ | | | | 1,053m³ |
| 2017-08-12 | | | 657m³ | | | | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | | | | 519m³ |
| 2017-08-14 | | | 9m³ | | | | 9m³ |
| 2017-08-20 | | | 198m³ | | | | 198m³ |
| 2017-08-21 | | | 561m³ | | | | 561m³ |
| 2017-08-22 | | | 477m³ | | | | 477m³ |
| 2017-08-23 | | | 648m³ | | | | 648m³ |
| 2017-08-24 | | | 495m³ | | | | 495m³ |
| 2017-08-25 | | | 345m³ | | | | 345m³ |
| 2017-08-26 | | | 621m³ | | | | 621m³ |
| 2017-08-27 | | | 750m³ | | | | 750m³ |
| 2017-08-28 | | | 267m³ | | | | 267m³ |
| 2017-08-29 | | | 864m³ | | | | 864m³ |
| 2017-08-30 | | | 963m³ | | | | 963m³ |
| 2017-08-31 | | | 519m³ | | | | 519m³ |
| 2017-09-01 | | | 582m³ | | | | 582m³ |
| 2017-09-02 | | | 513m³ | | | | 513m³ |
| 2017-09-05 | | | 1,200m³ | | | | 1,200m³ |
| 2017-09-06 | | | 1,359m³ | | | | 1,359m³ |
| 2017-09-07 | | | 1,329m³ | | | | 1,329m³ |
| 2017-09-08 | | | 219m³ | | | | 219m³ |
| 2017-09-09 | | | 522m³ | | | | 522m³ |
| 2017-09-10 | | | 1,434m³ | | | | 1,434m³ |
| 2017-09-11 | | | 1,107m³ | | | | 1,107m³ |
| 2017-09-12 | | | 917m³ | | | | 917m³ |
| 2017-09-15 | | | 828m³ | | | | 828m³ |
| 2017-09-16 | | | 1,341m³ | | | | 1,341m³ |
| 2017-09-17 | | | 987m³ | | | | 987m³ |
| 2017-09-18 | | | 1,113m³ | | | | 1,113m³ |
| 2017-09-19 | | | 840m³ | | | | 840m³ |
| 2017-09-20 | | | 867m³ | | | | 867m³ |
| 2017-09-21 | | | | 285m³ | 243m³ | | 528m³ |
| 2017-09-22 | | | | 474m³ | | | 474m³ |
| 2017-09-26 | | | | 153m³ | | | 153m³ |
| **Total Type 2** | **10,080m³** | **917m³** | **23,741m³** | **912m³** | **243m³** | | **35,893m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | AEC1 | Stockpile | Route "B" | TOTAL |
|---|---|---|---|---|---|---|---|
| **Type 4** | | | | | | | |
| 2017-07-26 | 60m³ | | | | | | 60m³ |
| 2017-07-27 | 150m³ | | | | | | 150m³ |
| 2017-07-29 | 36m³ | | | | | | 36m³ |
| 2017-08-05 | 48m³ | | | | | | 48m³ |
| 2017-08-06 | 9m³ | | | | | | 9m³ |
| 2017-08-09 | 366m³ | | | | | | 366m³ |
| 2017-08-10 | 295m³ | | | | | | 295m³ |
| 2017-08-11 | 126m³ | | | | | | 126m³ |
| 2017-08-12 | 231m³ | | | | | | 231m³ |
| 2017-09-25 | | | | | | 189m³ | 189m³ |
| 2017-09-26 | | | | | | 117m³ | 117m³ |
| **Total Type 4** | **1,321m³** | | | | | **306m³** | **1,627m³** |
| **Type 1** | | | | | | | |
| 2017-08-14 | | | 174m³ | | | | 174m³ |
| 2017-08-16 | | | 54m³ | | | | 54m³ |
| 2017-08-17 | | | 261m³ | | | | 261m³ |
| 2017-08-18 | | | 81m³ | | | | 81m³ |
| 2017-08-19 | | | 9m³ | | | | 9m³ |
| 2017-08-22 | | | 72m³ | | | | 72m³ |
| 2017-08-23 | | | 9m³ | | | | 9m³ |
| 2017-08-31 | | | 501m³ | | | | 501m³ |
| 2017-09-01 | | | 87m³ | | | | 87m³ |
| 2017-09-26 | | | | | | 60m³ | 60m³ |
| **Total Type 1** | | | **1,248m³** | | | **60m³** | **1,308m³** |
| **Type 3** | | | | | | | |
| 2017-08-19 | | | 63m³ | | | | 63m³ |
| 2017-08-20 | | | 27m³ | | | | 27m³ |
| 2017-08-24 | | | 153m³ | | | | 153m³ |
| 2017-08-25 | | | 252m³ | | | | 252m³ |
| 2017-08-28 | | | 480m³ | | | | 480m³ |
| 2017-09-01 | | | 195m³ | | | | 195m³ |
| 2017-09-02 | | | 220m³ | | | | 220m³ |
| 2017-09-08 | | | 1,065m³ | | | | 1,065m³ |
| 2017-09-09 | | | 723m³ | | | | 723m³ |
| 2017-09-14 | | | 360m³ | | | | 360m³ |
| 2017-09-15 | | | 162m³ | | | | 162m³ |
| 2017-09-18 | | | 93m³ | | | | 93m³ |
| 2017-09-21 | | | | | 363m³ | | 363m³ |
| **Total Type 3** | | | **3,793m³** | | **363m³** | | **4,156m³** |

File updated: 2017-09-27

Kudlik Construction Ltd.

**NON HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.1 | ITEM 2.2 | TOTAL |
|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 20m³ | | |
| 2017-08-16 | 30m³ | | |
| 2017-08-22 | 47m³ | | |
| 2017-08-26 | 32m³ | | |
| 2017-08-29 | 15m³ | | |
| 2017-08-31 | 16m³ | | |
| **TOTAL** | **160m³** | **0m³** | **160.0m³** |
| **AEC-2 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-15 | 78.4m³ | | |
| 2014-08-17 | 35m³ | | |
| 2017-08-28 | 32m³ | | |
| 2017-08-29 | 16m³ | | |
| 2017-08-30 | 32m³ | | |
| 2017-08-31 | 16m³ | | |
| 2017-09-12 | 304m³ | | |
| **TOTAL** | **513.4m³** | **0m³** | **513.4m³** |
| **AEC-3 to LAYDOWN AREA 1 AND THEN 2** | | | |
| 2017-08-14 | | 94.9m³ | |
| 2017-08-15 | | 491m³ | |
| 2017-08-17 | | 16m³ | |
| 2017-08-18 | | 96m³ | |
| 2017-08-19 | | 96m³ | |
| 2017-08-20 | | 128m³ | |
| 2017-08-21 | | 32m³ | |
| 2017-09-17 | | 90m³ | |
| **TOTAL** | **0m³** | **1,044m³** | **1,044.2m³** |
| **TOTAL** | **673.4m³** | **1,044.2m³** | **1,717.6m³** |

**HAZARDOUS MATERIAL TRANSFER**

| | ITEM 2.3 Hydrocarbon containing material | ITEM 2,4 Metal contaminated soil | ITEM 2.5 PCB contaminated sediment | ITEM 2.7 Other Hazardous Material | TOTAL |
|---|---|---|---|---|---|
| **AEC-1 to LAYDOWN AREA 1** | | | | | |
| 2017-08-26 | 32m³ | | | | |
| 2017-08-27 | | 64m³ | | | |
| 2017-08-31 | | 4m³ | | | |
| **TOTAL** | **32m³** | **68m³** | **0m³** | **0m³** | **100.0m³** |
| **AEC-2 to LAYDOWN AREA 1** | | | | | |
| 2017-08-13 | | | | 32m³ | |
| 2017-08-17 | | | | 20m³ | |
| 2017-08-30 | | | | 16m³ | |
| 2017-09-27 | | | 49m³ | | |
| **TOTAL** | **0.0m³** | **0.0m³** | **0.0m³** | **68.0m³** | **68.0m³** |
| **AEC-3 to LAYDOWN AREA 1** | | | | | |
| 2017-08-14 | | | | 5m³ | |
| 2017-08-15 | | | | 68m³ | |
| 2017-08-18 | | | | 12m³ | |
| 2017-08-19 | | | | 4m³ | |
| 2017-08-22 | | | | 8m³ | |
| 2017-08-31 | | | | 4m³ | |
| 2017-09-14 | | | | 12m³ | |
| **TOTAL** | **0m³** | **0m³** | **0m³** | **113m³** | **113.0m³** |
| **TOTAL** | **32.0m³** | **68.0m³** | **0.0m³** | **181.0m³** | **281.0m³** |

***VOLUMES NOT INCLUDED IN ZONE #1 (TO BE ADDED SEPERATELY)***

***VOLUMES NEED CONFIRMATION WITH AMOUNT OF CONTAINERS SHIPPED SOUTH (M³) FOR PAYMENT***

Kudlik Construction Ltd.

**Item 3.9) Common excavation - ditches / swales at AEC3**

| Date | Quantities |
|---|---|
| 2017-09-12 | 56m³ |
| 2017-09-16 | 90m³ |
| 2017-09-22 | 87m³ |
| **Total général** | **233m³** |

**Item 3.18) Place, compact and grade Type 2 Material in Zone 2 of Landfill Embankment**

| - | | |
|---|---|---|
| Date | Road "A" to main landfill | Total général |
| 2017-09-13 | 1,408m³ | 1,408m³ |
| 2017-09-14 | 1,248m³ | 1,248m³ |
| 2017-09-15 | 656m³ | 656m³ |
| 2017-09-19 | 1,184m³ | 1,184m³ |
| 2017-09-20 | 624m³ | 624m³ |
| 2017-09-21 | 576m³ | 576m³ |
| 2017-09-22 | 368m³ | 368m³ |
| **Total général** | **6,064m³** | **6,064m³** |

**Item 3.6) Re-Shape and Regrade AEC-1 with Type 2 Aggregate - 300mm thick on average**

| - | | |
|---|---|---|
| Date | Road "A" to AEC1 | Total général |
| 2017-09-22 | 560m³ | 560m³ |
| 2017-09-23 | 416m³ | 416m³ |
| 2017-09-28 | 464m³ | 464m³ |
| **Total général** | **1,440m³** | **1,440m³** |

**Item 3.7) Re-Shape and Regrade AEC-2 with Type 2 Aggregate - 300mm thick on average**

| - | | |
|---|---|---|
| Date | Road "A" to AEC2 | Total général |
| 2017-09-23 | 592m³ | 592m³ |
| 2017-09-24 | 300m³ | 300m³ |
| **Total général** | **892m³** | **892m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | AEC1 | Stockpile | Route "B" | AEC2 | TOTAL |
|---|---|---|---|---|---|---|---|---|
| **Type 2** | | | | | | | | |
| 2017-07-25 | 249m³ | | | | | | | 249m³ |
| 2017-07-26 | 291m³ | | | | | | | 291m³ |
| 2017-07-27 | 465m³ | | | | | | | 465m³ |
| 2017-07-29 | 411m³ | | | | | | | 411m³ |
| 2017-07-30 | 636m³ | | | | | | | 636m³ |
| 2017-07-31 | 891m³ | | | | | | | 891m³ |
| 2017-08-01 | 996m³ | | | | | | | 996m³ |
| 2017-08-02 | 1,005m³ | | | | | | | 1,005m³ |
| 2017-08-03 | 1,059m³ | | | | | | | 1,059m³ |
| 2017-08-04 | 969m³ | | | | | | | 969m³ |
| 2017-08-05 | 930m³ | | | | | | | 930m³ |
| 2017-08-06 | 1,005m³ | | | | | | | 1,005m³ |
| 2017-08-07 | 891m³ | | | | | | | 891m³ |
| 2017-08-08 | 126m³ | | | | | | | 126m³ |
| 2017-08-09 | 66m³ | | | | | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | | | | | 644m³ |
| 2017-08-11 | | | 1,053m³ | | | | | 1,053m³ |
| 2017-08-12 | | | 657m³ | | | | | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | | | | | 519m³ |
| 2017-08-14 | | | 9m³ | | | | | 9m³ |
| 2017-08-20 | | | 198m³ | | | | | 198m³ |
| 2017-08-21 | | | 561m³ | | | | | 561m³ |
| 2017-08-22 | | | 477m³ | | | | | 477m³ |
| 2017-08-23 | | | 648m³ | | | | | 648m³ |
| 2017-08-24 | | | 495m³ | | | | | 495m³ |
| 2017-08-25 | | | 345m³ | | | | | 345m³ |
| 2017-08-26 | | | 621m³ | | | | | 621m³ |
| 2017-08-27 | | | 750m³ | | | | | 750m³ |
| 2017-08-28 | | | 267m³ | | | | | 267m³ |
| 2017-08-29 | | | 864m³ | | | | | 864m³ |
| 2017-08-30 | | | 963m³ | | | | | 963m³ |
| 2017-08-31 | | | 519m³ | | | | | 519m³ |
| 2017-09-01 | | | 582m³ | | | | | 582m³ |
| 2017-09-02 | | | 513m³ | | | | | 513m³ |
| 2017-09-05 | | | 1,200m³ | | | | | 1,200m³ |
| 2017-09-06 | | | 1,359m³ | | | | | 1,359m³ |
| 2017-09-07 | | | 1,329m³ | | | | | 1,329m³ |
| 2017-09-08 | | | 219m³ | | | | | 219m³ |
| 2017-09-09 | | | 522m³ | | | | | 522m³ |
| 2017-09-10 | | | 1,434m³ | | | | | 1,434m³ |
| 2017-09-11 | | | 1,107m³ | | | | | 1,107m³ |
| 2017-09-12 | | | 917m³ | | | | | 917m³ |
| 2017-09-15 | | | 828m³ | | | | | 828m³ |
| 2017-09-16 | | | 1,341m³ | | | | | 1,341m³ |
| 2017-09-17 | | | 987m³ | | | | | 987m³ |
| 2017-09-18 | | | 1,113m³ | | | | | 1,113m³ |
| 2017-09-19 | | | 840m³ | | | | | 840m³ |
| 2017-09-20 | | | 867m³ | | | | | 867m³ |
| 2017-09-21 | | | | 285m³ | 243m³ | | | 528m³ |
| 2017-09-22 | | | | 474m³ | | | | 474m³ |
| 2017-09-26 | | | | 153m³ | | | | 153m³ |
| 2017-09-30 | | | 72m³ | 189m³ | | | 72m³ | 333m³ |
| **Total Type 2** | **10,080m³** | **917m³** | **23,813m³** | **1,101m³** | **243m³** | | **72m³** | **36,226m³** |

File updated: 2017-10-01

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | AEC1 | Stockpile | Route "B" | AEC2 | TOTAL |
|---|---|---|---|---|---|---|---|---|
| **Type 4** | | | | | | | | |
| 2017-07-26 | 60m³ | | | | | | | 60m³ |
| 2017-07-27 | 150m³ | | | | | | | 150m³ |
| 2017-07-29 | 36m³ | | | | | | | 36m³ |
| 2017-08-05 | 48m³ | | | | | | | 48m³ |
| 2017-08-06 | 9m³ | | | | | | | 9m³ |
| 2017-08-09 | 366m³ | | | | | | | 366m³ |
| 2017-08-10 | 295m³ | | | | | | | 295m³ |
| 2017-08-11 | 126m³ | | | | | | | 126m³ |
| 2017-08-12 | 231m³ | | | | | | | 231m³ |
| 2017-09-25 | | | | | | 189m³ | | 189m³ |
| 2017-09-26 | | | | | | 117m³ | | 117m³ |
| **Total Type 4** | **1,321m³** | | | | | **306m³** | | **1,627m³** |
| **Type 1** | | | | | | | | |
| 2017-08-14 | | | 174m³ | | | | | 174m³ |
| 2017-08-16 | | | 54m³ | | | | | 54m³ |
| 2017-08-17 | | | 261m³ | | | | | 261m³ |
| 2017-08-18 | | | 81m³ | | | | | 81m³ |
| 2017-08-19 | | | 9m³ | | | | | 9m³ |
| 2017-08-22 | | | 72m³ | | | | | 72m³ |
| 2017-08-23 | | | 9m³ | | | | | 9m³ |
| 2017-08-31 | | | 501m³ | | | | | 501m³ |
| 2017-09-01 | | | 87m³ | | | | | 87m³ |
| 2017-09-26 | | | | | | 60m³ | | 60m³ |
| **Total Type 1** | | | **1,248m³** | | | **60m³** | | **1,308m³** |
| **Type 3** | | | | | | | | |
| 2017-08-19 | | | 63m³ | | | | | 63m³ |
| 2017-08-20 | | | 27m³ | | | | | 27m³ |
| 2017-08-24 | | | 153m³ | | | | | 153m³ |
| 2017-08-25 | | | 252m³ | | | | | 252m³ |
| 2017-08-28 | | | 480m³ | | | | | 480m³ |
| 2017-09-01 | | | 195m³ | | | | | 195m³ |
| 2017-09-02 | | | 220m³ | | | | | 220m³ |
| 2017-09-08 | | | 1,065m³ | | | | | 1,065m³ |
| 2017-09-09 | | | 723m³ | | | | | 723m³ |
| 2017-09-14 | | | 360m³ | | | | | 360m³ |
| 2017-09-15 | | | 162m³ | | | | | 162m³ |
| 2017-09-18 | | | 93m³ | | | | | 93m³ |
| 2017-09-21 | | | | | 363m³ | | | 363m³ |
| **Total Type 3** | | | **3,793m³** | | **363m³** | | | **4,156m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | AEC1 | Stockpile | Route "B" | AEC2 | TOTAL |
|---|---|---|---|---|---|---|---|---|
| **Type 2** | | | | | | | | |
| 2017-07-25 | 249m³ | | | | | | | 249m³ |
| 2017-07-26 | 291m³ | | | | | | | 291m³ |
| 2017-07-27 | 465m³ | | | | | | | 465m³ |
| 2017-07-29 | 411m³ | | | | | | | 411m³ |
| 2017-07-30 | 636m³ | | | | | | | 636m³ |
| 2017-07-31 | 891m³ | | | | | | | 891m³ |
| 2017-08-01 | 996m³ | | | | | | | 996m³ |
| 2017-08-02 | 1,005m³ | | | | | | | 1,005m³ |
| 2017-08-03 | 1,059m³ | | | | | | | 1,059m³ |
| 2017-08-04 | 969m³ | | | | | | | 969m³ |
| 2017-08-05 | 930m³ | | | | | | | 930m³ |
| 2017-08-06 | 1,005m³ | | | | | | | 1,005m³ |
| 2017-08-07 | 891m³ | | | | | | | 891m³ |
| 2017-08-08 | 126m³ | | | | | | | 126m³ |
| 2017-08-09 | 66m³ | | | | | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | | | | | 644m³ |
| 2017-08-11 | | | 1,053m³ | | | | | 1,053m³ |
| 2017-08-12 | | | 657m³ | | | | | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | | | | | 519m³ |
| 2017-08-14 | | | 9m³ | | | | | 9m³ |
| 2017-08-20 | | | 198m³ | | | | | 198m³ |
| 2017-08-21 | | | 561m³ | | | | | 561m³ |
| 2017-08-22 | | | 477m³ | | | | | 477m³ |
| 2017-08-23 | | | 648m³ | | | | | 648m³ |
| 2017-08-24 | | | 495m³ | | | | | 495m³ |
| 2017-08-25 | | | 345m³ | | | | | 345m³ |
| 2017-08-26 | | | 621m³ | | | | | 621m³ |
| 2017-08-27 | | | 750m³ | | | | | 750m³ |
| 2017-08-28 | | | 267m³ | | | | | 267m³ |
| 2017-08-29 | | | 864m³ | | | | | 864m³ |
| 2017-08-30 | | | 963m³ | | | | | 963m³ |
| 2017-08-31 | | | 519m³ | | | | | 519m³ |
| 2017-09-01 | | | 582m³ | | | | | 582m³ |
| 2017-09-02 | | | 513m³ | | | | | 513m³ |
| 2017-09-05 | | | 1,200m³ | | | | | 1,200m³ |
| 2017-09-06 | | | 1,359m³ | | | | | 1,359m³ |
| 2017-09-07 | | | 1,329m³ | | | | | 1,329m³ |
| 2017-09-08 | | | 219m³ | | | | | 219m³ |
| 2017-09-09 | | | 522m³ | | | | | 522m³ |
| 2017-09-10 | | | 1,434m³ | | | | | 1,434m³ |
| 2017-09-11 | | | 1,107m³ | | | | | 1,107m³ |
| 2017-09-12 | | | 917m³ | | | | | 917m³ |
| 2017-09-15 | | | 828m³ | | | | | 828m³ |
| 2017-09-16 | | | 1,341m³ | | | | | 1,341m³ |
| 2017-09-17 | | | 987m³ | | | | | 987m³ |
| 2017-09-18 | | | 1,113m³ | | | | | 1,113m³ |
| 2017-09-19 | | | 840m³ | | | | | 840m³ |
| 2017-09-20 | | | 867m³ | | | | | 867m³ |
| 2017-09-21 | | | | 285m³ | 243m³ | | | 528m³ |
| 2017-09-22 | | | | 474m³ | | | | 474m³ |
| 2017-09-26 | | | | 153m³ | | | | 153m³ |
| 2017-09-30 | | | 72m³ | 189m³ | | | 72m³ | 333m³ |
| **Total Type 2** | **10,080m³** | **917m³** | **23,813m³** | **1,101m³** | **243m³** | | **72m³** | **36,226m³** |

File updated: 2017-10-04

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | AEC1 | Stockpile | Route "B" | AEC2 | TOTAL |
|---|---|---|---|---|---|---|---|---|
| **Type 4** | | | | | | | | |
| 2017-07-26 | 60m³ | | | | | | | 60m³ |
| 2017-07-27 | 150m³ | | | | | | | 150m³ |
| 2017-07-29 | 36m³ | | | | | | | 36m³ |
| 2017-08-05 | 48m³ | | | | | | | 48m³ |
| 2017-08-06 | 9m³ | | | | | | | 9m³ |
| 2017-08-09 | 366m³ | | | | | | | 366m³ |
| 2017-08-10 | 295m³ | | | | | | | 295m³ |
| 2017-08-11 | 126m³ | | | | | | | 126m³ |
| 2017-08-12 | 231m³ | | | | | | | 231m³ |
| 2017-09-25 | | | | | | 189m³ | | 189m³ |
| 2017-09-26 | | | | | | 117m³ | | 117m³ |
| 2017-10-02 | | | | | | 18m³ | | 18m³ |
| 2017-10-03 | | | | | | 540m³ | | 540m³ |
| **Total Type 4** | **1,321m³** | | | | | **864m³** | | **2,185m³** |
| **Type 1** | | | | | | | | |
| 2017-08-14 | | | 174m³ | | | | | 174m³ |
| 2017-08-16 | | | 54m³ | | | | | 54m³ |
| 2017-08-17 | | | 261m³ | | | | | 261m³ |
| 2017-08-18 | | | 81m³ | | | | | 81m³ |
| 2017-08-19 | | | 9m³ | | | | | 9m³ |
| 2017-08-22 | | | 72m³ | | | | | 72m³ |
| 2017-08-23 | | | 9m³ | | | | | 9m³ |
| 2017-08-31 | | | 501m³ | | | | | 501m³ |
| 2017-09-01 | | | 87m³ | | | | | 87m³ |
| 2017-09-26 | | | | | | 60m³ | | 60m³ |
| **Total Type 1** | | | **1,248m³** | | | **60m³** | | **1,308m³** |
| **Type 3** | | | | | | | | |
| 2017-08-19 | | | 63m³ | | | | | 63m³ |
| 2017-08-20 | | | 27m³ | | | | | 27m³ |
| 2017-08-24 | | | 153m³ | | | | | 153m³ |
| 2017-08-25 | | | 252m³ | | | | | 252m³ |
| 2017-08-28 | | | 480m³ | | | | | 480m³ |
| 2017-09-01 | | | 195m³ | | | | | 195m³ |
| 2017-09-02 | | | 220m³ | | | | | 220m³ |
| 2017-09-08 | | | 1,065m³ | | | | | 1,065m³ |
| 2017-09-09 | | | 723m³ | | | | | 723m³ |
| 2017-09-14 | | | 360m³ | | | | | 360m³ |
| 2017-09-15 | | | 162m³ | | | | | 162m³ |
| 2017-09-18 | | | 93m³ | | | | | 93m³ |
| 2017-09-21 | | | | | 363m³ | | | 363m³ |
| **Total Type 3** | | | **3,793m³** | | **363m³** | | | **4,156m³** |

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | AEC1 | Stockpile | Route "B" | AEC2 | TOTAL |
|---|---|---|---|---|---|---|---|---|
| **Type 2** | | | | | | | | |
| 2017-07-25 | 249m³ | | | | | | | 249m³ |
| 2017-07-26 | 291m³ | | | | | | | 291m³ |
| 2017-07-27 | 465m³ | | | | | | | 465m³ |
| 2017-07-29 | 411m³ | | | | | | | 411m³ |
| 2017-07-30 | 636m³ | | | | | | | 636m³ |
| 2017-07-31 | 891m³ | | | | | | | 891m³ |
| 2017-08-01 | 996m³ | | | | | | | 996m³ |
| 2017-08-02 | 1,005m³ | | | | | | | 1,005m³ |
| 2017-08-03 | 1,059m³ | | | | | | | 1,059m³ |
| 2017-08-04 | 969m³ | | | | | | | 969m³ |
| 2017-08-05 | 930m³ | | | | | | | 930m³ |
| 2017-08-06 | 1,005m³ | | | | | | | 1,005m³ |
| 2017-08-07 | 891m³ | | | | | | | 891m³ |
| 2017-08-08 | 126m³ | | | | | | | 126m³ |
| 2017-08-09 | 66m³ | | | | | | | 66m³ |
| 2017-08-10 | 90m³ | 554m³ | | | | | | 644m³ |
| 2017-08-11 | | | 1,053m³ | | | | | 1,053m³ |
| 2017-08-12 | | | 657m³ | | | | | 657m³ |
| 2017-08-13 | | 363m³ | 156m³ | | | | | 519m³ |
| 2017-08-14 | | | 9m³ | | | | | 9m³ |
| 2017-08-20 | | | 198m³ | | | | | 198m³ |
| 2017-08-21 | | | 561m³ | | | | | 561m³ |
| 2017-08-22 | | | 477m³ | | | | | 477m³ |
| 2017-08-23 | | | 648m³ | | | | | 648m³ |
| 2017-08-24 | | | 495m³ | | | | | 495m³ |
| 2017-08-25 | | | 345m³ | | | | | 345m³ |
| 2017-08-26 | | | 621m³ | | | | | 621m³ |
| 2017-08-27 | | | 750m³ | | | | | 750m³ |
| 2017-08-28 | | | 267m³ | | | | | 267m³ |
| 2017-08-29 | | | 864m³ | | | | | 864m³ |
| 2017-08-30 | | | 963m³ | | | | | 963m³ |
| 2017-08-31 | | | 519m³ | | | | | 519m³ |
| 2017-09-01 | | | 582m³ | | | | | 582m³ |
| 2017-09-02 | | | 513m³ | | | | | 513m³ |
| 2017-09-05 | | | 1,200m³ | | | | | 1,200m³ |
| 2017-09-06 | | | 1,359m³ | | | | | 1,359m³ |
| 2017-09-07 | | | 1,329m³ | | | | | 1,329m³ |
| 2017-09-08 | | | 219m³ | | | | | 219m³ |
| 2017-09-09 | | | 522m³ | | | | | 522m³ |
| 2017-09-10 | | | 1,434m³ | | | | | 1,434m³ |
| 2017-09-11 | | | 1,107m³ | | | | | 1,107m³ |
| 2017-09-12 | | | 917m³ | | | | | 917m³ |
| 2017-09-15 | | | 828m³ | | | | | 828m³ |
| 2017-09-16 | | | 1,341m³ | | | | | 1,341m³ |
| 2017-09-17 | | | 987m³ | | | | | 987m³ |
| 2017-09-18 | | | 1,113m³ | | | | | 1,113m³ |
| 2017-09-19 | | | 840m³ | | | | | 840m³ |
| 2017-09-20 | | | 867m³ | | | | | 867m³ |
| 2017-09-21 | | | | 285m³ | 243m³ | | | 528m³ |
| 2017-09-22 | | | | 474m³ | | | | 474m³ |
| 2017-09-26 | | | | 153m³ | | | | 153m³ |
| 2017-09-30 | | | 72m³ | 189m³ | | | 72m³ | 333m³ |
| **Total Type 2** | **10,080m³** | **917m³** | **23,813m³** | **1,101m³** | **243m³** | | **72m³** | **36,226m³** |

File updated: 2017-10-05

Kudlik Construction Ltd.

# Metal Dump Remediation - Quantities shipped on site

| | Route "A" | Access to AEC1 | AEC3 | AEC1 | Stockpile | Route "B" | AEC2 | TOTAL |
|---|---|---|---|---|---|---|---|---|
| **Type 4** | | | | | | | | |
| 2017-07-26 | 60m³ | | | | | | | 60m³ |
| 2017-07-27 | 150m³ | | | | | | | 150m³ |
| 2017-07-29 | 36m³ | | | | | | | 36m³ |
| 2017-08-05 | 48m³ | | | | | | | 48m³ |
| 2017-08-06 | 9m³ | | | | | | | 9m³ |
| 2017-08-09 | 366m³ | | | | | | | 366m³ |
| 2017-08-10 | 295m³ | | | | | | | 295m³ |
| 2017-08-11 | 126m³ | | | | | | | 126m³ |
| 2017-08-12 | 231m³ | | | | | | | 231m³ |
| 2017-09-25 | | | | | | 189m³ | | 189m³ |
| 2017-09-26 | | | | | | 117m³ | | 117m³ |
| 2017-10-02 | | | | | | 18m³ | | 18m³ |
| 2017-10-03 | | | | | | 540m³ | | 540m³ |
| **Total Type 4** | **1,321m³** | | | | | **864m³** | | **2,185m³** |
| **Type 1** | | | | | | | | |
| 2017-08-14 | | | 174m³ | | | | | 174m³ |
| 2017-08-16 | | | 54m³ | | | | | 54m³ |
| 2017-08-17 | | | 261m³ | | | | | 261m³ |
| 2017-08-18 | | | 81m³ | | | | | 81m³ |
| 2017-08-19 | | | 9m³ | | | | | 9m³ |
| 2017-08-22 | | | 72m³ | | | | | 72m³ |
| 2017-08-23 | | | 9m³ | | | | | 9m³ |
| 2017-08-31 | | | 501m³ | | | | | 501m³ |
| 2017-09-01 | | | 87m³ | | | | | 87m³ |
| 2017-09-26 | | | | | | 60m³ | | 60m³ |
| 2017-10-04 | | | | | | 162m³ | | 162m³ |
| **Total Type 1** | | | **1,248m³** | | | **222m³** | | **1,470m³** |
| **Type 3** | | | | | | | | |
| 2017-08-19 | | | 63m³ | | | | | 63m³ |
| 2017-08-20 | | | 27m³ | | | | | 27m³ |
| 2017-08-24 | | | 153m³ | | | | | 153m³ |
| 2017-08-25 | | | 252m³ | | | | | 252m³ |
| 2017-08-28 | | | 480m³ | | | | | 480m³ |
| 2017-09-01 | | | 195m³ | | | | | 195m³ |
| 2017-09-02 | | | 220m³ | | | | | 220m³ |
| 2017-09-08 | | | 1,065m³ | | | | | 1,065m³ |
| 2017-09-09 | | | 723m³ | | | | | 723m³ |
| 2017-09-14 | | | 360m³ | | | | | 360m³ |
| 2017-09-15 | | | 162m³ | | | | | 162m³ |
| 2017-09-18 | | | 93m³ | | | | | 93m³ |
| 2017-09-21 | | | | | 363m³ | | | 363m³ |
| **Total Type 3** | | | **3,793m³** | | **363m³** | | | **4,156m³** |

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SEPTEMBER 23 2017
87.6 CUBIC METER

Kudlik Construction Ltd.

**Item 3,9) Common excavation - ditches / swales at AEC3**

| Date | Quantities |
|---|---|
| 2017-09-12 | 56m³ |
| **Total général** | **56m³** |

**Item 3.18) Place, compact and grade Type 2 Material in Zone 2 of Landfill Embankment**

| - Date | Road ''A'' to main landfill | Total général |
|---|---|---|
| 2017-09-13 | 1 408m³ | 1 408m³ |
| 2017-09-14 | 1 248m³ | 1 248m³ |
| **Total général** | **2 656m³** | **2 656m³** |

Kudlik Construction Ltd.

**Item 3,9) Common excavation - ditches / swales at AEC3**

| Date | Quantities |
|---|---|
| 2017-09-12 | 56m³ |
| **Total général** | **56m³** |

**Item 3.18) Place, compact and grade Type 2 Material in Zone 2 of Landfill Embankment**

| - Date | Road ''A'' to main landfill | Total général |
|---|---|---|
| 2017-09-13 | 1 408m³ | 1 408m³ |
| 2017-09-14 | 1 248m³ | 1 248m³ |
| 2017-09-15 | 656m³ | 656m³ |
| **Total général** | **3 312m³** | **3 312m³** |

Kudlik Construction Ltd.

**Item 3,9) Common excavation - ditches / swales at AEC3**

| Date | Quantities |
|---|---|
| 2017-09-12 | 56m³ |
| 2017-09-16 | 90m³ |
| **Total général** | **146m³** |

**Item 3.18) Place, compact and grade Type 2 Material in Zone 2 of Landfill Embankment**

| - Date | Road ''A'' to main landfill | Total général |
|---|---|---|
| 2017-09-13 | 1 408m³ | 1 408m³ |
| 2017-09-14 | 1 248m³ | 1 248m³ |
| 2017-09-15 | 656m³ | 656m³ |
| **Total général** | **3 312m³** | **3 312m³** |

Kudlik Construction Ltd.

**Item 3,9) Common excavation - ditches / swales at AEC3**

| Date | Quantities |
|---|---|
| 2017-09-12 | 56m³ |
| 2017-09-16 | 90m³ |
| **Total général** | **146m³** |

**Item 3.18) Place, compact and grade Type 2 Material in Zone 2 of Landfill Embankment**

| - Date | Road ''A'' to main landfill | Total général |
|---|---|---|
| 2017-09-13 | 1 408m³ | 1 408m³ |
| 2017-09-14 | 1 248m³ | 1 248m³ |
| 2017-09-15 | 656m³ | 656m³ |
| 2017-09-19 | 1 184m³ | 1 184m³ |
| **Total général** | **4 496m³** | **4 496m³** |

Kudlik Construction Ltd.

**Item 3.9) Common excavation - ditches / swales at AEC3**

| Date | Quantities |
|---|---|
| 2017-09-12 | 56m³ |
| 2017-09-16 | 90m³ |
| **Total général** | **146m³** |

**Item 3.18) Place, compact and grade Type 2 Material in Zone 2 of Landfill Embankment**

| - Date | Road ''A'' to main landfill | Total général |
|---|---|---|
| 2017-09-13 | 1 408m³ | 1 408m³ |
| 2017-09-14 | 1 248m³ | 1 248m³ |
| 2017-09-15 | 656m³ | 656m³ |
| 2017-09-19 | 1 184m³ | 1 184m³ |
| 2017-09-20 | 624m³ | 624m³ |
| **Total général** | **5 120m³** | **5 120m³** |

Kudlik Construction Ltd.

**Item 3.9) Common excavation - ditches / swales at AEC3**

| Date | Quantities |
|---|---|
| 2017-09-12 | 56m³ |
| 2017-09-16 | 90m³ |
| **Total général** | **146m³** |

**Item 3.18) Place, compact and grade Type 2 Material in Zone 2 of Landfill Embankment**

| - Date | Road ''A'' to main landfill | Total général |
|---|---|---|
| 2017-09-13 | 1 408m³ | 1 408m³ |
| 2017-09-14 | 1 248m³ | 1 248m³ |
| 2017-09-15 | 656m³ | 656m³ |
| 2017-09-19 | 1 184m³ | 1 184m³ |
| 2017-09-20 | 624m³ | 624m³ |
| 2017-09-21 | 576m³ | 576m³ |
| **Total général** | **5 696m³** | **5 696m³** |

Kudlik Construction Ltd.

**Item 3.9) Common excavation - ditches / swales at AEC3**

| Date | Quantities |
|---|---|
| 2017-09-12 | 56m³ |
| 2017-09-16 | 90m³ |
| 2017-09-22 | 87m³ |
| **Total général** | **233m³** |

**Item 3.18) Place, compact and grade Type 2 Material in Zone 2 of Landfill Embankment**

| - | | |
|---|---|---|
| Date | Road ''A'' to main landfill | Total général |
| 2017-09-13 | 1 408m³ | 1 408m³ |
| 2017-09-14 | 1 248m³ | 1 248m³ |
| 2017-09-15 | 656m³ | 656m³ |
| 2017-09-19 | 1 184m³ | 1 184m³ |
| 2017-09-20 | 624m³ | 624m³ |
| 2017-09-21 | 576m³ | 576m³ |
| 2017-09-22 | 368m³ | 368m³ |
| **Total général** | **6 064m³** | **6 064m³** |

**Item 3.6) Re-Shape and Regrade AEC-1 with Type 2 Aggregate - 300mm thick on average**

| - | | |
|---|---|---|
| Date | Road ''A'' to AEC1 | Total général |
| 2017-09-22 | 560m³ | 560m³ |
| 2017-09-23 | 416m³ | 416m³ |
| **Total général** | **976m³** | **976m³** |

**Item 3.7) Re-Shape and Regrade AEC-2 with Type 2 Aggregate - 300mm thick on average**

| - | | |
|---|---|---|
| Date | Road ''A'' to AEC2 | Total général |
| 2017-09-23 | 592m³ | 592m³ |
| **Total général** | **592m³** | **592m³** |

Kudlik Construction Ltd.

**Item 3.9) Common excavation - ditches / swales at AEC3**

| Date | Quantities |
|---|---|
| 2017-09-12 | 56m³ |
| 2017-09-16 | 90m³ |
| 2017-09-22 | 87m³ |
| **Total général** | **233m³** |

**Item 3.18) Place, compact and grade Type 2 Material in Zone 2 of Landfill Embankment**

| - | | |
|---|---|---|
| Date | Road ''A'' to main landfill | Total général |
| 2017-09-13 | 1 408m³ | 1 408m³ |
| 2017-09-14 | 1 248m³ | 1 248m³ |
| 2017-09-15 | 656m³ | 656m³ |
| 2017-09-19 | 1 184m³ | 1 184m³ |
| 2017-09-20 | 624m³ | 624m³ |
| 2017-09-21 | 576m³ | 576m³ |
| 2017-09-22 | 368m³ | 368m³ |
| **Total général** | **6 064m³** | **6 064m³** |

**Item 3.6) Re-Shape and Regrade AEC-1 with Type 2 Aggregate - 300mm thick on average**

| - | | |
|---|---|---|
| Date | Road ''A'' to AEC1 | Total général |
| 2017-09-22 | 560m³ | 560m³ |
| 2017-09-23 | 416m³ | 416m³ |
| **Total général** | **976m³** | **976m³** |

**Item 3.7) Re-Shape and Regrade AEC-2 with Type 2 Aggregate - 300mm thick on average**

| - | | |
|---|---|---|
| Date | Road ''A'' to AEC2 | Total général |
| 2017-09-23 | 592m³ | 592m³ |
| 2017-09-24 | 300m³ | 300m³ |
| **Total général** | **892m³** | **892m³** |

Kudlik Construction Ltd.

**Item 3.9) Common excavation - ditches / swales at AEC3**

| Date | Quantities |
|---|---|
| 2017-09-12 | 56m³ |
| 2017-09-16 | 90m³ |
| 2017-09-22 | 87m³ |
| **Total général** | **233m³** |

**Item 3.18) Place, compact and grade Type 2 Material in Zone 2 of Landfill Embankment**

| - | | |
|---|---|---|
| Date | Road "A" to main landfill | Total général |
| 2017-09-13 | 1,408m³ | 1,408m³ |
| 2017-09-14 | 1,248m³ | 1,248m³ |
| 2017-09-15 | 656m³ | 656m³ |
| 2017-09-19 | 1,184m³ | 1,184m³ |
| 2017-09-20 | 624m³ | 624m³ |
| 2017-09-21 | 576m³ | 576m³ |
| 2017-09-22 | 368m³ | 368m³ |
| **Total général** | **6,064m³** | **6,064m³** |

**Item 3.6) Re-Shape and Regrade AEC-1 with Type 2 Aggregate - 300mm thick on average**

| - | | |
|---|---|---|
| Date | Road "A" to AEC1 | Total général |
| 2017-09-22 | 560m³ | 560m³ |
| 2017-09-23 | 416m³ | 416m³ |
| 2017-09-28 | 464m³ | 464m³ |
| **Total général** | **1,440m³** | **1,440m³** |

**Item 3.7) Re-Shape and Regrade AEC-2 with Type 2 Aggregate - 300mm thick on average**

| - | | |
|---|---|---|
| Date | Road "A" to AEC2 | Total général |
| 2017-09-23 | 592m³ | 592m³ |
| 2017-09-24 | 300m³ | 300m³ |
| **Total général** | **892m³** | **892m³** |

Kudlik Construction Ltd.

**Item 3.9) Common excavation - ditches / swales at AEC3**

| Date | Quantities |
|---|---|
| 2017-09-12 | 56m³ |
| 2017-09-16 | 90m³ |
| 2017-09-22 | 87m³ |
| **Total général** | **233m³** |

**Item 3.18) Place, compact and grade Type 2 Material in Zone 2 of Landfill Embankment**

| - | | |
|---|---|---|
| **Date** | **Road "A" to main landfill** | **Total général** |
| 2017-09-13 | 1,408m³ | 1,408m³ |
| 2017-09-14 | 1,248m³ | 1,248m³ |
| 2017-09-15 | 656m³ | 656m³ |
| 2017-09-19 | 1,184m³ | 1,184m³ |
| 2017-09-20 | 624m³ | 624m³ |
| 2017-09-21 | 576m³ | 576m³ |
| 2017-09-22 | 368m³ | 368m³ |
| 2017-09-29 | 224m³ | 224m³ |
| **Total général** | **6,288m³** | **6,288m³** |

**Item 3.6) Re-Shape and Regrade AEC-1 with Type 2 Aggregate - 300mm thick on average**

| - | | |
|---|---|---|
| **Date** | **Road "A" to AEC1** | **Total général** |
| 2017-09-22 | 560m³ | 560m³ |
| 2017-09-23 | 416m³ | 416m³ |
| 2017-09-28 | 464m³ | 464m³ |
| 2017-09-29 | 224m³ | 224m³ |
| **Total général** | **1,664m³** | **1,664m³** |

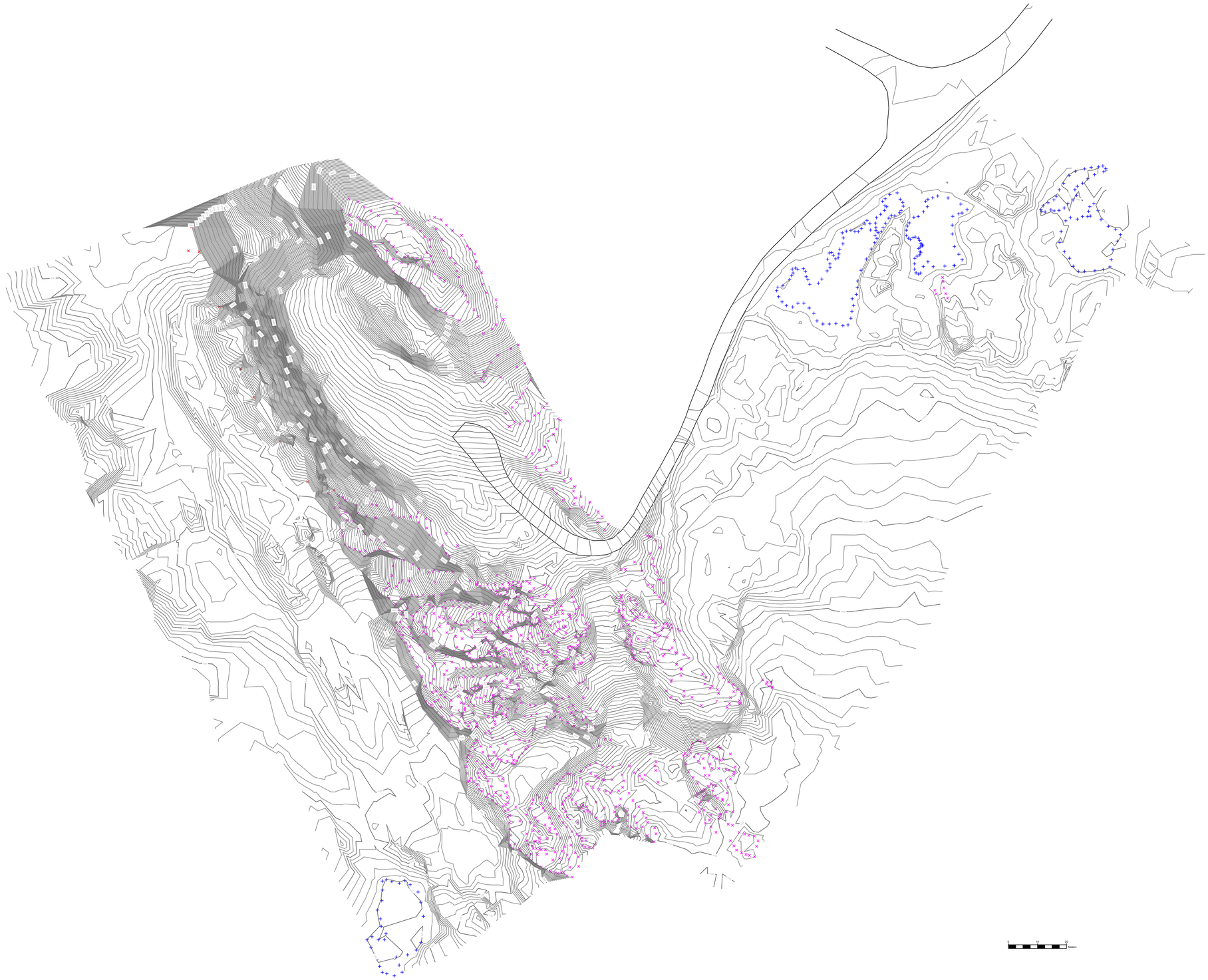
**Item 3.7) Re-Shape and Regrade AEC-2 with Type 2 Aggregate - 300mm thick on average**

| - | | |
|---|---|---|
| **Date** | **Road "A" to AEC2** | **Total général** |
| 2017-09-23 | 592m³ | 592m³ |
| 2017-09-24 | 300m³ | 300m³ |
| **Total général** | **892m³** | **892m³** |

# APPENDIX K

## As-Built Drawings and Soil Volume Confirmations

## (CAD files to be provided on DVD with final)




Kudlik Construction Ltd.
IQALUIT | Nunavut

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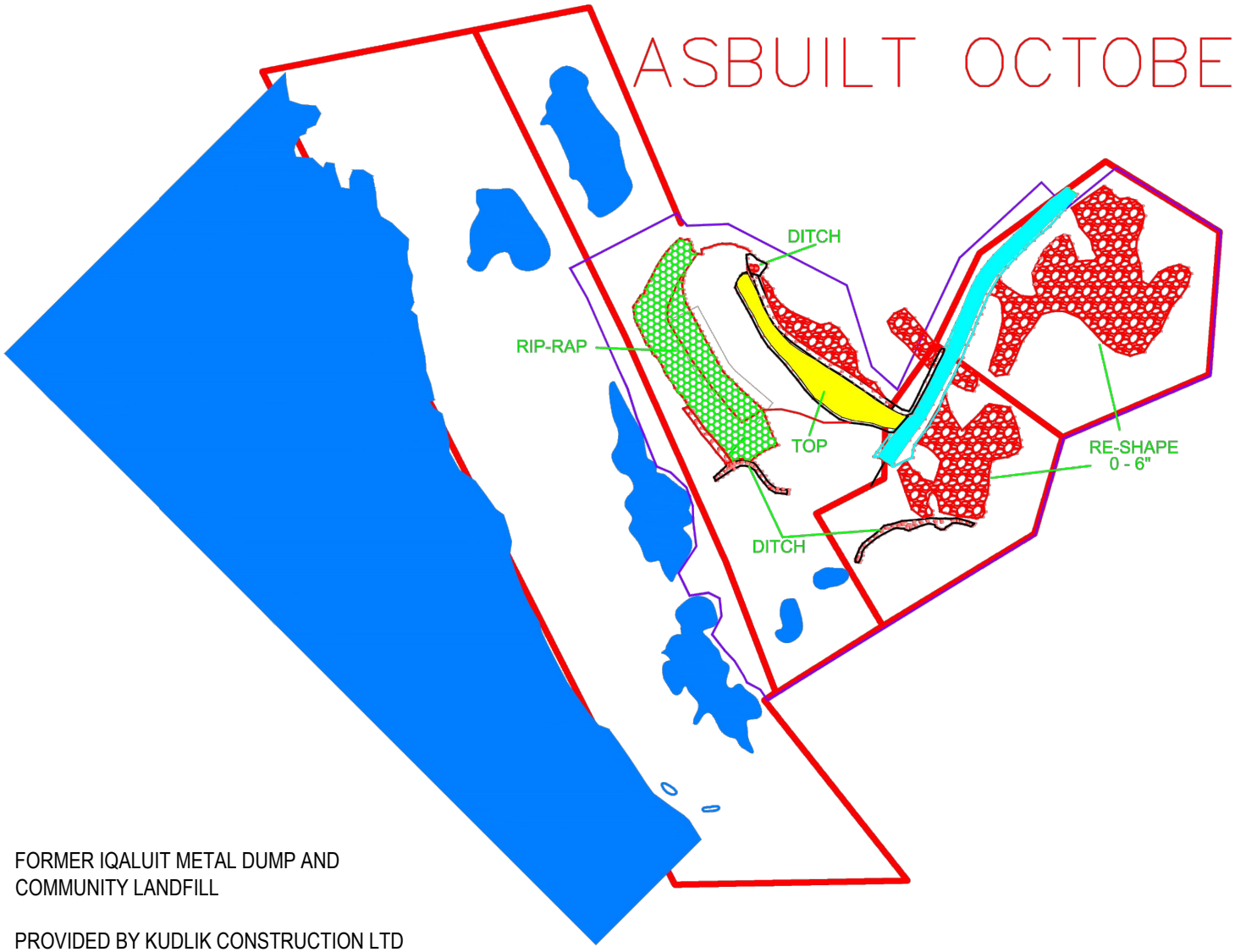
1519 Federal Road
P.O. Box 727
Iqaluit, Nunavut
X0A 0H0
Tel.: 867.979.1166 #26
Fax.: 867.979.1169


# *Remidiation Metal Dump*

| DATE | SCALE | DESIGNER | VÉRIFIED BY |
|---|---|---|---|
| 2017-07-01 | -- | Jeff Deziel | --- |

| PROJECT # | DRAWING # | SHEET | REV. | FOR. |
|---|---|---|---|---|
| ### | ## | 01 | 01 | A1 |

# ASBUILT OCTOBER 5 2017

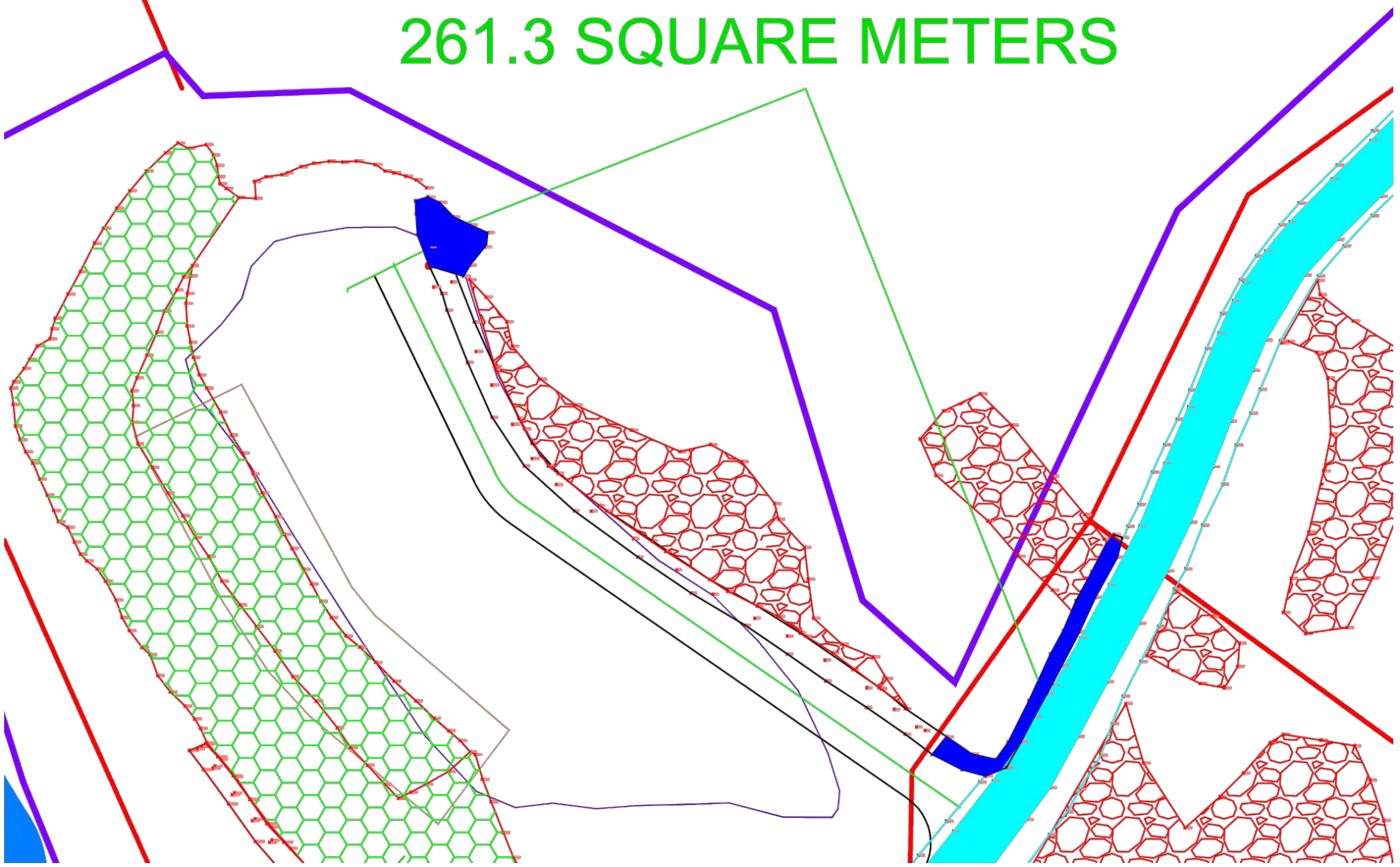



FORMER IQALUIT METAL DUMP AND
COMMUNITY LANDFILL

PROVIDED BY KUDLIK CONSTRUCTION LTD

ARCADIS PROJECT No. 102153-002

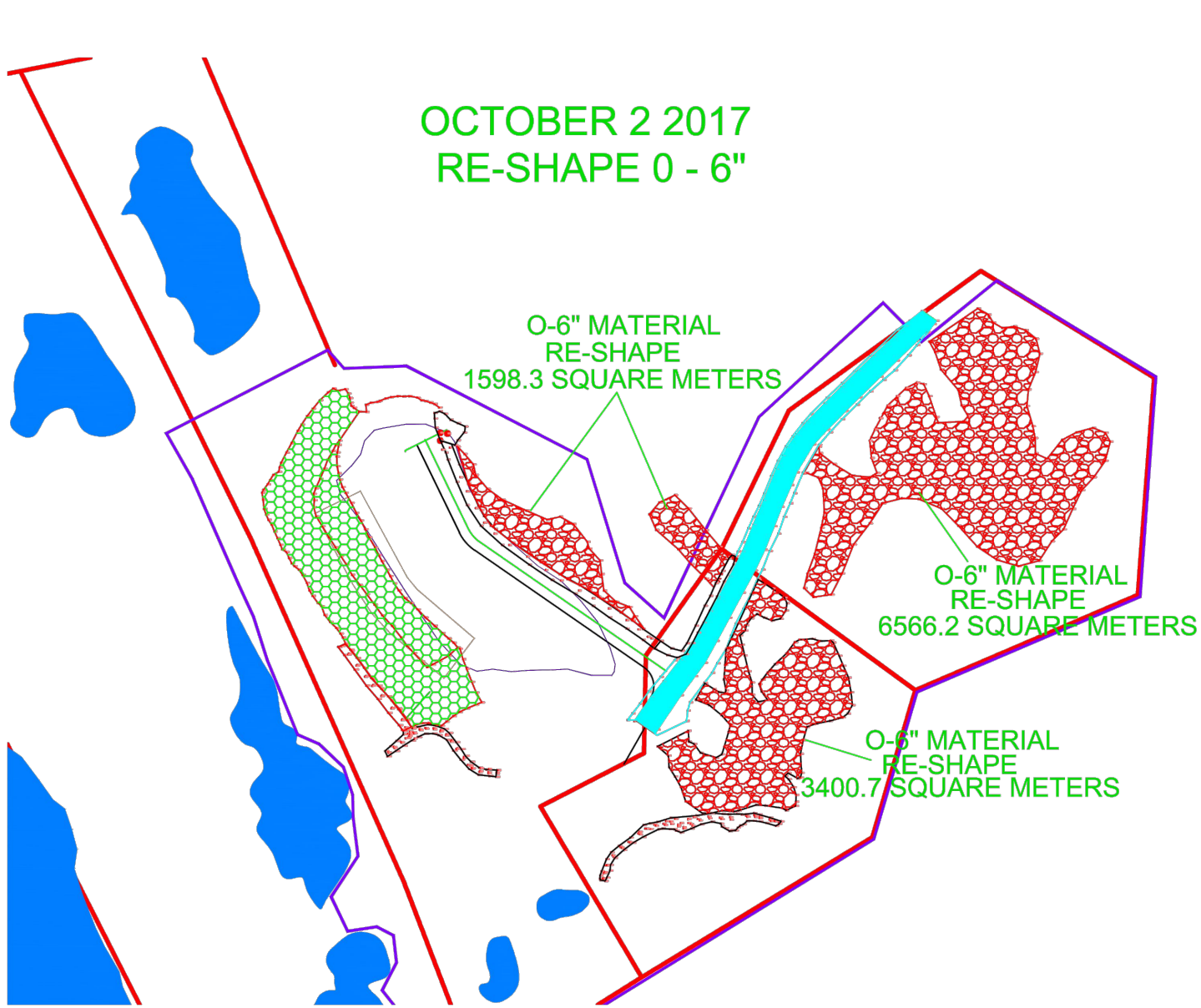
# OCTOBER 2 2017
# ASBUILT DITCH ROAD A AND B
# GEOTEXTILE
# 261.3 SQUARE METERS



FORMER IQALUIT METAL DUMP AND
COMMUNITY LANDFILL

PROVIDED BY KUDLIK CONSTRUCTION LTD

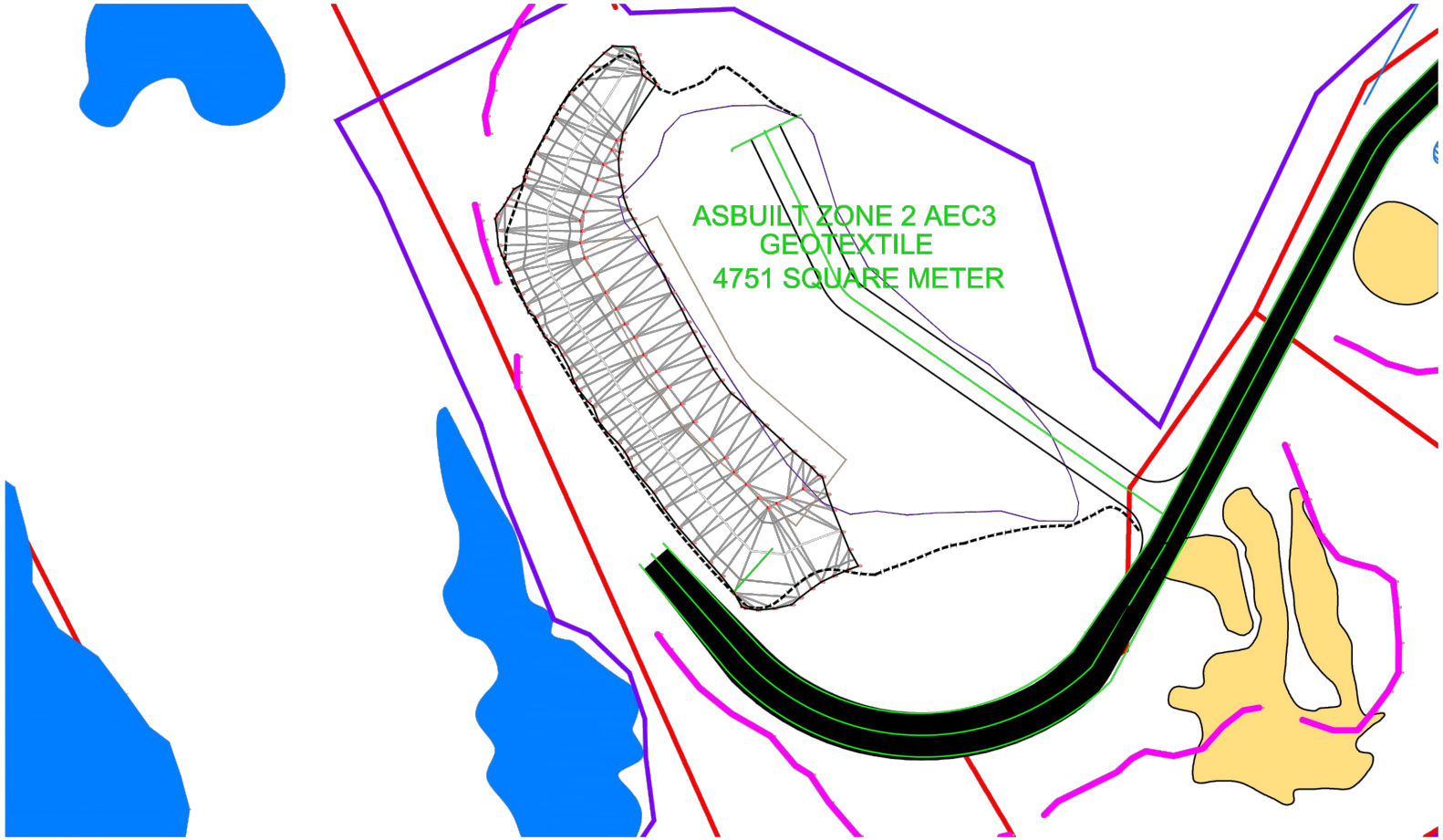
ARCADIS PROJECT No. 102153-002




FORMER IQALUIT METAL DUMP AND
COMMUNITY LANDFILL

PROVIDED BY KUDLIK CONSTRUCTION LTD

ARCADIS PROJECT No. 102153-002




FORMER IQALUIT METAL DUMP AND
COMMUNITY LANDFILL

PROVIDED BY KUDLIK CONSTRUCTION LTD

ARCADIS PROJECT No. 102153-002

# APPENDIX L

## Field Chemistry Monitoring Results

Design & Consultancy for natural and built assets

| | 13-Aug-17 | 14-Aug-17 | 15-Aug-17 | 17-Aug-17 | 18-Aug-17 | 19-Aug-17 | 20-Aug-17 | 21-Aug-17 | 22-Aug-17 | 23-Aug-17 | 24-Aug-17 | 25-Aug-17 | 26-Aug-17 | 27-Aug-17 | 28-Aug-17 | 29-Aug-17 | 30-Aug-17 | 31-Aug-17 | 01-Sep-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C | 7.48 | 11.22 | 12.89 | 9.84 | 10.5 | 9.52 | 12.33 | 11.87 | 11.42 | 10.7 | 8.6 | 10.06 | 9.98 | 10.02 | 11.35 | 8.53 | 9.94 | 9.02 | 7.57 |
| pH | 6.98 | 7.57 | 7.89 | 7.62 | 7.54 | 7.67 | 7.67 | 7.66 | 7.61 | 7.67 | 7.81 | 7.89 | 8.04 | 7.97 | 8.05 | 7.57 | 7.81 | 8.45 | 7.9 |
| ORPmV | 68 | 66 | 91 | 68 | 68 | 35 | 68 | 87 | 68 | 61 | 75 | 94 | 95 | 95 | 73 | 109 | 91 | 92 | 145 |
| mS/cm | 5.64 | 1.2 | 1.56 | 1.43 | 1.61 | 0.778 | 1.87 | 4.92 | 1.74 | 2.85 | 6.76 | 10.2 | 7.76 | 8.98 | 2.29 | 3.58 | 2.94 | 4.96 | 4.79 |
| NTU | 2.7 | 0.7 | 0 | 1.8 | 0.9 | 1.4 | 0.8 | 1 | 0.85 | 1.2 | 6.6 | 7.2 | 10.3 | 8.75 | 18.6 | 53.6 | 36.1 | 0.9 | 1 |
| mg/L DO | 12.15 | 9.28 | 9.62 | 10.99 | 11.25 | 12.35 | 11.07 | 10.76 | 11.16 | 11.56 | 13.33 | 12.84 | 10.46 | 11.65 | 10.08 | 9.55 | 9.82 | 12.62 | 11.48 |
| g/L TDS | 3.55 | 0.766 | 1 | 0.913 | 1.03 | 0.498 | 1.19 | 3.15 | 1.11 | 1.82 | 4.26 | 6.35 | 4.89 | 5.62 | 1.46 | 2.29 | 1.88 | 3.17 | 3.06 |
| ppt | 3.6 | 0.5 | 0.6 | 0.6 | 0.7 | 0.3 | 0.8 | 2.7 | 0.75 | 1.5 | 4.4 | 6.9 | 4.9 | 5.9 | 1.1 | 2 | 1.55 | 2.9 | 2.9 |

| | 02-Sep-17 | 03-Sep-17 | 04-Sep-17 | 06-Sep-17 | 07-Sep-17 | 09-Sep-17 | 11-Sep-17 | 14-Sep-17 | 15-Sep-17 |
|---|---|---|---|---|---|---|---|---|---|
| C | 8 | 6.47 | 4.94 | 7.15 | 7 | 7.13 | 7.87 | 5.2 | 2.87 |
| pH | 7.92 | 7.73 | 7.53 | 8.01 | 7.77 | 7.77 | 7.69 | 7.54 | 7.66 |
| ORPmV | 142 | 107 | 73 | 64 | 93 | 101 | 72 | 72 | 101 |
| mS/cm | 4.79 | 3.265 | 1.74 | 0.451 | 2.56 | 1.27 | 0.91 | 0.788 | 1.08 |
| NTU | 11.5 | 6.2 | 0.9 | 0.5 | 0 | 0 | 0.1 | 0.9 | 10.6 |
| mg/L DO | 12.03 | 11.87 | 11.71 | 13.03 | 12.97 | 13.12 | 13.38 | 12.6 | 14.36 |
| g/L TDS | 3.07 | 2.1 | 1.12 | 0.293 | 1.61 | 0.81 | 0.583 | 0.504 | 0.693 |
| ppt | 2.9 | 1.9 | 0.9 | 0.2 | 1.4 | 0.6 | 0.4 | 0.4 | 0.6 |

| | 13-Aug-17 | 14-Aug-17 | 15-Aug-17 | 17-Aug-17 | 18-Aug-17 | 19-Aug-17 | 20-Aug-17 | 21-Aug-17 | 22-Aug-17 | 23-Aug-17 | 24-Aug-17 | 25-Aug-17 | 26-Aug-17 | 27-Aug-17 | 28-Aug-17 | 29-Aug-17 | 30-Aug-17 | 31-Aug-17 | 01-Sep-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C | 9.04 | 12.34 | 13.69 | 10.69 | 11.23 | 9.94 | 12.41 | 13.52 | 11.73 | 11.82 | 9.69 | 11.38 | 10.7 | 11.04 | 11.76 | 9.79 | 10.78 | 8.75 | 7.49 |
| pH | 7.13 | 7.35 | 7.7 | 7.47 | 7.48 | 7.43 | 7.67 | 7.73 | 7.58 | 7.575 | 7.79 | 7.95 | 7.92 | 7.94 | 4.76 | 7.5 | 6.13 | 8.59 | 7.82 |
| ORPmV | 58 | 77 | 94 | 74 | 73 | 59 | 71 | 70 | 65 | 72 | 67 | 80 | 91 | 86 | 93 | 108 | 100.5 | 88 | 141 |
| mS/cm | 1.16 | 1.13 | 1.23 | 1.11 | 1.11 | 1.11 | 1.25 | 1.31 | 1.21 | 1.18 | 4.3 | 5.06 | 5.03 | 5.05 | 4.82 | 4.59 | 4.71 | 4.09 | 3.75 |
| NTU | 5.1 | 3.5 | 3.3 | 5.3 | 6 | 5.6 | 4 | 8.8 | 7.2 | 5 | 9.5 | 6 | 0.8 | 3.4 | 2.9 | 5.2 | 4.05 | 0 | 0 |
| mg/L DO | 9.97 | 9.32 | 9.05 | 11.23 | 10.42 | 12.28 | 10.69 | 10.43 | 11.36 | 10.56 | 12.57 | 12.24 | 10.79 | 11.52 | 8.73 | 9.17 | 8.95 | 14.71 | 11.18 |
| g/L TDS | 0.745 | 0.722 | 0.785 | 0.711 | 0.713 | 0.707 | 0.799 | 0.842 | 0.775 | 0.756 | 2.75 | 3.19 | 3.17 | 3.18 | 3.08 | 2.94 | 3.01 | 2.62 | 2.4 |
| ppt | 0.5 | 0.4 | 0.5 | 0.5 | 0.4 | 0.5 | 0.5 | 0.5 | 0.5 | 0.45 | 2.4 | 2.8 | 2.9 | 2.85 | 2.6 | 2.6 | 2.6 | 2.3 | 2.2 |

| | 02-Sep-17 | 03-Sep-17 | 04-Sep-17 | 06-Sep-17 | 07-Sep-17 | 09-Sep-17 | 11-Sep-17 | 14-Sep-17 | 15-Sep-17 | 16-Sep-17 | 17-Sep-17 | 18-Sep-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C | 8.01 | 6.38 | 4.75 | 7.36 | 7.66 | 6.88 | 4.59 | 4.67 | 3.12 | | | |
| pH | 8.15 | 7.8 | 7.45 | 7.49 | 7.7 | 7.57 | 7.48 | 7.37 | 7.57 | | | |
| ORPmV | 140 | 105.5 | 71 | 98 | 87 | 109 | 89 | 84 | 102 | | | |
| mS/cm | 3.81 | 3.09 | 2.36 | 2.25 | 2.16 | 1.59 | 1.17 | 0.785 | 1.05 | | | |
| NTU | 2 | 1.1 | 0.2 | 0 | 0.3 | 1.3 | 1.1 | 0.2 | 2.2 | | | |
| mg/L DO | 13.36 | 12.19 | 11.02 | 12.13 | 10.72 | 12.17 | 13.12 | 12.63 | 13.65 | | | |
| g/L TDS | 2.44 | 1.98 | 1.51 | 1.44 | 1.38 | 1.02 | 0.746 | 0.503 | 0.671 | | | |
| ppt | 2.2 | 1.8 | 1.4 | 1.2 | 1.1 | 0.8 | 0.6 | 0.4 | 0.5 | | | |

| | 13-Aug-17 | 14-Aug-17 | 15-Aug-17 | 17-Aug-17 | 18-Aug-17 | 19-Aug-17 | 20-Aug-17 | 21-Aug-17 | 22-Aug-17 | 23-Aug-17 | 24-Aug-17 | 25-Aug-17 | 26-Aug-17 | 27-Aug-17 | 28-Aug-17 | 29-Aug-17 | 30-Aug-17 | 31-Aug-17 | 01-Sep-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C | 8.67 | 11.9 | 15.35 | 10.61 | 11.3 | 10.39 | 13.2 | 13.94 | 12.25 | 12.17 | 9.67 | 11.6 | 11.22 | 11.41 | 11.82 | 9.64 | 10.73 | 8.32 | 7.47 |
| pH | 6.64 | 7.14 | 7.6 | 7.11 | 7.08 | 7.15 | 7.25 | 7.29 | 7.17 | 7.22 | 7.41 | 7.37 | 7.44 | 7.41 | 7.44 | 6.89 | 7.165 | 8.14 | 7.25 |
| ORPmV | 88 | 95 | 110 | 96 | 88 | 73 | 91 | 93 | 89.5 | 83 | 95 | 109 | 111 | 110 | 109 | 159 | 134 | 109 | 175 |
| mS/cm | 3.89 | 4.62 | 5.08 | 4.46 | 4.52 | 4.6 | 4.73 | 5.02 | 4.63 | 4.81 | 12.3 | 13.4 | 13.2 | 13.3 | 13.1 | 12.2 | 12.7 | 11.8 | 11 |
| NTU | 2.7 | 2.2 | 3.7 | 2.6 | 2.3 | 2.9 | 2.6 | 2.7 | 2.45 | 2.8 | 1.4 | 1.3 | 3.1 | 2.2 | 1.5 | 16.3 | 8.9 | 0 | 1 |
| mg/L DO | 9.93 | 8.59 | 8.51 | 9.65 | 9.97 | 10.98 | 10.27 | 10.96 | 10.12 | 10.97 | 12.63 | 12.62 | 9.72 | 11.17 | 9.75 | 10.75 | 10.25 | 12.73 | 11.82 |
| g/L TDS | 2.49 | 2.96 | 3.2 | 2.86 | 1.9 | 2.94 | 3.03 | 3.16 | 2.47 | 3.05 | 7.65 | 8.32 | 8.2 | 8.26 | 8.13 | 7.57 | 7.85 | 7.31 | 6.84 |
| ppt | 2.2 | 2.5 | 2.5 | 2.5 | 2.5 | 2.6 | 2.5 | 2.6 | 2.5 | 2.6 | 8.8 | 9.2 | 9.1 | 9.15 | 8.9 | 8.7 | 8.8 | 8.6 | 8.2 |

| | 02-Sep-17 | 03-Sep-17 | 04-Sep-17 | 06-Sep-17 | 07-Sep-17 | 09-Sep-17 | 11-Sep-17 | 14-Sep-17 | 15-Sep-17 |
|---|---|---|---|---|---|---|---|---|---|
| C | 7.59 | 6.23 | 4.87 | 7.1 | 7.73 | 7.41 | 4.87 | 4.89 | 3.33 |
| pH | 7.73 | 7.34 | 6.95 | 7.1 | 7.07 | 7.25 | 7.08 | 6.83 | 7.16 |
| ORPmV | 152 | 136 | 121 | 124 | 128 | 138 | 117 | 120 | 133 |
| mS/cm | 11.1 | 9.85 | 8.6 | 7.75 | 8.65 | 4.91 | 4.78 | 3.81 | 3.93 |
| NTU | 6.6 | 13.45 | 20.3 | 9 | 0 | 0 | 0.3 | 0.4 | 0 |
| mg/L DO | 12.66 | 12.13 | 11.6 | 12.09 | 12.35 | 12.23 | 14.15 | 13.62 | 13.67 |
| g/L TDS | 6.86 | 6.14 | 5.42 | 7.88 | 5.45 | 3.14 | 3.06 | 2.44 | 2.51 |
| ppt | 8.2 | 7.35 | 6.5 | 5.4 | 6 | 3.1 | 3.2 | 2.4 | 2.6 |

| | 13-Aug-17 | 14-Aug-17 | 15-Aug-17 | 17-Aug-17 | 18-Aug-17 | 19-Aug-17 | 20-Aug-17 | 21-Aug-17 | 22-Aug-17 | 23-Aug-17 | 24-Aug-17 | 25-Aug-17 | 26-Aug-17 | 27-Aug-17 | 28-Aug-17 | 29-Aug-17 | 30-Aug-17 | 31-Aug-17 | 01-Sep-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C | 6.87 | 10.65 | 10.45 | 8.52 | 9.8 | 8.73 | 13.35 | 14.07 | 11.58 | 11.4 | 10.65 | 14.17 | 11.8 | 12.99 | 12.02 | 7.66 | 9.84 | 9 | 6.9 |
| pH | 6.65 | 7.18 | 7.06 | 7.09 | 7.22 | 7.17 | 7.28 | 7.27 | 7.25 | 7.22 | 7.36 | 7.41 | 7.16 | 7.29 | 7.25 | 6.95 | 7.1 | 8.5 | 6.9 |
| ORPmV | 70 | 52 | 36 | 52 | 39 | 26 | 41 | 44 | 40 | 35 | 36 | 36 | 56 | 46 | 49 | 96 | 72.5 | 31 | 134 |
| mS/cm | 0.085 | 0.096 | 0.098 | 0.09 | 0.095 | 0.097 | 0.111 | 0.117 | 0.103 | 0.107 | 0.122 | 0.134 | 0.124 | 0.129 | 0.126 | 0.096 | 0.111 | 0.129 | 0.081 |
| NTU | 3.8 | 3.3 | 3 | 3.8 | 3.1 | 3.1 | 3.1 | 2.6 | 3.1 | 2.85 | 3.2 | 4.1 | 6.8 | 5.45 | 3.9 | 7.9 | 5.9 | 1.4 | 0.9 |
| mg/L DO | 14.53 | 13.78 | 13.47 | 13.81 | 13.95 | 13.6 | 12.43 | 10.2 | 13.19 | 11.9 | 12.52 | 10.93 | 10.23 | 10.58 | 10.57 | 12.07 | 11.32 | 13.14 | 13.23 |
| g/L TDS | 0.055 | 0.063 | 0.064 | 0.059 | 0.062 | 0.063 | 0.072 | 0.076 | 0.067 | 0.07 | 0.079 | 0.087 | 0.081 | 0.084 | 0.082 | 0.062 | 0.072 | 0.084 | 0.052 |
| ppt | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | 02-Sep-17 | 03-Sep-17 | 04-Sep-17 | 06-Sep-17 | 07-Sep-17 | 09-Sep-17 | 11-Sep-17 | 14-Sep-17 | 15-Sep-17 |
|---|---|---|---|---|---|---|---|---|---|
| C | 6.86 | 5.53 | 4.2 | 7.15 | 6.73 | 7.06 | 5.21 | 4.47 | 2.59 |
| pH | 8.37 | 7.53 | 6.69 | 2.27 | 6.84 | 7.35 | 7.05 | 6.83 | 7.2 |
| ORPmV | 56 | 71 | 86 | 78 | 87 | 93 | 79 | 83 | 99 |
| mS/cm | 0.088 | 0.074 | 0.06 | 0.073 | 0.074 | 0.078 | 0.073 | 0.064 | 0.064 |
| NTU | 2.1 | 5.25 | 8.4 | 0 | 0 | 0.2 | 0 | 0 | 0 |
| mg/L DO | 13.65 | 13.86 | 14.07 | 14.19 | 14.3 | 13.74 | 14.54 | 14.78 | 15.67 |
| g/L TDS | 0.058 | 0.049 | 0.039 | 0.047 | 0.048 | 0.051 | 0.0417 | 0.042 | 0.042 |
| ppt | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | 13-Aug-17 | 14-Aug-17 | 15-Aug-17 | 17-Aug-17 | 18-Aug-17 | 19-Aug-17 | 20-Aug-17 | 21-Aug-17 | 22-Aug-17 | 23-Aug-17 | 24-Aug-17 | 25-Aug-17 | 26-Aug-17 | 27-Aug-17 | 28-Aug-17 | 29-Aug-17 | 30-Aug-17 | 31-Aug-17 | 01-Sep-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C | 6.64 | 9.71 | 9.42 | 8.28 | 8.4 | 7.99 | 11.29 | 12.23 | 9.85 | 10.11 | 9.71 | 12.49 | 10.38 | 11.44 | 10.78 | 7.16 | 8.97 | 8.23 | 6.69 |
| pH | 6.76 | 7.37 | 7.27 | 7.26 | 7.44 | 7.42 | 7.43 | 7.43 | 7.44 | 7.43 | 7.5 | 7.55 | 7.26 | 7.41 | 7.5 | 7.07 | 7.285 | 8.1 | 6.97 |
| ORPmV | 59 | 43 | 17 | 37 | 21 | 5 | 23 | 28 | 22 | 17 | 19 | 15 | 42 | 29 | 25 | 88 | 56.5 | 46 | 132 |
| mS/cm | 0.074 | 0.079 | 0.082 | 0.08 | 0.08 | 0.08 | 0.088 | 0.09 | 0.084 | 0.085 | 0.091 | 0.098 | 0.096 | 0.097 | 0.097 | 0.083 | 0.09 | 0.081 | 0.074 |
| NTU | 3.6 | 2.7 | 2.9 | 4.4 | 3.5 | 3.1 | 3.2 | 2.7 | 3.35 | 2.9 | 4.5 | 4.8 | 10.3 | 7.55 | 3.3 | 7.8 | 5.55 | 2.1 | 2.2 |
| mg/L DO | 13.75 | 13.56 | 13.79 | 13.63 | 14.06 | 13.11 | 13.51 | 10.65 | 13.79 | 11.88 | 13.21 | 11.41 | 12.33 | 11.87 | 11.75 | 12.17 | 11.96 | 12.83 | 13.29 |
| g/L TDS | 0.048 | 0.052 | 0.053 | 0.052 | 0.052 | 0.052 | 0.057 | 0.059 | 0.055 | 0.056 | 0.059 | 0.064 | 0.062 | 0.063 | 0.063 | 0.054 | 0.059 | 0.053 | 0.048 |
| ppt | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | 02-Sep-17 | 03-Sep-17 | 04-Sep-17 | 06-Sep-17 | 07-Sep-17 | 09-Sep-17 | 11-Sep-17 | 14-Sep-17 | 15-Sep-17 |
|---|---|---|---|---|---|---|---|---|---|
| C | 6.65 | 5.42 | 4.19 | 7.15 | 6.64 | 7.13 | 4.93 | 4.58 | 2.67 |
| pH | 7.83 | 7.33 | 6.83 | 7.51 | 7.13 | 7.59 | 7.24 | 6.99 | 7.55 |
| ORPmV | 77 | 79.5 | 82 | 69 | 72 | 85 | 70 | 75 | 87 |
| mS/cm | 0.072 | 0.066 | 0.059 | 0.069 | 0.07 | 0.074 | 0.069 | 0.063 | 0.061 |
| NTU | 7.7 | 6.6 | 5.5 | 0 | 0 | 0 | 0.4 | 0 | 0 |
| mg/L DO | 13.26 | 13.83 | 14.4 | 14.08 | 13.95 | 13.94 | 14.59 | 15.12 | 15.54 |
| g/L TDS | 0.047 | 0.043 | 0.038 | 0.045 | 0.046 | 0.048 | 0.045 | 0.041 | 0.04 |
| ppt | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | 13-Aug-17 | 14-Aug-17 | 15-Aug-17 | 17-Aug-17 | 18-Aug-17 | 19-Aug-17 | 20-Aug-17 | 21-Aug-17 | 22-Aug-17 | 23-Aug-17 | 24-Aug-17 | 25-Aug-17 | 26-Aug-17 | 27-Aug-17 | 28-Aug-17 | 29-Aug-17 | 30-Aug-17 | 31-Aug-17 | 01-Sep-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C | 6.91 | 10.04 | 9.7 | 8.92 | 9.24 | 7.05 | 9.63 | 10.33 | 9.44 | 8.69 | 9.39 | 11.27 | 9.55 | 10.41 | 10.95 | 7.93 | 9.44 | 8.11 | 7.39 |
| pH | 7 | 7.74 | 7.51 | 7.44 | 7.72 | 7.64 | 7.63 | 7.58 | 7.68 | 7.61 | 7.59 | 7.69 | 7.55 | 7.62 | 7.77 | 7.21 | 7.49 | 7.84 | 7.22 |
| ORPmV | 38 | 25 | -6 | 21 | -1 | -14 | 5 | 14 | 2 | 0 | 2 | 1 | 24 | 13 | 3 | 83 | 43 | 57 | 124 |
| mS/cm | 0.073 | 0.08 | 0.081 | 0.082 | 0.082 | 0.077 | 0.08 | 0.083 | 0.081 | 0.08 | 0.091 | 0.105 | 0.092 | 0.099 | 0.098 | 0.086 | 0.092 | 0.079 | 0.074 |
| NTU | 4.4 | 3.9 | 4.9 | 5.1 | 4.7 | 3.8 | 3.8 | 3.9 | 4.25 | 3.85 | 37.6 | 11.7 | 9.3 | 10.5 | 19 | 28.4 | 23.7 | 4.6 | 2.2 |
| mg/L DO | 13.63 | 11.98 | 12.13 | 12.15 | 12.73 | 14.48 | 14.06 | 13.31 | 13.4 | 13.9 | 14.66 | 13.09 | 11.07 | 12.08 | 11.1 | 11.77 | 11.44 | 11.33 | 12.35 |
| g/L TDS | 0.047 | 0.052 | 0.053 | 0.053 | 0.053 | 0.05 | 0.052 | 0.054 | 0.053 | 0.052 | 0.059 | 0.068 | 0.06 | 0.064 | 0.063 | 0.056 | 0.06 | 0.051 | 0.048 |
| ppt | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | 02-Sep-17 | 03-Sep-17 | 04-Sep-17 | 06-Sep-17 | 07-Sep-17 | 09-Sep-17 | 11-Sep-17 | 14-Sep-17 | 15-Sep-17 |
|---|---|---|---|---|---|---|---|---|---|
| C | 6.71 | 5.52 | 4.33 | 7.54 | 7.16 | 7.5 | 5.93 | 5.25 | 3.49 |
| pH | 7.55 | 7.29 | 7.03 | 7.82 | 7.55 | 7.92 | 7.61 | 7.34 | 7.94 |
| ORPmV | 90 | 82 | 74 | 55 | 50 | 70 | 52 | 55 | 70 |
| mS/cm | 0.07 | 0.064 | 0.058 | 0.072 | 0.072 | 0.077 | 0.07 | 0.064 | 0.061 |
| NTU | 37.9 | 24.15 | 10.4 | 0.3 | 0 | 1.5 | 6.7 | 1.4 | 2.9 |
| mg/L DO | 12.06 | 13.25 | 14.44 | 13.78 | 12.85 | 13.72 | 12.45 | 14.91 | 14.57 |
| g/L TDS | 0.046 | 0.042 | 0.038 | 0.047 | 0.047 | 0.05 | 0.046 | 0.042 | 0.04 |
| ppt | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | 13-Aug-17 | 14-Aug-17 | 15-Aug-17 | 17-Aug-17 | 18-Aug-17 | 19-Aug-17 | 20-Aug-17 | 21-Aug-17 | 22-Aug-17 | 23-Aug-17 | 24-Aug-17 | 25-Aug-17 | 26-Aug-17 | 27-Aug-17 | 28-Aug-17 | 29-Aug-17 | 30-Aug-17 | 31-Aug-17 | 01-Sep-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C | 7.38 | 11.03 | 10.71 | 9.21 | 10.1 | 9.53 | 12.37 | 14.17 | 11.24 | 11.85 | 10.23 | 15.66 | 13.96 | 14.81 | 11.24 | 7.9 | 9.57 | 7.71 | 6.96 |
| pH | 7.37 | 7.86 | 7.59 | 7.58 | 7.9 | 7.68 | 7.56 | 7.43 | 7.73 | 7.555 | 7.82 | 7.89 | 7.74 | 7.82 | 7.64 | 7.58 | 7.61 | 7.44 | 7.35 |
| ORPmV | -12 | 28 | -25 | 1 | 28 | -2 | -6 | 8 | 11 | 3 | 0 | 26 | 25 | 256 | 6 | 80 | 43 | 71 | 122 |
| mS/cm | 0.095 | 0.116 | 0.115 | 0.114 | 0.123 | 0.111 | 0.109 | 0.113 | 0.12 | 0.112 | 0.145 | 0.222 | 0.123 | 0.1725 | 0.14 | 0.102 | 0.121 | 0.085 | 0.083 |
| NTU | 22.5 | 4.7 | 4.9 | 5.9 | 4.9 | 7.1 | 8.9 | 48 | 6.9 | 27.6 | 90.3 | 209 | 508 | 358.5 | 15.8 | 18 | 16.9 | 123 | 2.3 |
| mg/L DO | 14.29 | 12.51 | 12.12 | 11.23 | 13.11 | 11.28 | 10.19 | 9.14 | 11.65 | 10.21 | 12.07 | 8.62 | 8.28 | 8.45 | 8.32 | 11.09 | 9.71 | 10.11 | 11.55 |
| g/L TDS | 0.062 | 0.076 | 0.075 | 0.074 | 0.08 | 0.072 | 0.071 | 0.073 | 0.076 | 0.073 | 0.094 | 0.144 | 0.08 | 0.112 | 0.091 | 0.066 | 0.079 | 0.055 | 0.054 |
| ppt | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | 02-Sep-17 | 03-Sep-17 | 04-Sep-17 | 06-Sep-17 | 07-Sep-17 | 09-Sep-17 | 11-Sep-17 | 14-Sep-17 | 15-Sep-17 |
|---|---|---|---|---|---|---|---|---|---|
| C | 6.56 | 5.48 | 4.4 | 6.41 | 6.47 | 6.41 | 4.4 | 4.92 | 3.46 |
| pH | 7.05 | 7.13 | 7.21 | 8.49 | 7.98 | 8.46 | 8.53 | 7.88 | 8.49 |
| ORPmV | 108 | 83.5 | 59 | 36 | 38 | 63 | 16 | 25 | 58 |
| mS/cm | 0.081 | 0.07 | 0.059 | 0.073 | 0.08 | 0.098 | 0.089 | 0.072 | 0.075 |
| NTU | 9.9 | 18.5 | 27.1 | 2.5 | 0.5 | 3.1 | 2.7 | 2.7 | 0.7 |
| mg/L DO | 10.37 | 12.15 | 13.92 | 15.64 | 14.65 | 17.99 | 17.61 | 15.51 | 19.13 |
| g/L TDS | 0.052 | 0.045 | 0.038 | 0.048 | 0.052 | 0.064 | 0.058 | 0.047 | 0.049 |
| ppt | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

# APPENDIX M

## Long-Term Monitoring Plan

ARCADIS Design & Consultancy for natural and built assets

Public Services and Procurement Canada (PSPC)
on Behalf of Transport Canada

# PERFORMANCE & LONG TERM MONITORING PLAN (LTM), FORMER METAL DUMP AND COMMUNITY LANDFILL

Iqaluit, Nunavut

August 3, 2017

# PERFORMANCE & LONG TERM MONITORING PLAN (LTM), FORMER METAL DUMP AND COMMUNITY LANDFILL

Iqaluit, Nunavut

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# EXECUTIVE SUMMARY

Arcadis Canada Inc., was retained by Public Services and Procurement Canada (PSPC), Environmental Services on behalf of Transport Canada (TC) to complete a Performance and Long Term Monitoring (LTM) Plan for the Transport Canada Iqaluit Former Metal Dump and Community Landfill (referenced as "the site" throughout this document). A detailed monitoring plan is also a requirement of Part K, condition 1 of Water Licence 1BR-MDR1721, issued by the Nunavut Water Board on July 31, 2017.

The Iqaluit Former Metal Dump/Community Landfill is located 1.7 km southwest of the City of Iqaluit, Nunavut on the border of the Sylvia Grinnell Territorial Park and the Sylvia Grinnell River. The site covers an area of approximately 72,500 $m^2$. The United States Air Force (USAF) used the site from 1955 to 1963 as a metal dump for vehicles, truck bodies, barrels and scrap metal. The majority of materials were deposited in 1963 when the US Military left Frobisher Bay. The debris was scattered over a large area and consisted of vehicles, equipment, barrels, and scrap metal. Shops, buildings, and other materials were simply bulldozed over the cliff.

Four areas of environmental concern were identified at the site in the Environmental Site Assessments conducted from 2008-2009; three of these areas are noted as having moderate to significant impacts to water quality, sediment and/or soils. The site is being remediated from July 2017 to November 2017. Remediation activities include but are not limited to the consolidation of non-hazardous debris into the main landfill, off-site disposal of selected soils and sediments, off-site disposal of hazardous materials, construction of an engineered landfill at the main landfill site for disposal of on-site waste in support of remediation, and surface water management. After remediation, the only structures that will remain at the site are a constructed single use landfill, which will be covered with an aggregate cap, and the associated drainage swales.

There are two separate but related monitoring plans included in this document; one for Remedial Performance Monitoring during active remediation and one for Long Term Monitoring post-closure. During active remediation, on-going performance monitoring will be conducted at the site to ensure mitigation measures implemented to reduce additional impacts from remediation efforts are performing as anticipated. The LTM Plan will be implemented post-closure to monitor the long-term performance of site remediation efforts. The long-term monitoring plan has been developed with consideration of INAC's Abandoned Military Site Remediation Protocol (2008). Long Term Monitoring will include visual, water quality, sediment and natural environmental monitoring. Seepage and soil sampling will be completed as required based on landfill performance.

The goal of this Performance and LTM Plan is to ensure that present and future risks to human health and the environment from the site conditions during and post remedial work are negligible and that monitoring, at some point in the future, could be terminated with confidence, based on findings of no risk and no depreciation of site environmental status.

# CONTENTS

1 Introduction ..... 1-1
1.1 Regulatory Framework ..... 1-1
1.1.1 Nunavut Regulatory Context and Water Licence Requirements ..... 1-1
1.1.2 Contaminated Sites Management ..... 1-2
1.2 Environmental Quality Guidelines ..... 1-2
2 Background ..... 2-3
2.1 Site Overview and Location ..... 2-3
2.2 Climate ..... 2-4
2.3 Ecological Characterization of the Site ..... 2-4
3 Existing site Conditions ..... 3-5
3.1 Areas of Environmental Concern ..... 3-6
3.2 Summary of Site Impacts Prior to Remediation ..... 3-7
4 Selected Remedial Strategy ..... 4-9
4.1 Engineered Decommissioning of Landfill (AEC 3) ..... 4-11
5 Remedial Performance Monitoring Plan ..... 5-12
5.1 Surface Water Monitoring Station Locations: Performance Monitoring ..... 5-13
5.2 Contingency Planning ..... 5-14
6 Long Term Monitoring Plan ..... 6-14
6.1 Post-Closure Monitoring Program ..... 6-14
6.1.1 Visual Monitoring ..... 6-15
6.1.1.1 Rationale ..... 6-15
6.1.1.2 Monitoring Plan: Visual Monitoring ..... 6-15
6.1.2 Seepage Monitoring ..... 6-16
6.1.2.1 Rationale ..... 6-16
6.1.2.2 Monitoring Plan: Seepage Monitoring ..... 6-16
6.1.3 Soil Sampling ..... 6-16
6.1.3.1 Rationale ..... 6-16
6.1.3.2 Monitoring Plan: Soil Sampling ..... 6-17
6.1.4 Surface Water Monitoring ..... 6-17
6.1.4.1 Rationale ..... 6-17

6.1.4.2 Monitoring Plan: Surface Water Sampling ....6-17
6.1.5 Sediment Sampling ....6-18
6.1.5.1 Rationale....6-18
6.1.5.2 Monitoring Plan: Sediment Sampling ....6-18
6.1.6 Natural Environmental Monitoring ....6-18
6.1.6.1 Rationale....6-18
6.1.6.2 Monitoring Plan: Natural Environmental....6-19
6.2 Monitoring Station Locations ....6-19
6.3 Effluent Discharge Limits ....6-20
6.4 Selection of EQGs for Evaluation of Soils, Water Quality, and Sediment ....6-21
6.4.1 Soils....6-21
6.4.2 Surface Water and Sediment ....6-22
6.5 Quality Assurance and Quality Control Plan ....6-23
6.5.1 Sample Methodologies....6-24
6.5.1.1 Solids....6-24
6.5.1.2 Aqueous....6-24
6.5.2 Sample Duplicates....6-24
7 Long Term Monitoring Schedule and Reporting ....7-25
7.1 Schedule....7-25
7.2 Reduction or Termination of Site Monitoring ....7-27
7.3 Reporting ....7-27
7.3.1 Nunavut Water Board Annual Reporting....7-27
7.3.2 Long Term Monitoring Annual Report ....7-28
8 Revisions....8-29

# TABLES

Table 2-1: Ecology of Iqaluit, Nunavut ....2-4
Table 3-1: 2008, 2009 and 2016 Testing Program ....3-7
Table 3-2: Summary of Contaminant Impacts....3-8
Table 4-1: Outline of Selected Remedial Strategy ....4-10
Table 5-1: Performance Monitoring: Potential Effects and Mitigative Measures ....5-12

Table 5-2: Summary of Proposed Monitoring Sample Stations .....5-13

Table 6-1: Summary of Proposed Long Term Monitoring Sample Stations.....6-19

Table 6-2: Effluent Discharge Limits as per Part D, condition 9 of Water Licence .....6-20

Table 6-3: Summary of Site Specific Environmental Quality Criteria.....6-22

Table 6-4: Criteria for the Evaluation of Blind and Duplicate Sample Results.....6-25

Table 7-1: Proposed Monitoring Schedule.....7-26

# FIGURES

Figure 1 Site Location

Figure 2 Site Layout

Figure 3 Long Term Monitoring Sample Locations

Figure 6-1 AEC Boundaries (within text)

# APPENDICES

Appendix A Remedial Action Plan Figures

Appendix B Identification of Potential Environmental and Resource Impacts during Remediation

Appendix C Visual Inspection Checklist

# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AEC | Areas of Environmental Concern |
| AMSRP | Abandoned Military Site Remediation Protocol |
| BTEX | benzene, toluene, ethylbenzene, and xylenes |
| CALA | Canadian Association of Laboratory Accreditation |
| CCME | Canadian Council of Ministers of the Environment |
| COC | contaminants of concern |
| CSedQG | Canadian Sediment Quality Guidelines |
| CSQG | Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health |
| CWS-PHC | Canada-Wide Standards for Petroleum Hydrocarbons in Soil |
| CWQG | Canadian Water Quality Guidelines |
| DOC | dissolved organic carbon |
| DO | dissolved oxygen |
| ESA | Environmental Site Assessment |
| EQG | Environmental Quality Guidelines |
| INAC | Indigenous Affairs and Northern Development Canada |
| LTM | Long Term Monitoring |
| MDL | method detection limit |
| NWB | Nunavut Water Board |
| ORP | oxidation-reduction potential |
| PAH | polycyclic aromatic hydrocarbons |
| PCB | polychlorinated biphenyls |
| PHC | petroleum hydrocarbons |
| PSPC | Public Services and Procurement Canada |
| QA/QC | quality assurance/quality control |
| RAP | Remedial Action Plan |
| RPD | relative percent difference |
| TC | Transport Canada |
| TDS | total dissolved solids |
| TOC | total organic carbon |
| USEPA | United States Environmental Protection Agency |
| VOC | volatile organic compounds |

# 1 INTRODUCTION

Arcadis Canada Inc. (Arcadis), was retained by Public Services and Procurement Canada (PSPC) Environmental Services on behalf of Transport Canada to complete a Performance and Long Term Monitoring (LTM) Plan for the Transport Canada Iqaluit Former Metal Dump and Community Landfill (referenced as “the site” throughout this document).

The goal of the performance and long-term monitoring program is to ensure that present and future risks to human health and the environment from the site conditions during and post remedial work are negligible and that monitoring, at some point in the future, could be terminated with confidence, based on findings of no risk and no depreciation of site environmental status.

The site is being remediated from July 2017 to November 2017. Remediation activities generally include but are not limited to the consolidation of non-hazardous debris into the main landfill, off-site disposal of selected soils and sediments, off-site disposal of hazardous materials, construction of an engineered landfill at the main landfill site for disposal of on-site waste in support of remediation, and surface water management. The landfill will be constructed with a final cap after this remedial work.

The performance monitoring component of this plan outlines the monitoring that will be undertaken during active remediation (Section 5.0). The LTM Plan outlines the post-closure monitoring program (Section 6.0).

## 1.1 Regulatory Framework

### 1.1.1 Nunavut Regulatory Context and Water Licence Requirements

The *Nunavut Waters and Nunavut Surface Rights Tribunal Act* grants the Nunavut Water Board (NWB or Board) the authority to regulate the use of water and deposit of wastes through issuance of water licences to proponents. The objective of the Board is to provide for the conservation and utilization of waters in Nunavut in a manner that will provide optimal benefit for the residents of Nunavut and Canadians in general (Section 35 of the Act).

As stated on the NWB website, the Board operates at arm's length from government and other parties. The Board is part of a larger management regime in Nunavut constituted of other Institutions of Public Government, including the Nunavut Surface Rights Tribunal, the Nunavut Impact Review Board and the Nunavut Planning Commission. Other land and resource management bodies in Nunavut include the Nunavut Wildlife Management Board, regional wildlife organizations and local hunter and trapper organizations.

The NWB holds the authority to regulate the remediation of the site through the conditions set forth in Water Licence 1BR-MDR1721. Part K, conditions 1 through 8 identify requirements for inclusion in this monitoring plan. Part B, condition 1 outlines annual reporting requirements (Section 7.3.1).

The performance and long-term monitoring program is being developed in accordance with Park K, Item 1 of Water Licence 1BR-MDR1721. This monitoring plan:

a) details on-going site monitoring (i.e., the performance monitoring program, Section 5.0);

b) identifies monitoring program stations (Figure 3; Section 5.1 and 6.2);
c) addresses effluent discharge criteria (Section 6.3);
d) summarizes monitoring data collected thus far (Section 3.0); and
e) includes an assessment of how the facilities are expected to perform in the long-term (Section 4.1).

No effluent discharge is anticipated with this site clean-up (Park K, condition 1(c)). Recommendations for improvements to this monitoring plan will be made in future annual reports (Part K, Item 1e and Part B, Item 1(e)).

### 1.1.2 Contaminated Sites Management

The Contaminated Sites Management Working Group for federal government departments has defined a contaminated site as a site at which substances occur in concentrations that either: 1) are above background levels and pose, or are likely to pose, an immediate or long-term hazard to human health or the environment; or 2) exceed levels specified in policies and/or regulations. For the latter, the Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (CCME, 1999 and annual updates), including the Canada-Wide Standards for Petroleum Hydrocarbons in Soil (CCME, 2001 and updates) are applied in the numerical comparison of laboratory data to determine whether the site should be deemed a contaminated site. The guidelines are numerical limits intended to maintain, improve, or protect environmental quality and human health at contaminated sites.

The Government of Nunavut Department of Environment Guideline for the Management of Contaminated Sites (revised December 2014) has adopted the federal CCME Guidelines for the management of contaminated sites within its jurisdiction.

The chemical data obtained during the Franz (2009 & 2010c) Phase I/II and Phase III Environmental Site Assessments (ESA) and during the 2016 surface water and sediment testing conducted by Arcadis as part of the Arcadis 2017 Remedial Action Plan (RAP) update were compared to established guidelines from the federal CCME. The federal guidelines, referred to in this report as environmental quality guidelines (EQG) are relevant since the site(s) is currently federally managed and Nunavut has adopted the CCME approach (Section 1.2 and 6.4).

## 1.2 Environmental Quality Guidelines

The federal EQG are based on the level of risk a contaminant poses to humans, plants and wildlife. The EQG are used in the RAP to identify the areas where mitigation of exposure to chemicals of concern is required and are also incorporated as site-specific remedial objectives.

The specific guidelines that will be used to evaluate the impact to surface water, sediment and soil are as follows:

- Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (CSQGs) (CCME, 1999, with updates).
- Canada-Wide Standards for Petroleum Hydrocarbons in Soil (CWS-PHC) (CCME, 2008).
- Canadian Soil Quality Guidelines (CSQG) Polycyclic Aromatic Hydrocarbons factsheet (CCME, 2010).

- Canadian Environmental Quality Guidelines. Canadian Sediment Quality Guidelines (CSedQG) for the Protection of Aquatic Life (CCME, 2007, with updates).
- Canadian Environmental Quality Guidelines. Canadian Water Quality Guidelines (CWQG) for the Protection of Aquatic Life (CCME, 2007, with updates).

The soil EQGs are further categorized by land use (i.e., agricultural/wildland, residential/parkland, commercial and industrial) and soil properties (i.e., fined or coarse grained soil).

Samples collected during the Phase III ESA were compared against these guidelines (Section 3.0). Water, soil and sediment, sampling completed as part of the LTM Plan will also be compared against these EQG (Section 6.4).

# 2 BACKGROUND

## 2.1 Site Overview and Location

Iqaluit (formerly named Frobisher Bay) is located on the southern tip of Baffin Island. The Iqaluit Former Metal Dump/Community Landfill (UTM84, Zone 19 coordinates of E521904.94, N7067812.69) is located at the West 40 area on the border of Sylvia Grinnell Territorial Park and the Sylvia Grinnell River, 1.7 km southwest of the City of Iqaluit (Figure 1). The site covers an area of approximately 72,500 $m^2$. The site is situated on an escarpment leading to the Sylvia Grinnell River and has several shallow ravines and coulees partially filled with metal debris. Historically, the site has been referred to as Sylvia Grinnell Park Dump and West 40 – Dump Site #1 and Vehicle Dump and Community Landfill or simply “site” or “landfill”.

Two main areas of waste are present at the site as a result of former land use activities (Figure 2):

1) the main debris/community landfill area located in the central portion of the site and spanning the top, side and toe of a bedrock escarpment that runs northwest/southeast; and
2) the vehicle dump located approximately to the south and parallel with the main landfill.

The United States Air Force (USAF) used the site from 1955 to 1963 as a metal dump for vehicles, truck bodies, barrels and scrap metal. The majority of materials were deposited in 1963 when the US Military left Frobisher Bay. The debris was scattered over a large area and consisted of vehicles, equipment, barrels, and scrap metal. Shops, buildings, and other materials were simply bulldozed over the cliff. The area to the north side of the slope was used by the USAF and to a lesser degree the community of Iqaluit as a landfill site for household garbage until sometime in the 1970’s.

The site is being remediated from July 2017 to November 2017. Remediation activities include but are not limited to the consolidation of non-hazardous debris into the main landfill, off-site disposal of selected soils and sediments, off-site disposal of hazardous materials, construction of an engineered landfill at the main landfill site for disposal of on-site waste in support of remediation, and surface water management. After remediation, the only structures that will remain at the site are a constructed single use landfill, which will be covered with an aggregate cap, and associated drainage swales.

## 2.2 Climate

Iqaluit is located within an arctic climatic zone despite being well outside of the Arctic Circle. The average daily temperature range is -28˚C to 7.7˚C. The area is characterized by very cold winters and short summers that permit the growth of very small, stunted trees. The average monthly temperature is below freezing for eight months of the year. The average annual precipitation is 412.1 mm, which is much wetter than many other localities in the Canadian Arctic islands. There is 198.3 mm annual rainfall and 235.8 mm annual snowfall (www.climate.weatheroffice.ec.gc.ca).

## 2.3 Ecological Characterization of the Site

Although the landscape appears to be barren, the flora of Iqaluit is abundant. As reported by Franz (2009 & 2010c), the area is characterized by a combination of bare rocky outcrops, grasses, and lichens.

To determine if the site is part of or is near to a critical wildlife habitat, the network of protected areas administered by Environment Canada was reviewed. The network, which includes migratory bird sanctuaries, national wildlife areas, and marine wildlife areas, represents diverse habitats protected under federal legislation. In addition, a territorial search for information related to critical wildlife habitat was also conducted. The distribution data provided by Environment Canada and the Government of Nunavut are based on limited available information. Due to the dynamic nature of species distribution, the data provided in Table 2-1 does not represent an exhaustive and comprehensive inventory of a species' current distribution.

**Table 2-1: Ecology of Iqaluit, Nunavut**

| Vegetation and Terrestrial Mammals | Aquatic Wildlife and Birds |
|---|---|
| **Vegetation** | **Aquatic Wildlife** |
| • Arctic Fireweed (*Epilobium angustifolium)*<br>• flowers and berries<br>  o Crowberry (*Emporium*),<br>  o Poppy (*Papaver*)<br>  o Saxifrage (*Saxifraga)*<br>• numerous mushroom species<br>• lichens<br>  o Pixie-cup (*Cladonia asahinae)*<br>Scurvy-grass (*Cochlearia sp.)* | • Seal (Pinnipedia)<br>• Walrus (Odobenus rosmarus)<br>• Beluga (Delphinapterus leucas)<br>• Humpback Whale (Megaptera novaeangliae)<br>• Arctic Char (Salvelinus alpinus) |
| **Terrestrial Mammals** | **Birds** |
| • Wolverine (rare) (*Gulo gulo*),<br>• Lynx (*Lynx lynx*)<br>• Mice<br>• Marmot (*Marmota monax)*<br>• Muskox (*Ovibos moschatus)*<br>• Arctic Hare (*Lepus arcticus*)<br>• Lemming (*Dicrostonyx torquatus)* | • Canada Goose (Branta canadensis)<br>• Ptarmigan (Lagopus muta)<br>• Arctic Tern (Sterna paradisaea)<br>• Common Eider (Somateria mollissima)<br>• Glaucous Gull (Larus hyperboreus)<br>• Herring Gull (Larus argentatus)<br>• Snowy Owl (Bubo scandiacus) |

| Vegetation and Terrestrial Mammals | Aquatic Wildlife and Birds |
|---|---|
| • Caribou (*Rangifer tarandus*)<br>• Grey Wolf (*Canis lupus nubilus)*<br>• Arctic Fox (*Alopex lagopus)*<br>• Red Fox (*Vulpes vulpes*)<br>• Polar Bear (*Ursus maritimus*) | |

Sylvia Grinnell Territorial Park, the oldest of Nunavut's territorial parks, borders the site to the north-western extent (Figure 1). Sylvia Grinnell Park is divided in two by the Sylvia Grinnell River. The park plays a vital role in the community of Iqaluit by providing an important fishing ground for Arctic Char.

During the 2009 site visit, Arcadis (former Franz) personnel did not observe any wildlife. According to the Species at Risk web mapping application and the Nunavut Department of Environment website, no species are listed as threatened within the Killiniq region. Based on the Nunavut Wild Species 2000 report, the subject sites are within the range of three sensitive species: the wolverine, grey wolf and the polar bear.

Sylvia Grinnell Territorial Park is also home to Arctic Hare, Arctic Fox, Caribou, lemmings and other small mammals. Polar Bear have even been sighted on occasion, although they do not frequent the area. The park also plays a significant role in bird migration and over 40 species have been recorded in the park at different times of the year. The park is also the most southern breeding ground for the Ringed Plover. The local vegetation above and below the cliff consists of wet grassland tundra species including mosses, grasses and sedges. On the cliff and bedrock outcrops vegetation is sparse and consists of lichens with patches of grasses and mosses.

# 3 EXISTING SITE CONDITIONS

Environmental investigations have been carried out at the site dating back to 1988. The work has focused on the presence and impacts of petroleum hydrocarbons (PHCs), inorganic elements, pesticides, polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCB) contamination in soils, surface water, and sediments. Debris quantification and a designated substances building survey was also undertaken.

Significant reports on the Iqaluit Former Metal Dump and Community Landfill that preceded this LTM include:

- Arcadis Canada Inc., 2017. Remedial Action Plan, Former Metal Dump and Community Landfill. Prepared for Public Works and Government Services Canada on Behalf of Transport Canada. 27 January 2017.
- Franz Environmental Inc., 2010a. Remedial Action Plan, Vehicle Dump and Community Landfill, Iqaluit, Nunavut. Prepared for Public Works and Government Services Canada on behalf of Transport Canada.
- Franz Environmental Inc., 2010b. Ecological and Human Health Detailed Quantitative Risk Assessment (DQRA). Prepared for Public Works and Government Services Canada on behalf of Transport Canada.

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- Franz Environmental Inc., 2009, Preliminary Quantitative Risk Assessment (PQRA) – Human Health, Vehicle Dump and Community Landfill, Iqaluit, Nunavut. Prepared for Public Works and Government Services Canada on behalf of Transport Canada. March 2009.
- Franz Environmental Inc., 2009. Phase I/II Environmental Site Assessment, Vehicle Dump and Community Landfill, Iqaluit, Nunavut. Prepared for Public Works and Government Services Canada on behalf of Transport Canada. February 2009.
- Earth Tech Canada Inc., 2001. Desk Top Review of Scrap Metal Dump Site West of Iqaluit Airport, Iqaluit, Nunavut, Canada. Prepared for Transport Canada, Prairie and Northern Region-Programs;
- Lisa A. Peramaki and Jody F. Decker, School of Planning – University of Waterloo, 1999. Lead in Soil and Sediment in Iqaluit Nunavut, Canada and Links with Human Health;
- Royal Military College – Environmental Sciences Group, Victoria, BC, 1995. Environmental Study of a Military Installation and Six Waste Disposal Sites at Iqaluit, NWT. Prepared for Department of Indian and Northern Affairs Canada & Environment Canada;
- Avati Ltd., 1993. Remediation Options for an Abandoned US Airforce Base and Two Waste Sites at Iqaluit, NWT. October 1993;
- Public Works Canada Literature Review, 1992; and
- Härtling, J., 1988. PCB and Trace Metal Pollution from a Former Military Waste Disposal Site at Iqaluit, Northwest Territories. Master's Thesis.


## 3.1 Areas of Environmental Concern

The ESAs completed in the field seasons of 2008 (Franz, 2009) and 2009 (Franz, 2010c) identified four areas of environmental (AECs) concern at the site as follows:

**AEC 1 – Upgradient Buried Debris**

The area of the site directly up gradient from the vehicle dump contains buried metal debris identified during the Phase I/II/III ESA completed by Franz (2009, 2010c). The presence of debris was confirmed during the Arcadis 2016 supplemental assessment.

**AEC 2 – Vehicle Dump**

The area was referred to as the vehicle dump in the Franz (2009, 2010c) studies and described as containing vehicles, such as trucks, cars, trailers, boilers, tankers, and others. During the Arcadis 2016 supplemental assessment, the area was observed to contain fewer debris because much of the vehicular debris was removed in 2011 during a community wide recycling program. The contractor involved in that recycling program removed the vehicles, crushed them and shipped them south. The removal of this debris has previously been communicated to both PSPC and Transport Canada. The area is located to the east of the main landfill area. A drainage channel runs directly through the center of this debris pile discharging to the ponds, then the river.

**AEC 3 – Main Landfill**

The main landfill area consists of a mixture of debris spread across a steep graded bedrock slope. The top of the landfill area has been capped with granular material and the toe is left exposed with debris scattered throughout the area.

**AEC 4 – Downgradient, Off-site**

The downgradient and off-site area is located below the escarpment and includes part of the Sylvia Grinnell Park. This area contains only very few pieces of scattered debris. Some debris is also present in the bottom of the ponds, buried in sediments.

The boundaries of AECs 1 to 4 are presented in Figure 2. Note that these boundaries were revised from the Phase III ESA (Franz, 2010c) to account for the updated information obtained by Arcadis during the 2016 supplemental testing and the selection of the site specific EQG (Section 1.2 and 6.4).

## 3.2 Summary of Site Impacts Prior to Remediation

The potential contaminants of concern were tested in soil, surface water and sediment in all four AECs in 2008 and 2009. In addition, paint from the vehicles present in AEC 2 was also tested for lead content. Vegetation samples were collected in 2008 and 2009 to further evaluate the presence of the contaminants in the environment. In 2008, grain size samples of soil and sediment were collected and in 2009, total organic carbon (TOC) and dissolved organic carbon (DOC) were analysed in sediment and surface water, respectively, to assist with the interpretation of contaminant results. Limited sampling of surface water and sediment was conducted in 2016 to assess any potential changes in the media since the last sampling round conducted in 2009. The number of samples submitted per year and type of analysis is summarized in Table 3-1.

**Table 3-1: 2008, 2009 and 2016 Testing Program**

| Media | Soil | | | Surface Water | | | Sediment | | | Vegetation | | | Material Sampling | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 08 | 09 | 16 | 08 | 09 | 16 | 08 | 09 | 16 | 08 | 09 | 16 | 08 | 09 | 16 | Total |
| PHCs | 20 | 11 | - | 9 | 7 | 7 | 8 | 18 | 7 | - | - | - | - | - | - | **87** |
| Metals | 27 | 13 | - | 19 | 31 | 7 | 20 | 25 | 7 | 11 | 11 | - | - | 2 | - | **173** |
| PCBs | 13 | 6 | - | 15 | 9 | 7 | 11 | 18 | 7 | 9 | 2 | - | - | - | - | **97** |
| VOCs | 5 | 11 | - | 2 | 7 | - | 2 | 4 | - | - | - | - | - | - | - | **31** |
| PAHs | 7 | 5 | - | 2 | 5 | 7 | 2 | 3 | 7 | - | - | - | - | - | - | **38** |
| Pesticides | 5 | 1 | - | 3 | 10 | 7 | 3 | 18 | 7 | - | - | - | - | - | - | **54** |
| TOC | - | - | - | - | - | - | - | 25 | - | - | - | - | - | - | - | **25** |
| DOC | - | - | - | - | 31 | - | - | - | - | - | - | - | - | - | - | **31** |
| Grain Size | 5 | - | - | - | - | - | 2 | - | - | - | - | - | - | - | - | **7** |

| Media | Soil | | | Surface Water | | | Sediment | | | Vegetation | | | Material Sampling | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total number of analyses:** | **82** | **47** | **0** | **50** | **100** | **35** | **48** | **111** | **35** | **20** | **13** | **0** | **0** | **2** | **0** | **543** |

The findings indicated significant contamination impacts to soils surrounding the upgradient buried debris (AEC 1), the vehicle dump (AEC 2), and at the landfill (AEC 3). Moderate impacts to sediment were noted in the roadside ditch at AEC 1. Moderate to significant impacts to sediment were noted in the drainage ditch leading to pond 6 in AEC 2, with greatest impact at the height of vehicle debris. Significant surface water quality impacts were noted at AEC 3. Moderate and moderate to significant surface water impacts were noted at AEC 1 and AEC 2, respectively. Contamination at AEC 4 was noted as not significant for sediment and water quality. Soils were not tested at AEC 4 and no sediment was observed at AEC 3.

Overall, the drainage pathways and ponding systems were observed to be in the same condition with no evidence of new or worsening impacts between 2008/2009 and 2016.

A more detailed summary of the contaminant impacts is presented in Table 3-2. The spatial distribution of the impacts is represented in the RAP and included as a figure set in Appendix A: Figure 3 for soil, Figure 4 for sediment and Figure 5 for surface water, respectively (Arcadis, 2017).

**Table 3-2: Summary of Contaminant Impacts**

| Area Identification | Impacted Media | Exceedances of EQG | Elevated Leachate Indicator | Impact Location | Degree of Impact |
|---|---|---|---|---|---|
| AEC 1 – Upgradient Buried Debris | Soil | Metals (copper); PHCs (F2, F3) | - | Two discrete areas | Significant |
| | Sediment | Metal (zinc), DDT, DDD, DDE | Metal (calcium) | Small pond and ditch at road near AEC 1 & AEC 2 | Not significant (small pond) to moderate (ditch roadside) |
| | Surface Water | Metals (aluminum, chromium (IV), copper, iron) | - | Small pond and ditch at road near AEC 1 & AEC 2 | Moderate |
| AEC 2 – Vehicle Dump | Soil | Metals (cadmium, copper); PHCs (F2, F3, F4) | - | Three discrete areas | Significant |
| | Sediment | Metals (arsenic, cadmium, chromium, copper, lead, zinc); DDT, DDD, DDE; 9 PAHs; PCBs | PHCs (F2, F3, F4); Metals (calcium, iron) | Drainage features leading to pond 6 | Moderate to significant (degree of impact increases from north to south and present all across AEC 2) |
| | Surface Water | Metals (aluminum, cadmium, | Metal (zinc) | Drainage features leading to pond 6 | Moderate to significant (degree of impact greatest at the height of vehicle debris) |

| Area Identification | Impacted Media | Exceedances of EQG | Elevated Leachate Indicator | Impact Location | Degree of Impact |
|---|---|---|---|---|---|
| | | copper, iron, lead) | | | |
| AEC 3 – Main Landfill | Soil | Metals (zinc); 3 PAHs | - | Two discrete areas | Significant |
| | Sediment | - | - | - | None; no sediment observed |
| | Surface Water | Metals (aluminum, copper, iron, lead, zinc) | Metal (cadmium) | Water accumulation at toe of the landfill | Significant |
| AEC 4 – Downgradient and Off Site | Soil | - | - | - | - |
| | Sediment | Metals (cadmium, chromium, copper, lead, zinc), PCBs, 9 PAHs, DDE, DDD | Metals (calcium, iron), PHCs (F1, F2, F3, F4) | Pond 2 to 6 | Not significant (pond 2, 4) to moderate (pond 3, 5) to significant (pond 6) |
| | Surface Water | Metals (boron, chromium (IV), copper, iron), pH, TCE | Metal (zinc), PCB | Pond 1 to 6 | Not significant (pond 1, 2, 3) to moderate (pond 4, 5, 6) |

# 4 SELECTED REMEDIAL STRATEGY

The chosen remedial strategy was selected based on predefined RAP objectives including:

- minimizing human health and safety risks at the site;
- protecting ecological habitats;
- minimizing impacts during remediation;
- minimize long-term care and maintenance; and
- blending the final site conditions with the natural environment where possible while being cost-effective and technically feasible.

The remedial options considered suitable or recommended for the site were compared against the AEC specific issues (Section 3.1 and 3.2) to tailor a remedial strategy best suited to the site conditions and these objectives.

The remedial option selected targets:

a) the offsite disposal of significantly impacted soils and sediments;
b) the offsite removal of selected debris based on their waste stream category;
c) the onsite consolidation of debris and comingling impacted soils;
d) the engineered decommissioning of the site main landfill; and
e) the natural recovery of the remaining surface water and sediment impacts.

The selected strategy for each AEC and media/environmental concern is outlined in Table 4-1 below.

**Table 4-1: Outline of Selected Remedial Strategy**

| AEC Identification | Media/ Environmental Concern | Discussion |
|---|---|---|
| AEC 1: Up-gradient Debris | Soil | Targeted hot spot removal of PHC impacted soils exceeding selected EQGs. PHC impacted soils to Iqaluit land treatment unit. Metal impacted soils that are contiguous with debris to be consolidated in the landfill. |
| | Surface Water | Natural Attenuation with removal of impacted soils. |
| | Debris | Selected debris removal and disposal according to their waste stream. Only exposed debris would be removed, cut and placed within AEC 3 for permanent landfilling. The remaining debris would be capped in place with an engineered cap (no liner). |
| AEC 2: Vehicle Dump | Soil | Full removal of all impacted soils. PHC impacted soils to Iqaluit land treatment unit and ship south any PCB impacted soils, if encountered. Any soils impacted with metals only could be included in the construction of the main landfill. |
| | Sediment | Targeted hot spot removal of sediments in the drainage feature from the top of the vehicle dump, down to the top of Pond 6 (not including Pond 6). This strategy would eliminate and remove the impacts currently contributing to the observed impacts down gradient. In addition, there would be minimal disruption to the natural environment. Mitigation measures would be implemented during the removal to prevent the release of sediment downstream into fish frequented waters. Upon hot spot removal of sediments, large (~5 cm to 30 cm) rip-rap would be placed in the drainage channel to slow the run-off and help mitigate and control future erosion. This would also support the natural recovery of downstream sediments. |
| | Surface Water | Natural Attenuation with removal of impacted soils and sediments. No alteration to the course of the surface water pathways would be required. |
| | Debris | Full removal of all debris, staging at AEC 1 and cut and placed into AEC 3 for recycling (non-hazardous and recyclable), permanent landfilling (non-hazardous and non-recyclable) and/or shipment south (hazardous). |
| | General | No soil would be backfilled and exposed bedrock could be left as is after soil excavation. The area consists of a high quantity of exposed bedrock and this would be similar to naturally occurring conditions, within the AEC 3 boundaries. |
| | Soil | Minimal impacted soil was identified at the landfill proper and if within the landfill footprint, would be capped in place during final landfill construction. |

| AEC Identification | Media/ Environmental Concern | Discussion |
|---|---|---|
| AEC 3: Main Landfill<br>. | Sediment | No sediment is present within the AEC 3 boundaries. |
| | Surface Water | Minimal surface water is present within the AEC 3 boundaries (seasonal with melt water only). A high level of effort would be assigned to the design and implementation of surface water swales at the top, sides, and toe of the landfill to reduce water runoff loading and erosion of the landfill face. |
| | Debris | Scattered debris at the toe of the landfill would be cut down and incorporated into the landfill. Any hazardous material would be removed to the staging area, cut and packaged for shipment south. Only exposed debris would be considered for removal south. No excavations into the existing landfill face or cap would occur. |
| | General | Arcadis proposes a general cap-in place strategy for AEC 3. |
| AEC 4: Down-gradient ponds | Surface Water | Natural Attenuation with removal of up-gradient impacted soils and sediments. |
| | Sediment | Natural Attenuation with removal of up-gradient impacted soils and sediments. |
| | General | Pond 6 contains the highest exceedances of EQGs; however, Arcadis feels that Pond 6 and, to a lesser degree, Pond 5 acts as contaminant attenuation zones for the upgradient waste load. These two ponds have high organic content and established vegetation. It is proposed to not disturb these ponds but to rather keep their contaminant attenuating function and integrate it with the upstream reconstruction of the drainage feature located in AEC 2. |

## 4.1 Engineered Decommissioning of Landfill (AEC 3)

The only major construction component of the remediation strategy is construction and capping of a landfill at the main landfill site. Materials from around the site will be consolidated at the main landfill site and then the existing main landfill and all consolidated wastes will be covered with an aggregate landfill cap. The landfill design includes:

- an engineered landfill aggregate cap;
- consolidate exposed debris from surrounding areas (AEC 1, AEC 2, AEC 3, and AEC 4) into the main slope of AEC 3; and
- extensive swale designs to divert precipitation and melt water away from the landfill slopes to prevent both erosion and water infiltration.

A high level of effort was assigned to the design and implementation of surface water diversion at the top, sides, and toe of the landfill to reduce water runoff loading and erosion of the landfill face. The landfill will require the implementation of the LTM Plan to monitor performance (i.e., this document). The Engineered

Landfill at this site is designed to displace precipitation and meltwater away from the landfill to a predetermined surface water system through the use of swales at the top of the escarpment and at the base of the landfill. It is imperative to control water, as additional water near or within the landfill could generate excess landfill leachate or erosional effects. With passive water management, the landfill should act as an inert waste body with minimal erosion over time. In addition, as the landfill will have a finite mass of contamination, the leaching potential over time decreases as the leaching production curve diminishes over time.

The performance monitoring will consist of visual monitoring for evidence of settlement, erosion, differential movement, collection of soil and water samples from around the facility to monitor the effectiveness of the containment system, and monitoring of local surface waters near the berms and in the main body of the facility (Section 6.0).

# 5 REMEDIAL PERFORMANCE MONITORING PLAN

The water licence application package detailed the potential environmental and resource effects that may be encountered during the execution of remedial activities on site and identified mitigation measures that will be implemented during remediation. Mitigations for dust, soil and sediment erosion, and water quality are identified in the application (see Appendix B for a table of potential impacts and proposed mitigation measures for all valued ecosystem components).

During active remediation, on-going performance monitoring will be conducted at the site to ensure mitigation measures implemented to reduce additional impacts from remediation efforts are performing as anticipated. The proposed performance monitoring plan is outlined in Table 5-1. It identifies the proposed monitoring activity and frequency of monitoring to be completed. Active remediation is anticipated to be completed by November 15, 2017.

**Table 5-1: Performance Monitoring: Potential Effects and Mitigative Measures**

| Potential Effects noted in Application (Appendix B) | Mitigation Measures | Proposed Monitoring | Monitoring Frequency |
|---|---|---|---|
| Dustfall | On-going road watering during dry conditions, as required | Visual Inspections throughout construction period | Multiple times daily |
| Soil Erosion | Erosion Control measures including silt fencing and graded staging areas. | Visual Inspections of all erosion control measures throughout construction period | Prior to, during and after precipitation events |
| Sediment Erosion | Erosion Control Measures including Silt Curtains and silt fencing. | Visual Inspections of all erosion control measures throughout construction period | Prior to, during and after sediment removal |

| Potential Effects noted in Application (Appendix B) | Mitigation Measures | Proposed Monitoring | Monitoring Frequency |
|---|---|---|---|
| Water Quality | Erosion Control Measures including Silt Curtains and silt fencing. | Point sampling and visual inspections during work in or near water. Measure for temperature, turbidity, total dissolved solids using field instrumentation. | Weekly during remedial work, if within 30 m of a waterbody frequency will increase to 3 times per week minimum |

## 5.1 Surface Water Monitoring Station Locations: Performance Monitoring

As part of the performance monitoring at the site, pre-determined surface water sampling stations have been identified and are presented below in Table 5-2.

**Table 5-2: Summary of Proposed Monitoring Sample Stations**

| Performance Monitoring Station # | Surface Water Sample | Easting (UTM83) | Northing (UTM83) | Feature |
|---|---|---|---|---|
| 1 | X | 521750.251 | 7067946.256 | Pond 1 |
| 2 | X | 521800.108 | 7067986.503 | Pond 2 |
| 3 | X | 521836.893 | 7067795.774 | Pond 3 |
| 4 | X | 521860.124 | 7067686.315 | Pond 4 |
| 5 | X | 521915.011 | 7067718.731 | Pond 5 |
| 6 | X | 521936.764 | 7067744.086 | Pond 6 |
| 7 | X | 522027.627 | 7067865.856 | Culvert |

These sample stations correspond with the sample stations to be utilized during the LTM Plan. During the performance monitoring stage (i.e., during active remediation), each station will be monitored on a weekly basis for the field parameters of pH, temperature, conductivity, Dissolved Oxygen (DO), and turbidity using a field calibrated multi-meter (e.g., YSI 556 or similar). In the event of work being conducted within 30 m of a water body, the monitoring frequency will increase to three times per week minimum, assuming active remediation is occurring within the work area. Results from performance monitoring will be reported in the annual report in accordance with Part B, condition 1(c).

Weekly water quality sampling for the field parameters listed in Table 5-1 will commence at all seven stations at the beginning of August 2017, prior to start of remediation work near waterbodies. This sampling information will act as a baseline together with previous water quality data, when analyzing water quality results during active remediation (i.e., this performance monitoring program); this water quality data will be valuable for comparison purposes when completing long term monitoring as well.

Should performance monitoring results identify concerns with the mitigation measures implemented to reduce impacts from active remediation work, corrective action will be taken immediately. This may include improvements to existing measures (e.g., repair or replacement of silt curtains), or implementation of appropriate additional measures to address concerns. This may include:

- development of a dedicated sampling plan for a specified period;
- installation of additional monitoring locations;
- active or passive source risk reduction measures; and
- additional administrative controls.

## 5.2 Contingency Planning

In the unlikely event that a spill occurs on site during remediation, a Spill Contingency Plan for the site was submitted with the application and was approved by the Board in issuance of the Water Licence (Part I, condition 1). The activities set out in Part I of the Water Licence and the procedures outlined in the Spill Contingency Plan will be adhered to at all times, in the event of a spill. Additional monitoring plans may be developed to monitor areas where a spill has occurred, as needed.

# 6 LONG TERM MONITORING PLAN

After remediation work at the site is completed, the only structures that will be constructed and remain at the site are the capped single use landfill and its associated drainage swales.

This LTM Plan will be implemented to monitor the long-term performance of site remediation efforts.

## 6.1 Post-Closure Monitoring Program

Based on a review of other similar sites throughout Nunavut, with consideration given to INAC's Abandoned Military Site Remediation Protocol, AMSRP (2008), the following post-closure monitoring activities are recommended:

- Visual Monitoring
- Seepage Monitoring
- Potential soil sampling (if seepage is observed)
- Surface Water Monitoring
- Sediment Sampling
- Natural Environmental Monitoring

The following sections discuss each of the monitoring components in more detail.

### 6.1.1 Visual Monitoring

#### 6.1.1.1 Rationale

Visual monitoring is valuable as it provides information on the condition of the isolation cover and associated berms, culverts and tidal zone. Observations shall be documented with photographs. Pre-determined photograph locations will be established in the first year of monitoring, and these will be used to monitor future changes.

#### 6.1.1.2 Monitoring Plan: Visual Monitoring

Regular visual inspections will be conducted to check the physical integrity of the isolation cover and look for evidence of erosion, frost action, animal burrows, vegetation, staining, seepage points, exposed debris, breeches in the cover, condition of monitoring instruments and condition of the warning signs. The tidal zone and tidal periphery should be included in the inspection as well.

Photographs will be taken to document the condition of the isolation cover and substantiate the recorded observations. Pre-determined photograph locations will be established in the first year of monitoring, and these will be used to monitor future changes. At minimum, photos should be taken from each of these locations during each monitoring event.

The physical integrity of the landfill is to be inspected and reported on. A record of all observations will be collected and will include dimensions and location of each feature and its extent using a DGPS unit and note of significant changes and direction. If ponded water is noted in and around the landfill structure (other than naturally occurring ponds), the depth of water will be recorded along with its horizontal extents. Detailed field sketches will be generated and will include a correlation to existing features, monuments and survey identifiers noted on as-built drawings.

A visual inspection checklist will be utilized to compare the magnitude/severity and extent of features over time. A Visual Inspection Checklist is available in Appendix C of this document.

The following site features will be inspected:

- The isolation cover surface;
    - Settlement
    - Erosion
    - Lateral Movement
    - Frost Action
    - Sloughing
    - Cracking
    - Animal Burrows
    - Vegetation Re-establishment
    - Vegetation Stress
    - Seepage points and/or Ponded Water
    - Debris and/or Exposed Geotextile
    - Features of Note/Other Relevant Observations (e.g., signs of activity, ruts, etc.)
- Access Roadway

- Culverts
- Down-gradient Ponds
    - Staining
    - Vegetation Stress

This visual inspection monitoring program will be a significant component of the LTM Plan.

### 6.1.2 Seepage Monitoring

#### 6.1.2.1 Rationale

Seepage (i.e. surface water seeping through the landfill isolation cover) may be observed at some point during the LTM Plan. Water that contacts unfrozen landfill waste may become acidic and contain elevated concentrations of metals. Seepage monitoring, in combination with visual inspections, will indicate whether long term containment of the landfill waste is maintained or if corrective action may be required.

This seepage monitoring program will be a potential component of the LTM Plan, used in support of the observations made through the visual monitoring program.

#### 6.1.2.2 Monitoring Plan: Seepage Monitoring

Any potential observed areas of seepage on the surface and edges of the landfill isolation cover will be noted during the Visual Inspection. Seepage samples will be collected from these areas, where sufficient volume exists. These samples will be analysed and the results will be compared to baseline/background samples, as well as applicable CCME guidelines (Section 1.2 and 6.4).

Water samples will be analyzed for:

- Petroleum Hydrocarbons (PHCs), F1 to F4 (including BTEX)
- Arsenic, Cadmium, Cobalt, Chromium, Lead, Nickel, and Zinc
- Polychlorinated biphenyls (PCBs)
- Major ions, hardness, total dissolved solids, total suspended solids
- pH, conductivity and temperature

In addition, soil may also be collected at any given potential seepage point as per Section 6.1.3.

### 6.1.3 Soil Sampling

#### 6.1.3.1 Rationale

Soil sampling would be conducted on an as needed basis in the event of observed seepage through, below, or around the landfill isolation cover. Soil sampling would provide information pertaining to the state of any observed seepage points, including chemical composition and concentrations.

This soil sampling program will be a potential component of the LTM Plan, used in support of the observations made through the visual monitoring and seepage monitoring programs.

#### 6.1.3.2 Monitoring Plan: Soil Sampling

Soil sampling would be conducted on an as needed basis in the event of observed seepage through, below, or around the landfill isolation cover. Soil sampling would be limited to areas where seepage or staining has been identified as part of the visual inspection. When required, soil samples will be collected over the intervals of 0 to 0.15 metres and 0.35 to 0.5 metres depth (where possible). The parameters that will be analysed will include:

- Petroleum Hydrocarbons (PHCs), F1 to F4 (including BTEX)
- Arsenic, Cadmium, Cobalt, Chromium, Lead, Nickel, and Zinc
- Polychlorinated biphenyls (PCBs)

The results will be compared to baseline/background samples, as well as applicable CCME guidelines (Section 1.2 and 6.4).

### 6.1.4 Surface Water Monitoring

#### 6.1.4.1 Rationale

The natural drainage around the study area is influenced by the bedrock structure and numerous small, elongated ponds that have formed along fault lines and joints. The ponds are shallow (approximately less than 0.5 m deep) and are poorly drained. Six ponds of varying sizes exist on site and were assigned numbers from 1 to 6 (Figure 2). Three of these ponds experience influx of brackish ocean water twice daily (ponds 1, 3, and 4). The other three ponds are considered to be under a freshwater environment (ponds 2, 5 and 6). Two of these ponds (ponds 5 and 6) appear to play a crucial role in naturally attenuating sediment and surface water contaminants prior to discharge into the Sylvia Grinnell River.

Surface water monitoring will provide valuable information on the on-going state of the down-gradient surface water bodies. This plan would effectively provide an early warning system that could be implemented in association with a Contingency Plan and could provide the decision criteria for termination.

#### 6.1.4.2 Monitoring Plan: Surface Water Sampling

Surface water sampling will be conducted at pre-determined LTM sampling stations (Figure 3; Section 6.2) along the down-gradient drainage and pond system. These sample stations were selected to correspond with previous surface water sampling conducted on site in order to maintain consistency and have comparable concentrations.

Additional surface water samples may be warranted based on the results of the visual inspection and identification of any potential seepage points (Section 6.1.1). These samples will be analysed a and the results will be compared to baseline/background samples, as well as applicable CCME guidelines (see Section 1.2 and 6.4).

Surface water samples will be analysed for:

- Petroleum Hydrocarbons (PHCs), F1 to F4 (including BTEX)
- Arsenic, Cadmium, Cobalt, Chromium, Lead, Nickel, and Zinc

- Polychlorinated biphenyls (PCBs)
- Major ions, hardness, total dissolved solids, total suspended solids
- pH, conductivity and temperature

### 6.1.5 Sediment Sampling

#### 6.1.5.1 Rationale

As with surface water, the natural drainage around the study area is influenced by the bedrock structure and numerous small, elongated ponds that have formed along fault lines and joints. The ponds are shallow (approximately less than 0.5 m deep), and are poorly drained. Six ponds of varying sizes exist on site and were assigned numbers from 1 to 6 (Figure 2). Three of these ponds experience influx of brackish ocean water twice daily (ponds 1, 3, and 4). The other three ponds are considered to be under a freshwater environment (ponds 2, 5 and 6). Two of these ponds (ponds 5 and 6) appear to play a crucial role in naturally attenuating sediment and surface water contaminants prior to discharge into the Sylvia Grinnell River.

Sediment monitoring will provide valuable information on the on-going state of surface water bodies located down-gradient of the former infrastructure and the landfill. This plan would effectively provide an early warning system that could be implemented in association with a Contingency Plan and could provide the decision criteria for termination.

#### 6.1.5.2 Monitoring Plan: Sediment Sampling

Sediment sampling will be conducted at pre-determined LTM monitoring sample stations (Figure 3; Section 6.2) along the down-gradient drainage and pond system and will correspond (i.e., twin) with the LTM surface water stations. These samples will be analysed and the results will be compared to baseline/background samples, as well as applicable CCME guidelines (Section 1.2 and 6.4).

Sediment samples will be analysed for:

- Petroleum Hydrocarbons (PHCs), F1 to F4 (including BTEX)
- Arsenic, Cadmium, Cobalt, Chromium, Lead, Nickel, and Zinc
- Polychlorinated biphenyls (PCBs)

### 6.1.6 Natural Environmental Monitoring

#### 6.1.6.1 Rationale

Natural environment data will be collected as part of the LTM Plan at the site. This will include observations of animal usage of the site (i.e., direct observation, tracks, scat, etc.) and discussions with locals knowledgeable with the site regarding site usage (i.e., fishing, hunting, gathering, etc.). This information may be helpful for future planning.

### 6.1.6.2 Monitoring Plan: Natural Environmental

Natural environment data will be collected during site visits as well as during community meetings with people who use or visit the site/area frequently. The purpose of collecting this data is to provide anecdotal information related to the presence of wildlife and changes over time.

The site-specific data to be collected will include:

- wildlife sightings (species, number, gender, juveniles);
- other evidence of recent presence of wildlife (droppings, tracks, feathers/fur, carcass remains, etc.);
- wildlife activity (summering/nesting/denning, migratory/passing through);
- qualitative assessment of relative numbers versus previous years (more, same, less); and
- revegetation of disturbed areas versus previous years (more, same, less).

Information regarding observations of the site by local people may also be collected through consultations with local community members. The type of information that may be collected includes:

- wildlife sightings;
- use by people for traditional activities;
- season(s);
- activities (hunting, fishing, trapping, camping, other harvesting);
- relative frequency versus previous years (more, same, less);
- wildlife species present (sightings or evidence);
- wildlife presence versus previous years (more, same, less);
- health of wildlife observed or harvested (good, average, poor); and
- relative health of wildlife versus previous years (better, same, worse).

## 6.2 Monitoring Station Locations

Pre-determined surface water and sediment sample station have been identified and are presented below in Table 6-1 and on Figure 3:

**Table 6-1: Summary of Proposed Long Term Monitoring Sample Stations**

| LTM Station # | Surface Water Sample | Sediment Sample | Easting (UTM83) | Northing (UTM83) | Feature |
|---|---|---|---|---|---|
| 1 | X | X | 521750.251 | 7067946.256 | Pond 1 |
| 2 | X | X | 521800.108 | 7067986.503 | Pond 2 |
| 3 | X | X | 521836.893 | 7067795.774 | Pond 3 |
| 4 | X | X | 521860.124 | 7067686.315 | Pond 4 |
| 5 | X | X | 521915.011 | 7067718.731 | Pond 5 |
| 6 | X | X | 521936.764 | 7067744.086 | Pond 6 |

| LTM Station # | Surface Water Sample | Sediment Sample | Easting (UTM83) | Northing (UTM83) | Feature |
|---|---|---|---|---|---|
| 7 | X | X | 522027.627 | 7067865.856 | Culvert |

## 6.3 Effluent Discharge Limits

No discharge of effluent will occur as part of remediation of the site or during the post remedial stage. Should seepage from the landfill be noted during long term monitoring, it will be tested and compared against the water quality criteria included in Part D, condition 9 of the Water Licence:

**Table 6-2: Effluent Discharge Limits as per Part D, condition 9 of Water Licence**

| Parameter | Maximum Concentration of any Grab Sample (µg/L) |
|---|---|
| pH | 6 to 9 |
| Oil and Grease | 5000 |
| Benzene | 370 |
| Toluene | 2 |
| Ethylbenzene | 90 |
| Inorganics (Total) | |
| Arsenic | 100 |
| Cadmium | 10 |
| Chromium | 100 |
| Cobalt | 50 |
| Copper | 200 |
| Lead | 50 |
| Mercury | 0.6 |
| Nickel | 200 |
| Zinc | 500 |

Should seepage water quality exceed these allowable concentrations, water will be collected or treated in accordance with Part D, condition 10.

## 6.4 Selection of EQGs for Evaluation of Soils, Water Quality, and Sediment

Based on a review of the site settings, site usage, municipal zoning and adjacent activities, the site was divided into land use sectors for the purpose of evaluating the soil, water quality and sediment environmental quality against the EQGs.

### 6.4.1 Soils

For soils evaluation, the site was divided into two land use sectors (Figure 6-1). The coarse grained EQG were applied to both sectors since they are the most stringent of the set and considering that both fine and coarse grained soils were observed at the site.

**Wildland Sector**

The lower sector below the escarpment and encompassing ponds 1 to 6 and part of the Sylvia Grinnell Territorial Park was considered to be a wildland sector. This sector is outlined as Area of Environmental Concern 4 (AEC 4) in Figure 6-1.

The Sylvia Grinnell Territorial Park plays a significant role in bird migration and over 40 species have been recorded in the park at different times of the year. CCME agricultural/wildland use is defined as "*Land on which the primary activity is related to the productivity capability of the land and includes lands that provide habitat for wildlife and birds*". Based on this definition and on significance of the park's habitat, the CCME wildland guidelines are applicable to the northern section of AEC 4 which is part of the park.

The southern portion of the AEC 4 presents similar geomorphological/biological features and the presence of equivalent wildlife habitat can be expected throughout AEC 4. The wildland soil EQG are protective of the more sensitive ecological habitats expected in the area while protecting for the recreational usage observed and permitted by the municipal zoning (i.e., Iqaluit by-law 704 Open Area Zone (OR) which permits the use of the area as cultural interpretation centre, dog area, park, beach shack, temporary camping structures and utility installation).

**Commercial Sector**

The upper sector including the vehicle dump, the landfill and the upper debris was considered to be a commercial sector. This sector is outlined as AECs 1, 2, and 3. This sector is predominantly located within Iqaluit by-law 704, zone M2 and is regulated for heavy industrial usage. This sector also already includes a zoning allowance for a former waste disposal site (Iqaluit by-law, zone MR, exclusion 1).

The local residents are known to use the area for social activities (e.g., bonfire) and for accessing the Sylvia Grinnell River and Park. It is assumed that this behavior will continue following the remediation of the site and that no residential dwellings will be installed in the sector.

The CCME commercial guidelines would be protective of the site users and ecological receptors because they are calculated based on 10 hours a day, 5 days a week, 48 weeks a year, exposure assumptions that include site usage by all members of the public, including children (toddlers) and that consider the different potential exposure routes such as direct soil contact (ingestion and dermal contact), vapour inhalation and ecological soil contact.

### 6.4.2 Surface Water and Sediment

Surface water and sediment EQG are further refined into freshwater or marine environment. The commercial sector including AECs 1, 2, and 3 contains drainage features and small ponds that act as headwater to the wildland sector. Surface water and sediment from this sector is not affected by the tides and the freshwater EQG are applicable. Similarly, the eastern portion of the wildland sector (AEC 4) including ponds 2, 5 and 6 is not considered to be significantly affected by the tides and the freshwater EQG are applicable.

The western portion of the wildland sector (AEC 4) including ponds 1, 3 and 4 is replenished by the upstream freshwater features and intruded with saline water twice daily during high tide. Sodium concentrations measured in these ponds are generally less than the 1000 mg/L freshwater threshold; however, since it was observed that marine water intrudes the ponds and in the absence of sufficient information on resident species and environmental conditions, the water quality guideline protecting the most sensitive condition should be applied (CCME, 2007; *A Protocol for the Derivation of Water Quality Guidelines for the Protection of Aquatic Life 2007*). As such, the ponds are considered a brackish water environment and the lowest of the freshwater or marine surface water/sediment guidelines are applicable.

Federal groundwater EQG have been published by the CCME and under the Federal Contaminated Sites Action Plan (FCSAP); however, they have not been used in developing this monitoring plan. Exposure to contaminated groundwater is considered not applicable to the site (i.e., groundwater exposure pathway non-operable) for the following reasons:

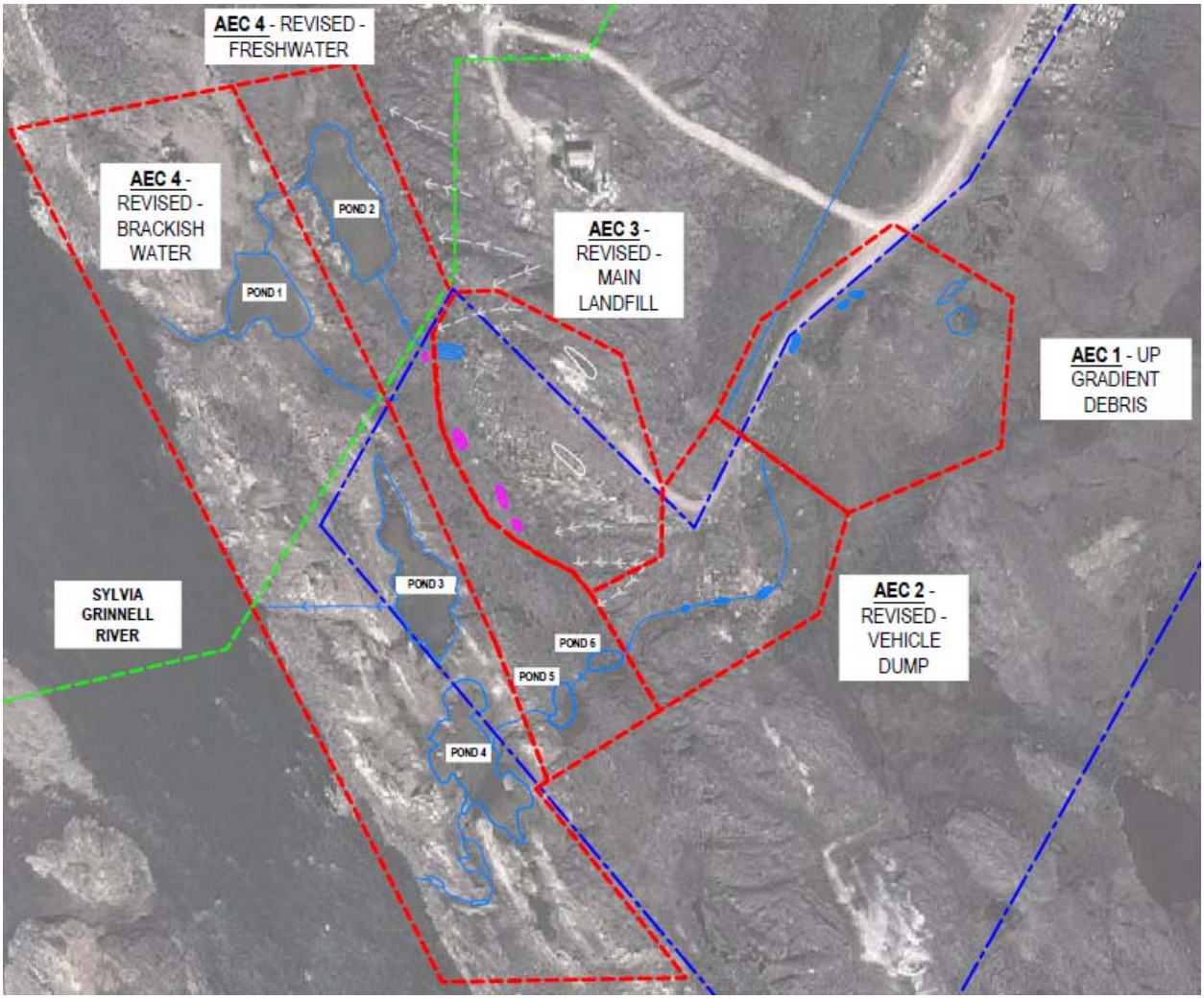
1) overland flow is the primary mode of water transport in the area;
2) groundwater associated with fractures in the bedrock and through the thin overburden would likely be minor;
3) groundwater is not used as a drinking water source in the area; and
4) the site lies within the continuous permafrost zone (Franz, 2010c).

The site specific EQG are summarized in Table 6-3 for the different sectors.

**Table 6-3: Summary of Site Specific Environmental Quality Criteria**

| Sector | AEC | EQG |
|---|---|---|
| Upper | 1, 2, 3 | Commercial, Freshwater, Coarse grained soil |
| Lower – Eastern portion | 4 | Wildland, Freshwater, Coarse grained soil |
| Lower – Western portion | 4 | Wildland, Lowest of Marine or Freshwater, Coarse grained soil |

Figure 6-1: AEC Boundaries




## 6.5 Quality Assurance and Quality Control Plan

Sample collection, preservation and analyses will be conducted in accordance with methods prescribed in the current edition of “Standard Methods for the Examination of Water and Wastewater” in accordance with Part K, condition 2 of the Water Licence. Analyses will be performed in a Canadian Association of Laboratory Accreditation (CALA)- certified Laboratory and will conform to ISO/IEC Standard 17025 (Part K, condition 3).

## 6.5.1 Sample Methodologies

### 6.5.1.1 Solids

Solids, for the purpose of this project, refer to soil and sediment samples. Samples will be collected from test pits or sediments manually excavated with hand tools (pick/shovel or Eckman dredge) which will be decontaminated between locations using Alconox and distilled water. Field personnel will use a new pair of Nitrile gloves for each sample station. Each solid sample will be collected in either laboratory supplied zip-top plastic bags and/or 125 mL clear glass jars, which will be filled with soil such that no headspace remains in the jars. Samples collected for analysis of volatiles (i.e., VOCs and/or BTEX) will be collected in two 40 mL clear glass vials with methanol for preservation.

All soil sampling locations will be backfilled after the collection of soil samples. All locations will be photographed during sampling and after backfilling is completed, these photographs will be included in the photographic records (Section 6.1.1).

### 6.5.1.2 Aqueous

Surface water samples will be collected by dipping laboratory supplied sample containers with the appropriate preservative (e.g., NAHS04 for F1/BTEX) directly into the water body. Care will be taken not to disturb any sediments in order to minimize sediment entrainment in the sample matrix. Surface water sampling will be conducted prior to any sediment sampling activities. Field personnel will use a new pair of Nitrile gloves for each sample station.

The following parameters will be monitored in the field using a calibrated multi meter: pH, temperature, conductivity, oxidation-reduction potential (ORP), dissolved oxygen (DO), and total dissolved solids (TDS). The field meter will be decontaminated using Alcanox and water between each sample station.

## 6.5.2 Sample Duplicates

Quality assurance/quality control (QA/QC) will be consistent with CALA regulations and guidelines. At least 10% of samples will be taken and analyzed in duplicate and appropriate QA/QC data will be generated and reported. All samples will be given sequential alphanumerical coding before submitting to the analytical laboratories; this coding method will mask any information concerning site location, sample type or possible concentrations in the samples.

Sampling procedures and laboratory analytical precision will be evaluated by calculating the relative percent difference (RPD) for a sample and duplicate pair according the following equation:

$$RPD = | X_1 - X_2 | / X_{avg} \times 100$$

where: $x_1$ and $x_1$ are the duplicate concentrations and $x_{avg}$ is the mean of these two values.

The duplicate results were evaluated using criteria developed by Zeiner (1994), which draws from several data validation guidelines developed by the United States Environmental Protection Agency (USEPA). According to these criteria, the RPD for duplicate samples should be less than 40% for aqueous samples, and less than 60% for solid samples. In addition, the newly developed CCME Guidance manual –

PN1551; 2016 indicates the use of RPD values of less than 40% for aqueous samples, and less than 60% for soils. RPDs can only be calculated when the compound is detected in both the original and the duplicate sample at concentrations of five times above the reportable detection limit (or method detection limit - MDL), or greater. Alternative criteria are used to evaluate duplicate pairs where one or both of the results are less than five times the MDL, or where one or both of the results is less than the MDL (i.e. nd or 'not-detected'). The alternative criteria used for the evaluation of the data, adapted from Zeiner (1994), are presented in the table below. When both concentrations are less than the MDL, no calculation/evaluation criterion is required.

**Table 6-4: Criteria for the Evaluation of Blind and Duplicate Sample Results**

| Scenario | Result A | Result B | Criteria for Acceptance | |
|---|---|---|---|---|
| | | | Aqueous (water) | Soil (Soil) |
| **A** | nd | nd | Acceptable precision; no evaluation required | |
| **B** | nd | positive | result B – 0.5 x MDL < MDL | result B – 0.5 x MDL < 2 x MDL |
| **C** | positive and > 5 x MDL | positive and > 5 x MDL | RPD < 40% (Zeiner) | RPD <60% (Zeiner) |
| **D** | positive and < or = 5 x MDL | positive | \|result B – result A\| < MDL[1] | \|result B – result A\| < 2 x MDL[1] |

Source(s):

Zeiner, S.T., Realistic Criteria for the Evaluation of Field Duplicate Sample Results, Proceedings of

Superfund XV, November 29-December 1, 1994, Sheraton Washington Hotel, Washington, D.C. – modified to use Method Detection Limit (MDL) or Reportable Detection Limit (RDL) in lieu of the Quantitation Limit (QL), the Instrument Detection Limit (IDL) and/or Laboratory Reporting Limit (LRL).

**Notes:**

nd – not detected

RPD – relative percent difference, |result A - result B| / |(result A + result B)/2|

1. When result reported are less than half the quantitation limit, half the limit will be used in the equation.

The precision is considered acceptable when the evaluation criteria are met or when both results are below the MDL. When the evaluation criteria are not satisfied, the following apply:

- nd vs. positive – unacceptable precision: the positive result is considered an estimate and the nd result is considered inconclusive.
- Positive vs. positive – unacceptable precision: the results are considered an estimate.

# 7 LONG TERM MONITORING SCHEDULE AND REPORTING

## 7.1 Schedule

Based on other landfill sites throughout the arctic and upon review of INAC's Abandoned Military Site Remediation Protocol, AMSRP (2008), Arcadis recommends the following protocol for monitoring frequency (expressed in years after landfill completion):

- Phase I: Years 1, 3 and 5

- Contingency -Phase II: Years 7, 10, 15 and 25
- Contingency -Phase III: beyond 25

The monitoring program is to be stopped at the end of phase I (5 years post remediation) after landfill completion (i.e., 2022) if the evaluation of the program confirms that there are no stability issues and that the landfill waste has been successfully encapsulated. Otherwise, monitoring will continue into phase II (i.e., up to 25 years post remediation). An evaluation will be conducted at the end of each monitoring event in phase II to determine if further monitoring is required and what level of effort is appropriate for phase III monitoring (if necessary).

The long term monitoring at the site would begin in 2018. The Phase I monitoring activities would take place in 2018, 2020, and 2022. Each of the monitoring activities discussed above (Section 6.0) will be conducted during each of the three site monitoring events (i.e., visual inspection, surface water monitoring, sediment monitoring, and natural environment monitoring – with the possibility of seepage monitoring and/or soil monitoring on an as needed basis). A site monitoring event would be conducted once per highlighted calendar year between the dates of July 15$^{th}$ and September 1$^{st}$ to account for the maximum permafrost thaw conditions. An evaluation and review of the monitoring data will be conducted at the end of 2022 to confirm whether or not additional monitoring would be required.

Table 7-1 below summarizes the proposed monitoring schedule.

**Table 7-1: Proposed Monitoring Schedule**

| Year | Years After Construction | Site Monitoring Event | Monitoring Phase |
|---|---|---|---|
| 2017 | 0 | Remediation and Landfill Construction | |
| 2018 | 1 | X | Phase I |
| 2019 | 2 | | |
| 2020 | 3 | X | Phase I |
| 2021 | 4 | | |
| 2022 | 5 | X | Phase I |
| 2023 | 6 | | |
| 2024 | 7 | X | Phase II |
| 2025 | 8 | | |
| 2026 | 9 | | |
| 2027 | 10 | X | Phase II |
| 2028 | 11 | | |
| 2029 | 12 | | |
| 2030 | 13 | | |
| 2031 | 14 | | |

| Year | Years After Construction | Site Monitoring Event | Monitoring Phase |
|---|---|---|---|
| 2032 | 15 | | |
| 2033 | 16 | | |
| 2034 | 17 | | |
| 2035 | 18 | | |
| 2036 | 19 | | |
| 2037 | 20 | | |
| 2038 | 21 | | |
| 2039 | 22 | | |
| 2040 | 23 | | |
| 2041 | 24 | | |
| 2042 | 25 | X | Phase II |

## 7.2 Reduction or Termination of Site Monitoring

As part of the monitoring plan, a reduction or termination of specific locations will be developed and any recommendations for changes will be presented in the annual monitoring report. Results of the site monitoring would be compared against the regulatory limits to provide continuous feedback for hazard identification and compliance with the data analysis and response actions.

The reduction or termination of the site monitoring could be evaluated against the following criteria (as examples):

1) Outside of the source area, are the chemical results consistently below the appropriate Regulatory Limit over the predefined monitoring period?
2) Outside of the source area, do the chemical results demonstrate a trend of reduced, non-detectable or steady state concentrations over a predefined sampling period?
3) Do the natural attenuation processes at the site remain consistent and predictable with previous interpretations
4) Have the pathways and/or receptors identified been modified or eliminated?

If these criteria have been met then the site monitoring could be reduced or terminated despite the fact that concentrations of contaminants of concern (COCs) within the source area could still remain above the Regulatory Limits.

## 7.3 Reporting

### 7.3.1 Nunavut Water Board Annual Reporting

Annual reporting will be submitted to the Nunavut Water Board in accordance with Part B, Section 1 of the Water Licence and will include:

1. A summary report of water use activities;
2. A summary of any construction work, modification and major maintenance work (includes as-built diagrams) carried out;
3. Tabular summaries for all data and information generated under the Monitoring Program;
4. A review and analysis of data collected during the Monitoring Program and a brief description of any future studies planned;
5. The results of any review conducted and any recommendations regarding any changes to the monitoring program and/or remediation requirements;
6. A summary of any remediation work undertaken during the year and an outline of any work anticipated for next year;
7. A list of unauthorized discharges and summary of follow-up actions taken;
8. Any updates or revisions for manuals and places as required by changes in operation and/or technology;
9. If applicable, a description of any trenches and sumps excavated, including the following; GPS coordinates, dimensions, depth below active layer, and secondary containment features;
10. A brief summary of work done to address any concerns of deficiencies listed in the inspection reports and/or compliance reports prepares by the Inspector;
11. An executive summary in English and Inuktitut of all plans, reports, or studies conducted under this Licence; and
12. Any other details on Water use or deposit of Waste requested by the Board by 1st of November of the year being reported.

### 7.3.2 Long Term Monitoring Annual Report

In addition to NWB Reporting, upon completion of each monitoring event, as outlined above in Section 7.1, a Long Term Monitoring report will be created as per contractual agreements with PSPC and TC. One annual monitoring report will be created for each monitoring event and will include:

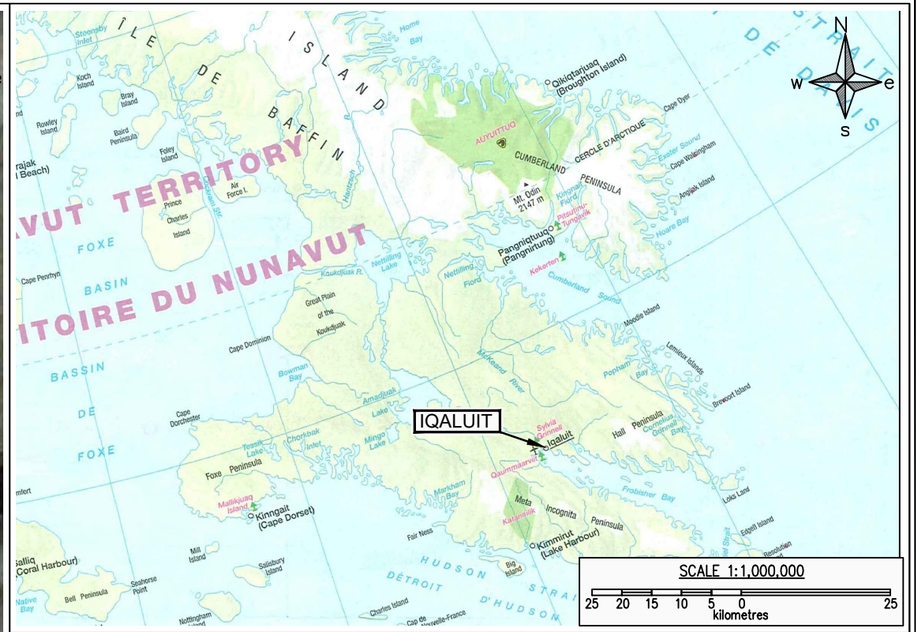
- An executive summary describing the main observations, assessment and conclusion (visual inspection results, assessment and conclusions) and any items to be addressed during subsequent site visits;
- A brief (max two to four pages) outline for the site with work objectives and scope of work, location map, site plan, timing of and weather conditions during field work, field staff and schedule, approach/methodology and equipment used for each monitoring component, and any deviations from the monitoring plan;
- The main landfill inspection section will include:
    - A landfill description;
    - Completed visual inspection checklist;
    - A geotechnical stability assessment (including severity rating for each feature of note). This must provide an overall performance rating for the landfill;
    - A discussion on any items identified during the visual and stability assessment assessed as “significant” or “unacceptable”;
    - A photolog outlining all of the sample locations/stations, overview viewpoints of the landfill, details of any features of note, and any changes from year to year;

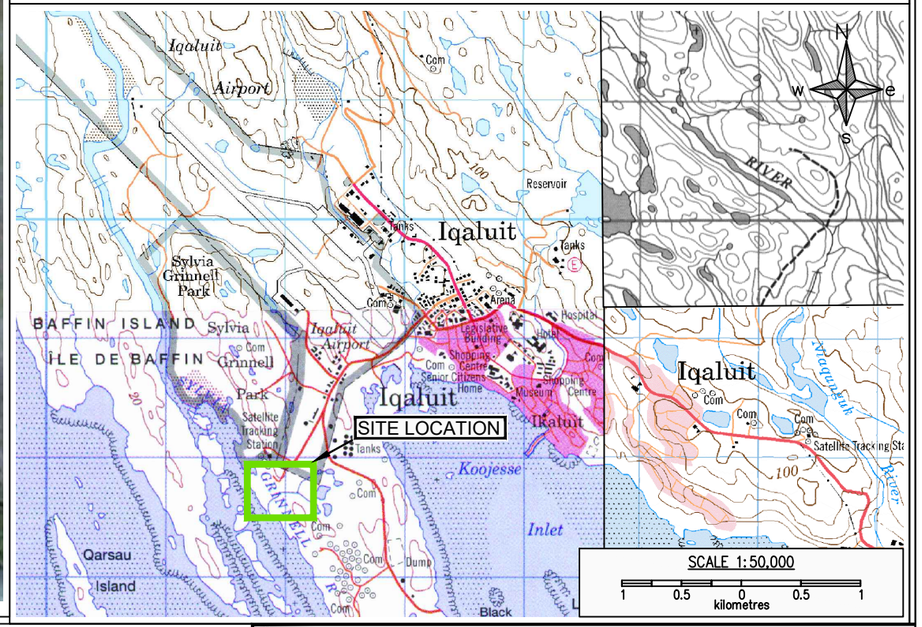
- Annotated drawings of the landfill area showing all visual inspection features, photospot viewpoints, chemical monitoring sample points and surface water flow directions;
- Analytical data from any chemical testing will be tabulated in excel format and presented. Formal laboratory certificates will be included as an appendix;
- A discussion and comparison of chemical data to both historical and background concentrations, as well as to the selected EQGs (Section 6.4);
- A discussion on QA/QC relative to the analytical results;
- An analysis of the overall performance of the Landfill base on a combination of current and historical (when available) visual, geotechnical, and chemical values;
- Review concentrations and trends to determine future monitoring requirements and
- Recommendations for future action and conclusions.

# 8 REVISIONS

If updates to the frequency or activities included in the monitoring plan are required based on results of monitoring completed, PSPC will be notified and provided with an updated monitoring plan. In addition, should monitoring results indicate a reduction in the frequency, number, or location of samples is possible, proposed changes will be submitted to PSPC and the NWB for approval.

# FIGURES




References:

(above) Google Earth satellite image, 200□.

(upper right) "*Canada Road Map*", MapArt Publishing, 2003.

(lower right, composite)
Natural Resources Canada NTS Sheet: 25-N□9 Burton Bay, Nunavut, Edition 3, NAD □3, Series A 713, 2001.
Natural Resources Canada NTS Sheet: 25-N□10 Hill Island, Nunavut, Edition 2, NAD □3, Series A 713, 2001.
Natural Resources Canada NTS Sheet: 25-N□15 Iqaluit, Nunavut, Edition 2, NAD □3, Series A 713, 2001.
Natural Resources Canada NTS Sheet: 25-N□16 □No Title□Nunavut, Edition 2, NAD □3, Series A 701, 2001.
(Note: ground elevations shown in metres above mean sea level).

Title: SITE LOCATION

ARCADIS

Project: LONG TERM MONITORING PLAN
LANDFILL - IQALUIT, NUNAVUT

Date: JULY 2017

Client: PWGSC - TRANSPORT CANADA

SCALES AS SHOWN

FIGURE 1

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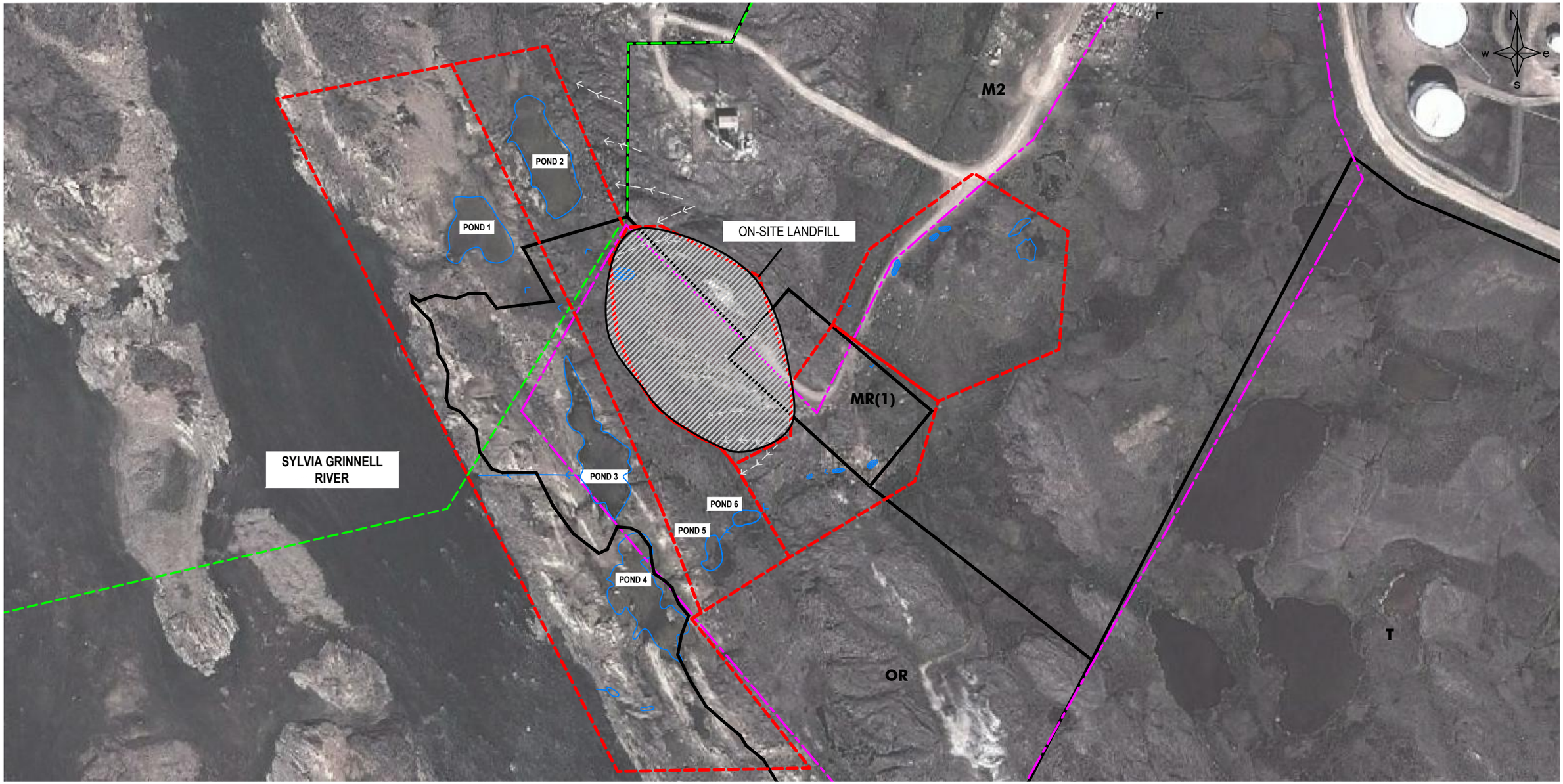



LEGEND:

- PROPERTY BOUNDARY
- PARK BOUNDARY
- IQALUIT ZONING OVERLAY
  - OR = OPEN AREA ZONE
  - MR1 = MUNICIPAL RESERVE ZONE (FORMER DISPOSAL SITE ALLOWANCE)
  - M2 = HEAVY INDUSTRIAL ZONE
  - T = TRANSPORTATION ZONE
- WATER
- APPROXIMATE EXTENT OF COMPLETED LANDFILL
- ADJUSTED FORMER AREAS OF ENVIRONMENTAL CONCERN (AEC)

*REFERENCE: BACKGROUND IMAGE OBTAINED FROM GOOGLE EARTH, 2008*

SCALE 1: 3000

75 60 45 30 15 0 metres 75 150

Title: LONG TERM MONITORING
FORMER AEC BOUNDARIES AND SITE PLAN

Project: FORMER VEHICLE DUMP & COMMUNITY
LANDFILL - IQALUIT, NUNAVUT

Client: PWGSC - TRANSPORT CANADA

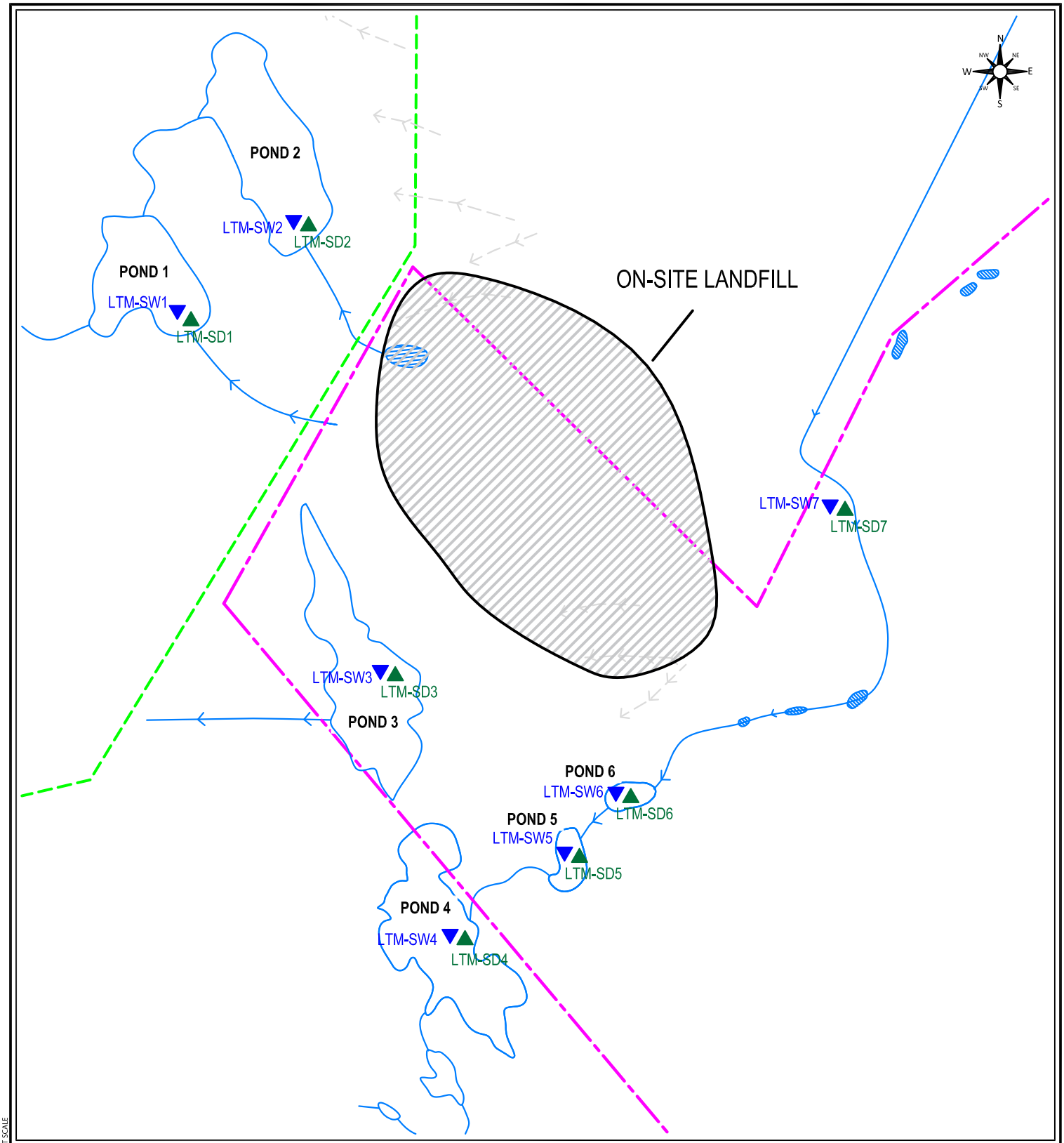
ARCADIS

Date: AUGUST 2017

FIGURE 2

*Original in colour

Z:\Projects\2009\1584-0901 TC Iqaluit Landfill\Figures\102153-000_TC IQALUIT_LTM Program.dwg




## Legend

- POOLING WATER
- PROPERTY BOUNDARY
- PARK BOUNDARY
- STREAM/DRAINAGE
- APPROXIMATE EXTENT OF COMPLETED LANDFILL

PROPOSED LONG TERM MONITORING SAMPLES

- LTM-SW4 ▼ PROPOSED SURFACE WATER SAMPLE STATION
- LTM-SD4 ▲ PROPOSED SEDIMENT SAMPLE STATION

0 50 100 Meters

1:1250

Title: LONG TERM MONITORING SAMPLE LOCATIONS

Project: FORMER VEHICLE DUMP & COMMUNITY LANDFILL - IQALUIT, NUNAVUT

Client: PWGSC - TRANSPORT CANADA

ARCADIS

Date: AUGUST 2017

FIGURE 3

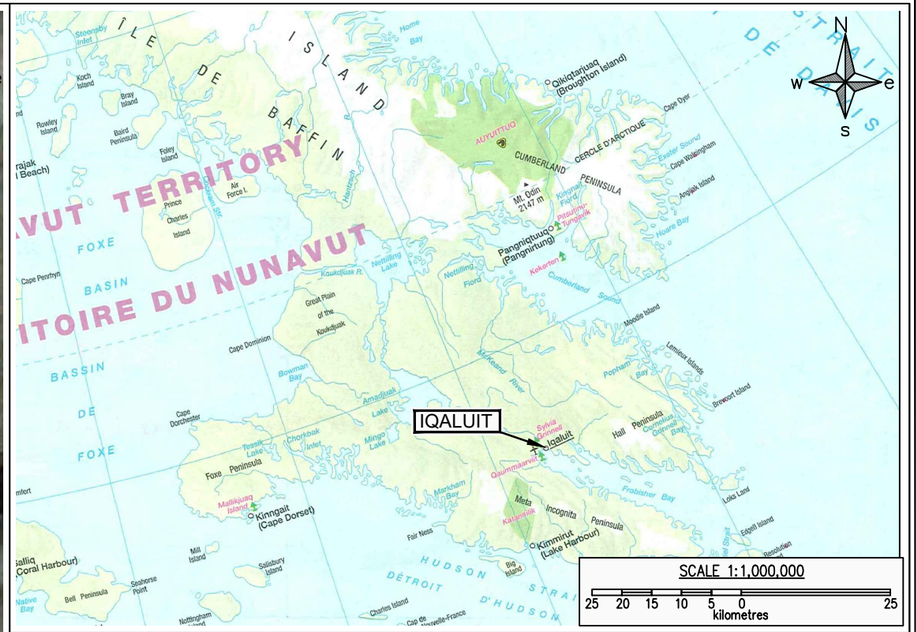
TO BE PRINTED IN COLOUR ON 8.5"X11" PAPER ONLY - DO NOT SCALE

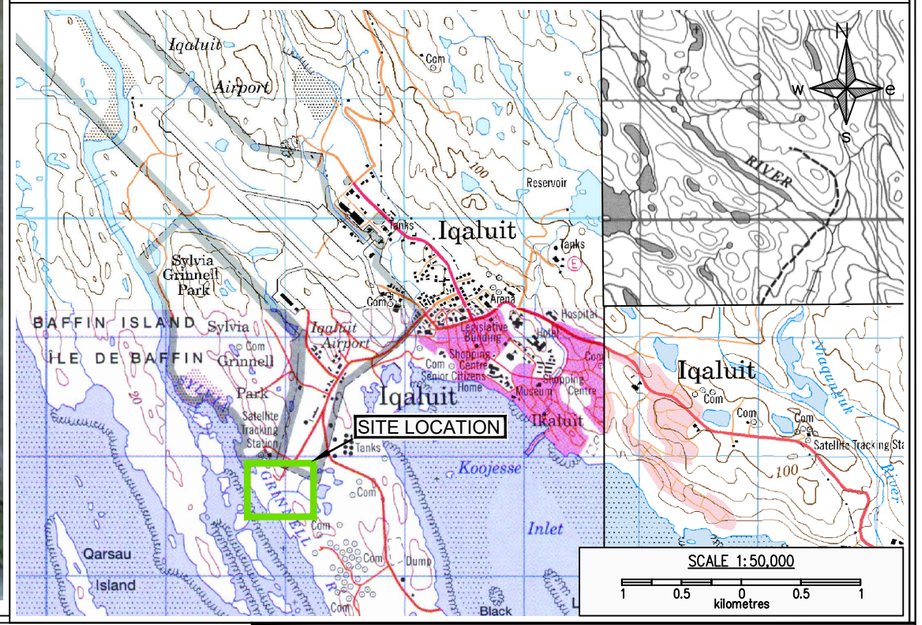
updated on:1-Aug-17 by rfletcher

Z:\Projects\2017\102153-000 TC Iqaluit\Figures\1-CAD\LTM Program\102153-000_TC IQALUIT_LTM Program.dwg(layout)

# APPENDIX A

## Remedial Action Plan Figures




References:

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(upper right) "*Canada Road Map*", MapArt Publishing, 2003.

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Natural Resources Canada NTS Sheet: 25-N□15 Iqaluit, Nunavut, Edition 2, NAD □3, Series A 713, 2001.
Natural Resources Canada NTS Sheet: 25-N□16 □No Title□Nunavut, Edition 2, NAD □3, Series A 701, 2001.
(Note: ground elevations shown in metres above mean sea level).

Title: SITE LOCATION

ARCADIS

Project: LANDFILL - IQALUIT, NUNAVUT

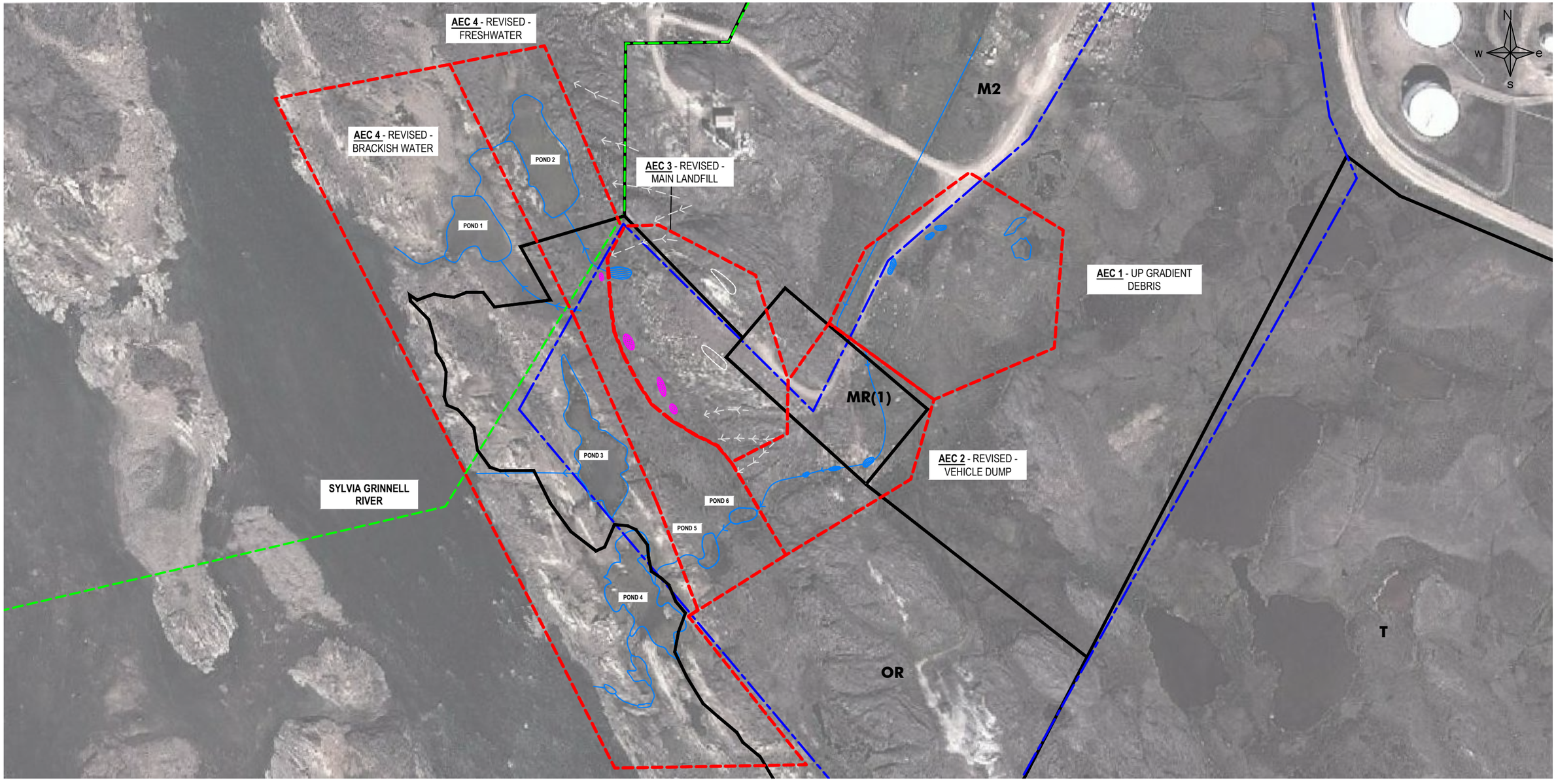
Date: JANUARY 2017

Client: PWGSC - TRANSPORT CANADA

SCALES AS SHOWN

FIGURE 1

Z:\Projects\2009\1584-0901 TC Iqaluit Landfill\Figures\TC-IQALUIT-LOCATION.dwg




LEGEND:

- POOLING WATER
- PROPERTY BOUNDARY
- PARK BOUNDARY
- ADJUSTED AREA OF ENVIRONMENTAL CONCERN (AEC)
- BURN AREA
- DRUMS
- SEEPAGE/GULLY
- STREAM/DRAINAGE
- IQALUIT ZONING OVERLAY
  - OR = OPEN AREA ZONE
  - MR1 = MUNICIPAL RESERVE ZONE (FORMER DISPOSAL SITE ALLOWANCE)
  - M2 = HEAVY INDUSTRIAL ZONE
  - T = TRANSPORTATION ZONE

*REFERENCE: BACKGROUND IMAGE OBTAINED FROM GOOGLE EARTH, 2008*

SCALE 1:3000

75 60 45 30 15 0 metres 75 150

*Original in colour

Title: REVISED AEC BOUNDARIES AND SITE PLAN

Project: VEHICLE DUMP & COMMUNITY LANDFILL - IQALUIT, NUNAVUT

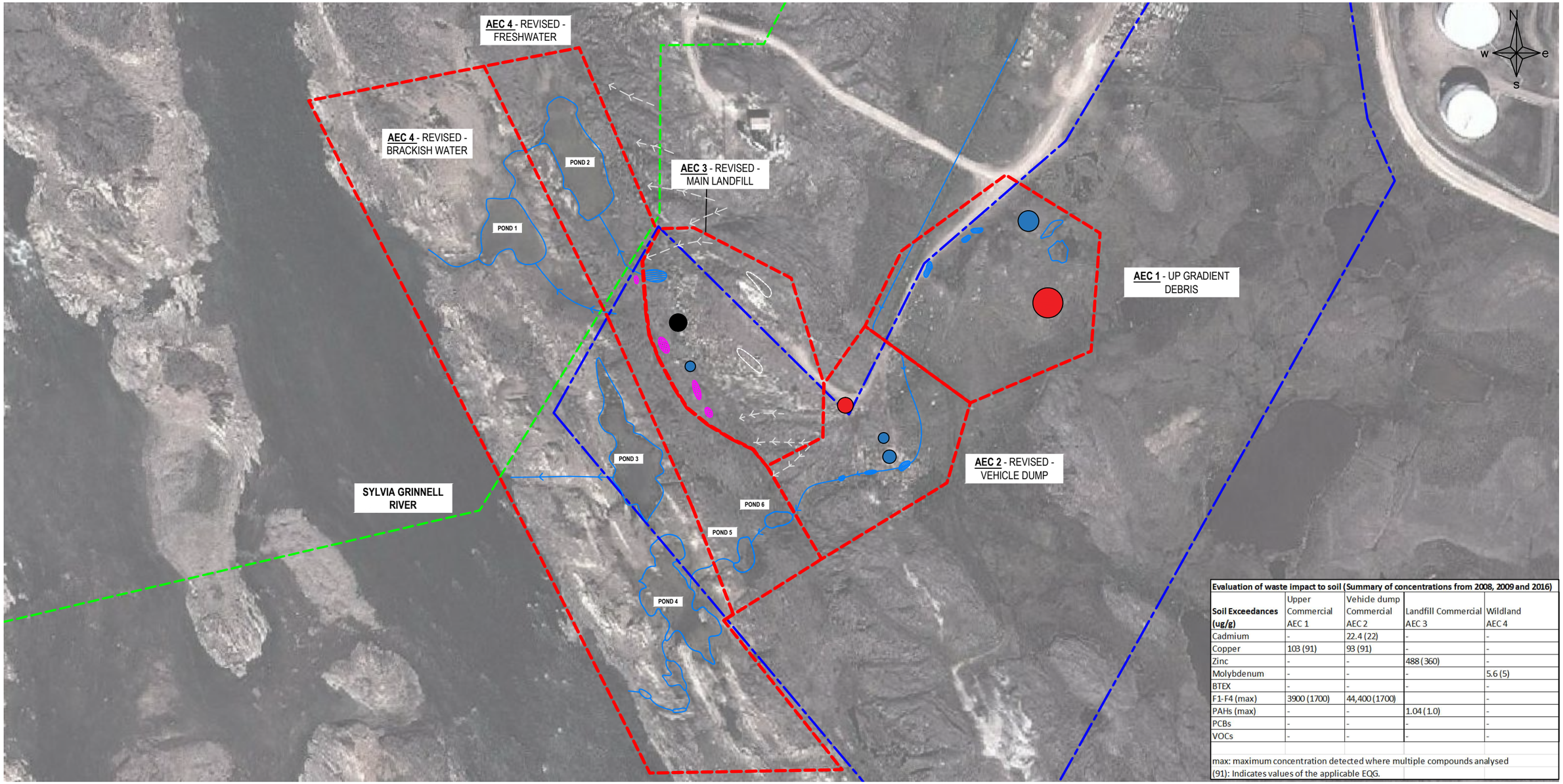
Client: PWGSC - TRANSPORT CANADA

ARCADIS

Date: JANUARY 2017

FIGURE 2

Z:\Projects\2009\1584-0901 TC Iqaluit Landfill\Figures\102153-000_TC IQALUIT_2016_RAP.dwg




**Evaluation of waste impact to soil (Summary of concentrations from 2008, 2009 and 2016)**

| Soil Exceedances (ug/g) | Upper Commercial AEC 1 | Vehicle dump Commercial AEC 2 | Landfill Commercial AEC 3 | Wildland AEC 4 |
|---|---|---|---|---|
| Cadmium | - | 22.4 (22) | - | - |
| Copper | 103 (91) | 93 (91) | - | - |
| Zinc | - | - | 488 (360) | - |
| Molybdenum | - | - | - | 5.6 (5) |
| BTEX | - | - | - | - |
| F1-F4 (max) | 3900 (1700) | 44,400 (1700) | | - |
| PAHs (max) | - | - | 1.04 (1.0) | - |
| PCBs | - | - | - | - |
| VOCs | - | - | - | - |

max: maximum concentration detected where multiple compounds analysed
(91): Indicates values of the applicable EQG.

LEGEND:

- POOLING WATER
- PROPERTY BOUNDARY
- PARK BOUNDARY
- ADJUSTED AREA OF ENVIRONMENTAL CONCERN (AEC)
- BURN AREA
- DRUMS
- SEEPAGE/GULLY
- STREAM/DRAINAGE
- PHC IMPACTED SOIL > COMMERCIAL EQG (LANDFARM)
- METAL IMPACTED SOIL TO BE PLACED IN AEC 3 LANDFILL
- PAH IMPACTED SOIL > COMMERCIAL EQG (LANDFARM OR PLACEMENT IN LANDFILL)

*REFERENCE: BACKGROUND IMAGE OBTAINED FROM GOOGLE EARTH, 2008*

SCALE 1:3000

75 60 45 30 15 0 metres 75 150

Title: SOIL IMPACT SUMMARY

Project: VEHICLE DUMP & COMMUNITY LANDFILL - IQALUIT, NUNAVUT

Client: PWGSC - TRANSPORT CANADA

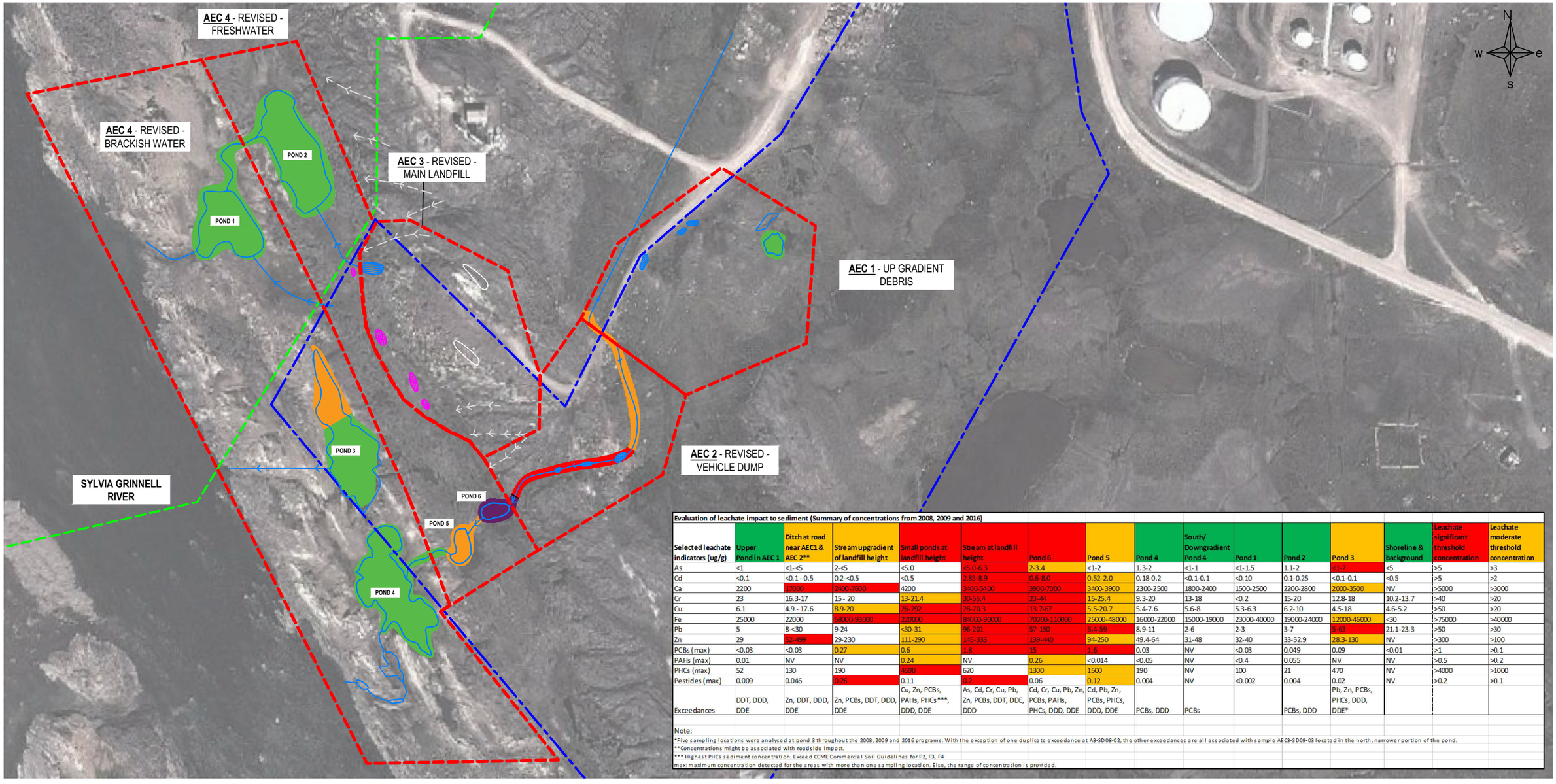
ARCADIS

Date: JANUARY 2017

FIGURE 3

*Original in colour

Z:\Projects\2009\1584-0901 TC Iqaluit Landfill\Figures\102153-000_TC IQALUIT_2016_RAP.dwg




Evaluation of leachate impact to sediment (Summary of concentrations from 2008, 2009 and 2016)

| Selected leachate indicators (ug/g) | Upper Pond in AEC 1 | Ditch at road near AEC1 & AEC 2** | Stream upgradient of landfill height | Small ponds at landfill height | Stream at landfill height | Pond 6 | Pond 5 | Pond 4 | South/ Downgradient Pond 4 | Pond 1 | Pond 2 | Pond 3 | Shoreline & background | Leachate significant threshold concentration | Leachate moderate threshold concentration |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| As | <1 | <1-<5 | 2-<5 | <5.0 | <5.0-6.3 | 2-3.4 | <1-2 | 1.3-2 | <1-1 | <1-1.5 | 1.1-2 | 4-7 | <5 | >5 | >3 |
| Cd | <0.1 | <0.1 - 0.5 | 0.2-<0.5 | <0.5 | 2.83-8.9 | 0.6-8.0 | 0.52-2.0 | 0.18-0.2 | <0.1-0.1 | <0.10 | 0.1-0.25 | <0.1-0.1 | <0.5 | >5 | >2 |
| Ca | 2200 | 17000 | 2400-7600 | 4200 | 3400-5400 | 3900-7000 | 3400-3900 | 2300-2500 | 1800-2400 | 1500-2500 | 2200-2800 | 2000-3500 | NV | >5000 | >3000 |
| Cr | 23 | 16.3-17 | 15 - 20 | 13-21.4 | 30-55.4 | 23-44 | 15-25.4 | 9.3-20 | 13-18 | <0.2 | 15-20 | 12.8-18 | 10.2-13.7 | >40 | >20 |
| Cu | 6.1 | 4.9 - 17.6 | 8.9-20 | 26-292 | 28-70.3 | 13.7-67 | 5.5-20.7 | 5.4-7.6 | 5.6-8 | 5.3-6.3 | 6.2-10 | 4.5-18 | 4.6-5.2 | >50 | >20 |
| Fe | 25000 | 22000 | 58000-93000 | 220000 | 84000-90000 | 70000-110000 | 25000-48000 | 16000-22000 | 15000-19000 | 23000-40000 | 19000-24000 | 12000-46000 | <30 | >75000 | >40000 |
| Pb | 5 | 8-<30 | 9-24 | <30-31 | 96-201 | 57-150 | 6.4-59 | 8.9-11 | 2-6 | 2-3 | 3-7 | 5-63 | 21.1-23.3 | >50 | >30 |
| Zn | 29 | 92-499 | 29-230 | 111-290 | 145-333 | 139-440 | 94-250 | 49.4-64 | 31-48 | 32-40 | 33-52.9 | 28.3-130 | NV | >300 | >100 |
| PCBs (max) | <0.03 | <0.03 | 0.27 | 0.6 | 1.8 | 15 | 1.6 | 0.03 | NV | <0.03 | 0.049 | 0.09 | <0.01 | >1 | >0.1 |
| PAHs (max) | 0.01 | NV | NV | 0.24 | NV | 0.26 | <0.014 | <0.05 | NV | <0.4 | 0.055 | NV | NV | >0.5 | >0.2 |
| PHCs (max) | 52 | 130 | 190 | 4500 | 620 | 1300 | 1500 | 190 | NV | 100 | 21 | 470 | NV | >4000 | >1000 |
| Pestides (max) | 0.009 | 0.046 | 0.26 | 0.11 | 0.2 | 0.06 | 0.12 | 0.004 | NV | <0.002 | 0.004 | 0.02 | NV | >0.2 | >0.1 |
| Exceedances | DDT, DDD, DDE | Zn, DDT, DDD, DDE | Zn, PCBs, DDT, DDD, DDE | Cu, Zn, PCBs, PAHs, PHCs***, DDD, DDE | As, Cd, Cr, Cu, Pb, Zn, PCBs, DDT, DDE, DDD | Cd, Cr, Cu, Pb, Zn, PCBs, PAHs, PHCs, DDD, DDE | Cd, Pb, Zn, PCBs, PHCs, DDD, DDE | PCBs, DDD | PCBs | | PCBs, DDD | Pb, Zn, PCBs, PHCs, DDD, DDE* | | | |

Note:
*Five sampling locations were analysed at pond 3 throughout the 2008, 2009 and 2016 programs. With the exception of one duplicate exceedance at A3-SD08-02, the other exceedances are all associated with sample AEC3-SD09-03 located in the north, narrower portion of the pond.
**Concentrations might be associated with roadside impact.
*** Highest PHCs sediment concentration. Exceed CCME Commercial Soil Guidelines for F2, F3, F4
max: maximum concentration detected for the areas with more than one sampling location. Else, the range of concentration is provided.

LEGEND:

- POOLING WATER
- PROPERTY BOUNDARY
- PARK BOUNDARY
- ADJUSTED AREA OF ENVIRONMENTAL CONCERN (AEC)
- BURN AREA
- DRUMS
- SEEPAGE/GULLY
- STREAM/DRAINAGE
- SIGNIFICANTLY IMPACTED TO BE REMOVED
- SIGNIFICANTLY IMPACTED TO REMAIN IN PLACE AS A SETTLING POND
- MODERATELY IMPACTED TO NATURALLY ATTENUATE
- NO SIGNIFICANT IMPACTS

*REFERENCE: BACKGROUND IMAGE OBTAINED FROM GOOGLE EARTH, 2008*

SCALE 1: 3000

75 60 45 30 15 0 metres 75 150

Title: SEDIMENT IMPACT SUMMARY

Project: VEHICLE DUMP & COMMUNITY LANDFILL - IQALUIT, NUNAVUT

Client: PWGSC - TRANSPORT CANADA

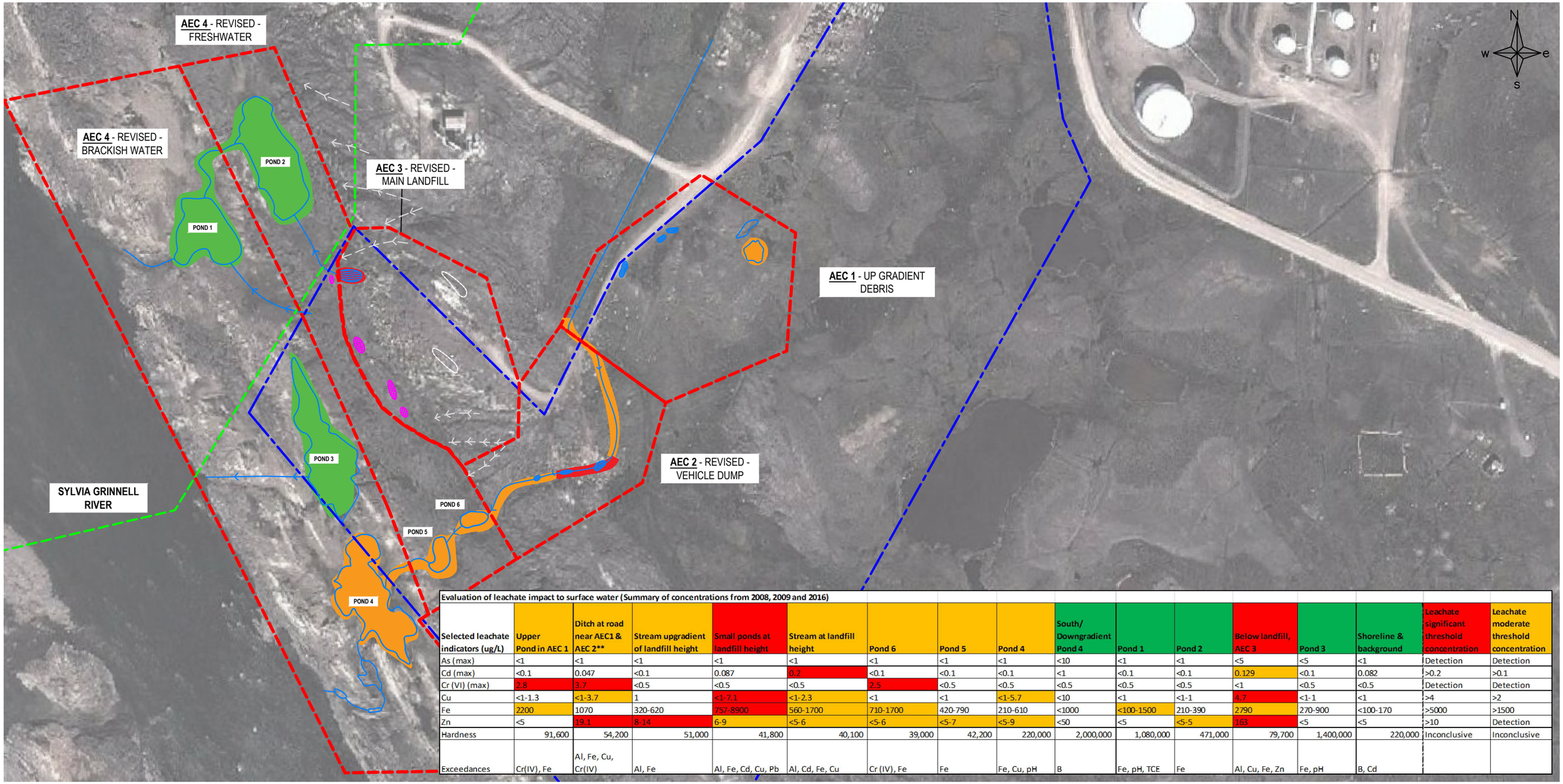
ARCADIS

Date: JANUARY 2017

FIGURE 4

*Original in colour

Z:\Projects\2009\1584-0901 TC Iqaluit Landfill\Figures\102153-000_TC IQALUIT_2016_RAP.dwg




Evaluation of leachate impact to surface water (Summary of concentrations from 2008, 2009 and 2016)

| Selected leachate indicators (ug/L) | Upper Pond in AEC 1 | Ditch at road near AEC1 & AEC 2** | Stream upgradient of landfill height | Small ponds at landfill height | Stream at landfill height | Pond 6 | Pond 5 | Pond 4 | South/ Downgradient Pond 4 | Pond 1 | Pond 2 | Below landfill, AEC 3 | Pond 3 | Shoreline & background | Leachate significant threshold concentration | Leachate moderate threshold concentration |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| As (max) | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <10 | <1 | <1 | <5 | <5 | <1 | Detection | Detection |
| Cd (max) | <0.1 | 0.047 | <0.1 | 0.087 | 0.2 | <0.1 | <0.1 | <0.1 | <1 | <0.1 | <0.1 | 0.129 | <0.1 | 0.082 | >0.2 | >0.1 |
| Cr (VI) (max) | 2.8 | 3.7 | <0.5 | <0.5 | <0.5 | 2.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <1 | <0.5 | <0.5 | Detection | Detection |
| Cu | <1-1.3 | <1-3.7 | 1 | <1-7.1 | <1-2.3 | <1 | <1 | <1-5.7 | <10 | <1 | <1-1 | 4.7 | <1-1 | <1 | >4 | >2 |
| Fe | 2200 | 1070 | 320-620 | 757-8900 | 560-1700 | 710-1700 | 420-790 | 210-610 | <1000 | <100-1500 | 210-390 | 2790 | 270-900 | <100-170 | >5000 | >1500 |
| Zn | <5 | 19.1 | 8-14 | 6-9 | <5-6 | <5-6 | <5-7 | <5-9 | <50 | <5 | <5-5 | 163 | <5 | <5 | >10 | Detection |
| Hardness | 91,600 | 54,200 | 51,000 | 41,800 | 40,100 | 39,000 | 42,200 | 220,000 | 2,000,000 | 1,080,000 | 471,000 | 79,700 | 1,400,000 | 220,000 | Inconclusive | Inconclusive |
| Exceedances | Cr(IV), Fe | Al, Fe, Cu, Cr(IV) | Al, Fe | Al, Fe, Cd, Cu, Pb | Al, Cd, Fe, Cu | Cr (IV), Fe | Fe | Fe, Cu, pH | B | Fe, pH, TCE | Fe | Al, Cu, Fe, Zn | Fe, pH | B, Cd | | |

LEGEND:

- POOLING WATER
- PROPERTY BOUNDARY
- PARK BOUNDARY
- ADJUSTED AREA OF ENVIRONMENTAL CONCERN (AEC)
- BURN AREA
- DRUMS
- SEEPAGE/GULLY
- STREAM/DRAINAGE
- SIGNIFICANTLY IMPACTED
- MODERATELY IMPACTED
- NO SIGNIFICANT IMPACTS

*REFERENCE: BACKGROUND IMAGE OBTAINED FROM GOOGLE EARTH, 2008*

SCALE 1:3000

75 60 45 30 15 0 metres 75 150

Title: SURFACE WATER IMPACT SUMMARY

Project: VEHICLE DUMP & COMMUNITY LANDFILL - IQALUIT, NUNAVUT

Client: PWGSC - TRANSPORT CANADA

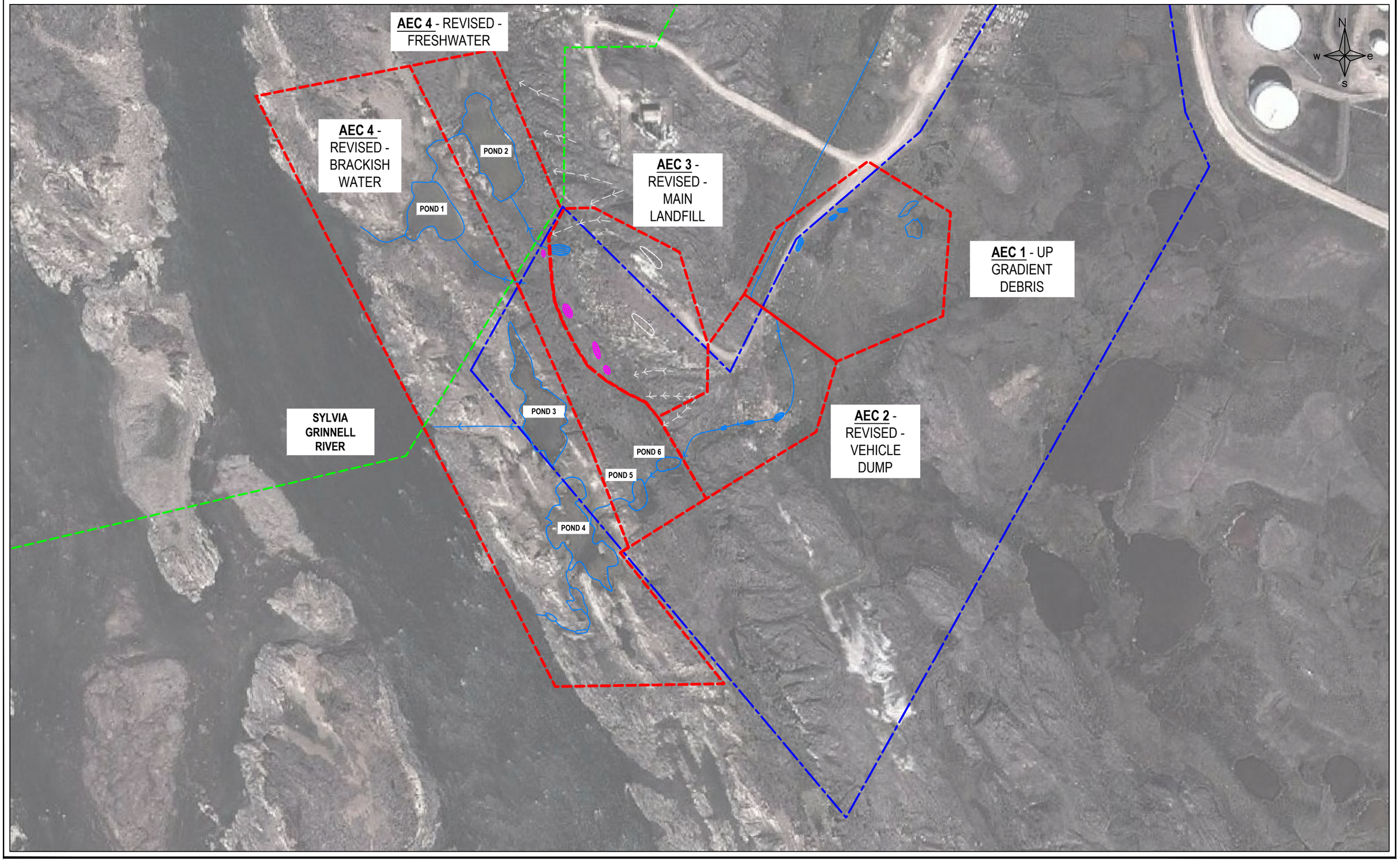
ARCADIS

Date: JANUARY 2017

FIGURE 5

*Original in colour

Z:\Projects\2009\1584-0901 TC Iqaluit Landfill\Figures\102153-000_TC IQALUIT_2016_RAP.dwg


AEC 4 - REVISED - FRESHWATER
AEC 4 - REVISED - BRACKISH WATER
POND 2
POND 1
AEC 3 - REVISED - MAIN LANDFILL
AEC 1 - UP GRADIENT DEBRIS
POND 3
SYLVIA GRINNELL RIVER
AEC 2 - REVISED - VEHICLE DUMP
POND 6
POND 5
POND 4
N
W
e
S

# APPENDIX B

## Identification of Potential Environmental and Resource Impacts

| Value Ecosystem Component | Activity | Description of Impact | Proposed Mitigation Measure |
|---|---|---|---|
| Air Quality | Hydrocarbon Contaminated Soil/Sediments Removal | Air quality may be impacted by the removal of hydrocarbon contaminated soil/sediment. Soil volume to be excavated is expected to be minimal and localized and have low potential for dust generation. Sediment will be moist to wet and have a low potential for dust generation. | Execute work by methods to minimize raising dust (e.g., minimize height of waste release from excavator bucket into trailers). Stockpiles will be covered and refuse will be covered when not being excavated. Work may be suspended if conditions of high dust generation can not be controlled. |
| | Site Grading | The extraction of granular materials and grading activities has the potential to create dust and impact air quality. | Implement dust control measures, if required. Only water will be used for dust control. Work may be suspended if conditions of high dust generation can not be controlled. Access roads will have hard-packed surfaces to reduce dust generation. The speed limit for on-site traffic will be 15 km/hr. |
| | Emission | Emissions from equipment used on site during remediation. | No unnecessarily idling. |
| Soil Quality | Site Remediation/Landfill & Vehicle Dump Closure | Contaminated soils, sediments and waste at the site are contributing to the release of contaminant in the environment. The remediation and landfill closure activities will limit the migration of contaminants to the soil. If not completed properly, contaminants may continue to leach out of the landfill following the remediation program and impact soil quality. | Accessible hazardous material containing debris will be removed from the site. The waste and co-mingling impacted soils/sediments will be consolidated in the landfill which will undergo engineered decommissioning that will include extensive swale designs to divert precipitation and melt water away from the landfill slopes to prevent both erosion and water infiltration. |
| | Fuel Handling | Refuelling of equipment during remediation could lead to accidental release of fuel in the environment. | No storage tanks and hazardous materials are to be stored on site.<br>No refuelling equipment is allowed on site other than at a staging area away from the work site.<br>Spill response kit to be available on-site at all time.<br>Spill contingency plan developed for the site |

| Value Ecosystem Component | Activity | Description of Impact | Proposed Mitigation Measure |
|---|---|---|---|
| | | | and to be available on-site at all time. |
| | Transport of Hazardous Material, Fuel and Contaminated Soil/Sediment | The potential exists for accidental release of hazardous materials, contaminated soil/sediments and/or fuels during transport, which could impact soil quality. | Proper handling, storage, and transportation procedures for hazardous materials to be implemented as per TDGA regulations. All contaminated soil/sediment, landfill waste and liquid waste, if encountered, shall be separated and managed on-site at the staging area to prevent contamination of uncontaminated material or migration to non-contaminated areas. All workers to be trained in proper handling procedures for all hazardous materials on-site. Workers to follow the spill contingency plan. All materials and equipment to implement contingency plan to be available on-site. |
| Water Quality | Contaminated Soil/Sediment and Hazardous Materials Removal | Contaminated soils, sediments and waste at the site are contributing to the release of contaminant in the environment. The remediation and landfill closure activities will limit the migration of contaminants to the water. If not completed properly, contaminants may continue to leach out of the landfill following the remediation program and impact water quality. | Accessible hazardous material containing debris will be removed from the site. The waste and co-mingling impacted soils/sediments will be consolidated in the landfill which will undergo engineered decommissioning that will include extensive swale designs to divert precipitation and melt water away from the landfill slopes to prevent both erosion and water infiltration. |
| | Fuel Handling | Refuelling of equipment during remediation could lead to accidental release of fuel in the environment. | No storage tanks and hazardous materials are to be stored on site. No refuelling equipment is allowed on site other than at a staging area away from the work site. |

| Value Ecosystem Component | Activity | Description of Impact | Proposed Mitigation Measure |
|---|---|---|---|
| | | | Spill response kit to be available on-site at all time.<br>Spill contingency plan developed for the site and to be available on-site at all time. |
| | Removal of Debris near the Sylvia Grinnell River and removal of debris/impacted sediment/soil near/within the upstream drainage features | Sediment release and associated sedimentation in ecologically productive aquatic habitat may occur during removal. | Prevent sediments from entering waterbodies by use of berms and/or silt fences. |
| | | Potential inadvertent release of harmful substances such as fuels and lubricating oils when completing removal of debris. | Proper handling, storage, and transportation procedures for hazardous materials to be implemented as per TDGA regulations. All workers to be trained in proper handling procedures for all hazardous materials on-site. All contaminated soil/sediment, landfill waste and liquid waste, if encountered, shall be separated and managed on-site at the staging area to prevent contamination of uncontaminated material or migration to non-contaminated areas.<br>Workers to follow the spill contingency plans.<br>All materials and equipment to implement contingency plans to be available on- site.<br>Implement mitigation measures to prevent deleterious substances from entering the aquatic environment.<br>Implement water control measures such as maintain excavation areas (if produced) free of water,<br>protect site from standing or running water, prevent surface |
| | Stockpiling of debris and soil/sediment in the staging area | Potential release of contaminants from surface water runoff leaving the staging area. | |

| Value Ecosystem Component | Activity | Description of Impact | Proposed Mitigation Measure |
|---|---|---|---|
| | | | water runoff from leaving work areas, prevent precipitation from infiltrating or from directly running off stockpiled waste materials where practical and provide, operate, and maintain necessary equipment appropriately sized to keep excavations, staging pads, and other work areas free from water. |
| Terrain | Site Regrading | Terrain and drainage will be improved as a result of grading disturbed areas. Previously disturbed areas will blend into the natural environment. | N/A |
| | Contaminated Soil Excavation | The excavation of contaminated soil has the potential to degrade the permafrost. | Minimize the time permafrost is exposed. Minimize surface area of exposed permafrost or active zone. |
| | Importation of Fill and/or Other Material | Site could be re-contaminated by poor quality fill. | The contractor will be responsible for providing documentation pertaining to the environmental quality of the material, including analytical results (where required) and to disclose the location of origin for the material. The contractor will also be responsible for removing any excess imported materials from the site. |
| Noise | Heavy machinery at the site | Increased noise level during operation of machinery | Site is away from populated area and the general population is not likely to be impacted. On site workers will be required to follow the health and safety procedures as outlined in the project health and safety plan to mitigate risks associated with noise and odours. |
| Odour | Moving impacted soil/sediment and debris | Temporary release of odour | |
| Terrestrial Animals | General Remediation Activities and Landfill Decommissioning | The use of heavy equipment during the remediation has the potential to disturb wildlife. | Avoid areas of known wildlife colonies or bird nesting areas. Employ minimum distance requirements for transportation activities around the site. |

| Value Ecosystem Component | Activity | Description of Impact | Proposed Mitigation Measure |
|---|---|---|---|
| Aquatic Habitat and Aquatic Life | General Remediation Activities and Landfill Decommissioning | The removal of debris, soil/sediment has the potential to release material into the aquatic environment and disturb aquatic habitat and aquatic life. | During excavation, implement mitigation measures to prevent deleterious substances from entering the aquatic environment. Prevent siltation by use of berms and/or silt fences. Do not operate equipment within the wetted perimeter. Disturbed areas adjacent to water are to be stabilized, if required. |
| Health and Safety | General Clean Up Activities | The excavation of potentially hazardous materials from the landfills, the collection and disposal of potentially hazardous debris, the removal of hazardous materials from the facilities and the general handling of hazardous materials has the potential to impact the health and safety of workers. | Transportation of any hazardous materials is to be in accordance with the TDGA Regulations.<br>Workers must wear and use appropriate personal protective equipment.<br>Workers are to be trained in the use of personal protective equipment and proper handling procedures for hazardous materials.<br>Proper procedures for working around heavy equipment to be implemented. |

# APPENDIX C

## Visual Inspection Checklist

**POST-CONSTRUCTION - LANDFILL MONITORING**

**VISUAL INSPECTION CHECKLIST**



| |
|---|
| SITE NAME: |
| DATE OF INSPECTION: |
| WEATHER CONDITIONS: |
| DATE OF PREVIOUS INSPECTION: |
| INSPECTED BY (name and signature): |
| REPORT PREPARED BY (name and signature): |
| **The inspector represents to the best of their knowledge that the following statements and observations are true and correct and that no material facts have been suppressed or misstated.** |

*Notes:*

- *All Features must have UNIQUE and consistent identifiers:*
  - *If a Feature is identified as Feature 'A' in 2018; then this same Feature 'A' must be followed up on as Feature 'A' in 2020 and all subsequent years. If it is not observed in a year, than it must be described as 'not observed'; Feature 'A' cannot be replaced to become a different Feature in later years.*
  - *If a Feature was noted in a previous year, but in the Geotechnical Engineer's opinion is not relevant; you can explain why in your opinion it is not relevant.*
  - *A new Feature must get its own unique identifier, in alphabetical order from where the previous list of Features left off; It should also be described as 'NEW' in the description column;*
  - *New Features can only be grouped together if they are very similar and located in close proximity;*
  - *Feature names must be consistent in the Tables, Figures, Photos and text; All Feature referencing must be verified for consistency.*
- *All measurements must be metric units;*
- *GPS is in UTM coordinates (NAD83).*

## VISUAL INSPECTION CHECKLIST - INSPECTION REPORT – PAGE 2 OF 3

| Checklist Item | Present Yes/No | Feature Number (Feature A, B, C – Keep name from historical observations, where appropriate) | Location (Describe relative to existing monuments/ features and relative to landfill design i.e. surface, berms, toe) | GPS coordinates (Taken at each 0.5m to 1m interval, and at any significant change in direction and around circumference of feature) Also take centre of feature (where feasible, and call c) Easting/ Northing/Zone | Length | Width | Depth | Extent relative to Area of Landfill (%) | Description | Comparison with historical observations | Additional Comments | Photographic Records Photo Reference, Focal length, location, view point & direction (relative to magnetic north) Feature of note Scale |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Settlement** | | | | | | | | | | | | |
| **Erosion** | | | | | | | | | | | | |
| **Lateral Movement** | | | | | | | | | | | | |
| **Frost Action** | | | | | | | | | | | | |
| **Sloughing** | | | | | | | | | | | | |
| **Cracking** | | | | | | | | | | | | |
| **Animal Burrows** | | | | | | | | | | | | |

## VISUAL INSPECTION CHECKLIST - INSPECTION REPORT – PAGE 3 OF 3

| Checklist Item | Present Yes/No | Feature Number (Feature A, B, C – Keep name from historical observations, where appropriate) | Location (Describe relative to existing monuments/ features and relative to landfill design i.e. surface, berms, toe) | GPS coordinates (Taken at each 0.5m to 1m interval, and at any significant change in direction and around circumference of feature) Also take centre of feature (where feasible, and call c) Easting/ Northing/Zone | Length | Width | Depth | Extent relative to Area of Landfill (%) | Description | Comparison with historical observations | Additional Comments | Photographic Records Photo Reference, Focal length, location, view point & direction (relative to magnetic north) Feature of note Scale |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vegetation Establishment | | | | | | | | | | | | |
| Staining | | | | | | | | | | | | |
| Vegetation Stress | | | | | | | | | | | | |
| Seepage Points (or) Ponded Water | | | | | | | | | | | | |
| Debris and/or Liner Exposed | | | | | | | | | | | | |
| Presence & Condition of Monitoring Instruments | | | | | | | | | | | | |
| Features of Note/ Other Relevant Observations (e.g. signs of activity, ruts…) | | | | | | | | | | | | |

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Ottawa, Ontario K1Z 5B8

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# APPENDIX N

## Selected Site Photographs

**Photo:** 1
31 July 2017

**Description:**

## (Before)

Overview of southeast of Main Landfill prior to remediation operations

**Location:**

AEC 3 – Photo Stn 1 looking northwest

**Photo: 2**
23 September 2017

**Description:**

## (After)

Overview of southeast of Main Landfill, final filling and grading operations

**Location:**

AEC 3 – Photo Stn 1 looking northwest

**Photo:** 1
31 July 2017

**Description:**

## (Before)

Overview of southwest of Main Landfill prior to remediation operations

**Location:**

AEC 3 – Photo Stn 4 looking northeast

**Photo: 2**
26 September 2017

**Description:**

## (After)

Overview of southwest of Main Landfill

**Location:**

AEC 3 – Photo Stn 4 looking northeast

**Photo:** 1
31 July 2017

**Description:**

## (Before)

Overview of west of Main Landfill prior to remediation operations

**Location:**

AEC 3 –
Photo Stn 5 looking northeast

**Photo: 2**
23 September 2017

**Description:**

## (After)

Overview of west of Main Landfill

**Location:**

AEC 3 –
Photo Stn 5 looking northeast

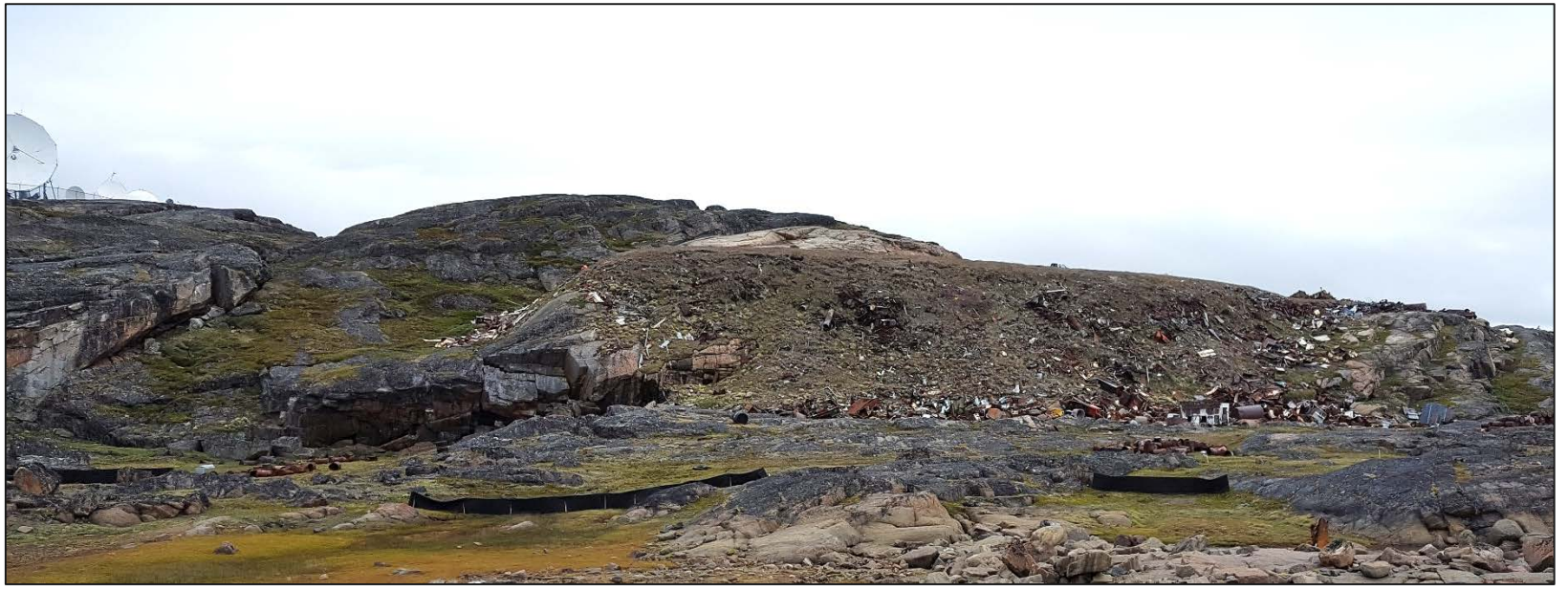

**Photo:** 1
31 July 2017

**Description:**

## (Before)

Overview of west of Main Landfill prior to remediation operations

**Location:**

AEC 3 – Photo Stn 6 looking east

**Photo: 2**
23 September 2017

**Description:**

## (After)

Overview of west of Main Landfill

**Location:**

AEC 3 – Photo Stn 6 looking east

**Photo:** 1
October 2016

**Description:**

## (Before)

Overview AEC 2 vehicle dump

**Location:**

AEC 2

**Photo: 2**
28 September 2017

**Description:**

## (After)

Overview of AEC 2 cap

**Location:**

AEC 2

**Photo:** 1
October 2016

**Description:**

## (Before)

Overview AEC 2 vehicle dump

**Location:**

AEC 2

**Photo: 2**
28 September 2017

**Description:**

## (After)

Overview of AEC 2 drainage

**Location:**

AEC 2

**Photo:** 1
October 2016

**Description:**

## (Before)

Overview AEC 1

**Location:**

AEC 1

**Photo: 2**
28 September 2017

**Description:**

## (After)

Overview of AEC 1 after capping

**Location:**

AEC 1

**Photo:** 1
October 2016

**Description:**

## (Before)

Overview AEC 3, north end

**Location:**

AEC 3

**Photo: 2**
28 September 2017

**Description:**

## (After)

Overview of AEC 3 north end after capping

**Location:**

AEC 3

## Project Photographs

2017 Site Remediation Summary Report – Former Iqaluit Metal Dump and Community Landfill, Iqaluit NU

**Photo:** 1

July 30, 2017

**Description:**

**(Before)** Overview of SE of Main Landfill Prior to Remediation Operations

**Location:**

AEC 3 - Photo Stn 1 looking northwest

**Photo: 2**

July 30, 2017

**Description:**

**(Before)** Overview of SW of Main Landfill

**Location:**

AEC 3 – Photo Stn 4 looking north

**Photo: 3**

July 30, 2017

**Description:**

**(Before)** Overview of SW of Main Landfill

**Location:**

AEC 3 – Photo Stn 5 looking northeast

## Project Photographs

2017 Site Remediation Summary Report – Former Iqaluit Metal Dump and Community Landfill, Iqaluit NU

**Photo: 4**

July 30, 2017

**Description:**

**(Before)** Overview of West of Main Landfill

**Location:**

AEC 3 – Photo Stn 6 looking east

**Photo: 5**

Aug 14, 2017

**Description:**

**(During 1)** Overview of SE of Main Landfill

**Location:**

AEC 3 - Photo Stn 1 looking northwest

**Photo: 6**

Aug 14, 2017

**Description:**

**(During 1)** Overview of SW of Main Landfill

**Location:**

AEC 3 – Photo Stn 4 looking north

## Project Photographs

2017 Site Remediation Summary Report – Former Iqaluit Metal Dump and Community Landfill, Iqaluit NU

**Photo: 7**

Aug 14, 2017

**Description:**

**(During 1)** Overview of West of Main Landfill

**Location:**

AEC 3 – Photo Stn 5 looking east

**Photo: 8**

Aug 14, 2017

**Description:**

**(During 1)** Overview of West of Main Landfill

**Location:**

AEC 3 – Photo Stn 6 looking east

**Photo: 9**

Sep 02, 2017

**Description:**

**(During 2)** Overview of SE of Main Landfill

**Location:**

AEC 3 - Photo Stn 1 looking northwest

## Project Photographs

2017 Site Remediation Summary Report – Former Iqaluit Metal Dump and Community Landfill, Iqaluit NU

**Photo: 10**

Sep 02, 2017

**Description:**

**(During 2)** Overview of SW of Main Landfill

**Location:**

AEC 3 – Photo Stn 4 looking north

**Photo: 11**

Sep 02, 2017

**Description:**

**(During 2)** Overview of SW of Main Landfill

**Location:**

AEC 3 – Photo Stn 5 looking northeast

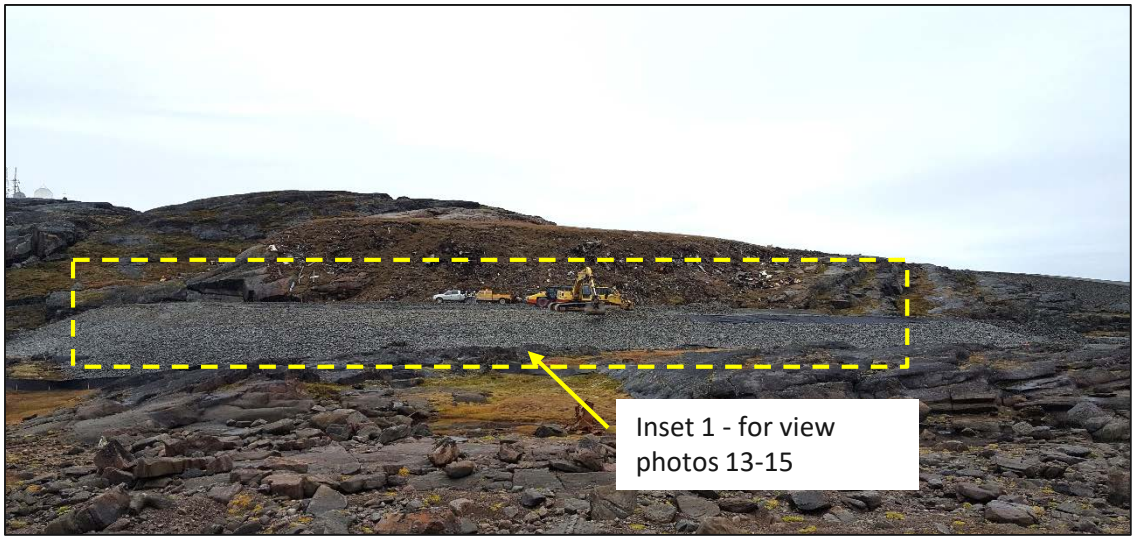


**Photo: 12**

Sep 02, 2017

**Description:**

**(During 2)** Overview of West of Main Landfill

**Location:**

AEC 3 – Photo Stn 6 looking east

## Project Photographs

2017 Site Remediation Summary Report – Former Iqaluit Metal Dump and Community Landfill, Iqaluit NU

**Photo: 13**

Sep 05, 2017

**Description:**

**(Inset 1)** Overview of West of Main Landfill from above

**Location:**

AEC 3 – Looking southeast

**Photo: 14**

Sep 05, 2017

**Description:**

**(Inset 1)** Overview of West of Main Landfill from above

**Location:**

AEC 3 – Looking southwest

**Photo: 15**

Sep 05, 2017

**Description:**

**(Inset 1)** Overview of West of Main Landfill

**Location:**

AEC 3 – Looking west

## Project Photographs

2017 Site Remediation Summary Report – Former Iqaluit Metal Dump and Community Landfill, Iqaluit NU

**Photo: 16**

Aug 12, 2017

**Description:**

(Before) Drum Sorting

**Location:**

AEC 3 – From above looking southwest

**Photo: 17**

Aug 14, 2017

**Description:**

(During) Drum Liquid removal staging area

**Location:**

TWA-1, view looking southwest

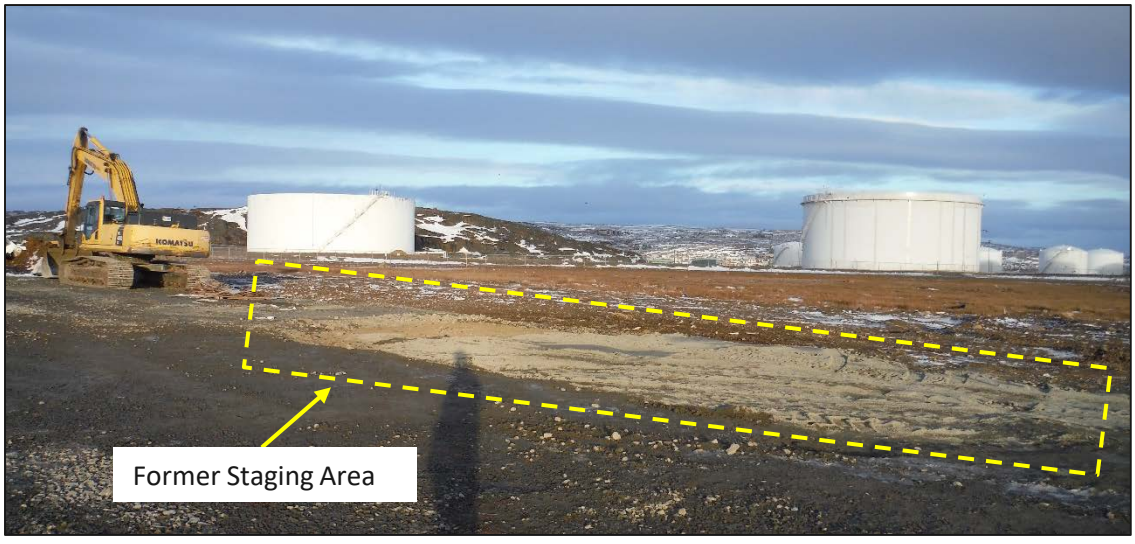


**Photo: 18**

04 October, 2017

**Description:**

**(After)** Drum Staging Area after liquid removal

**Location:**

TWA-1, view looking northeast

## Project Photographs

2017 Site Remediation Summary Report – Former Iqaluit Metal Dump and Community Landfill, Iqaluit NU

**Photo: 19**

Sep 31, 2017

**Description:**

**(After)** Overview of SW of Main Landfill

**Location:**

AEC 3 – Photo Stn 1 Looking north

**Photo: 20**

Sep 31, 2017

**Description:**

**(After)** Overview of SW of Main Landfill

**Location:**

AEC 3 – Photo Stn 4 looking northeast

**Photo: 21**

Sep 31, 2017

**Description:**

**(After)** Overview of SW of Main Landfill

**Location:**

AEC 3 – Photo Stn 5 looking northeast

## Project Photographs

2017 Site Remediation Summary Report – Former Iqaluit Metal Dump and Community Landfill, Iqaluit NU

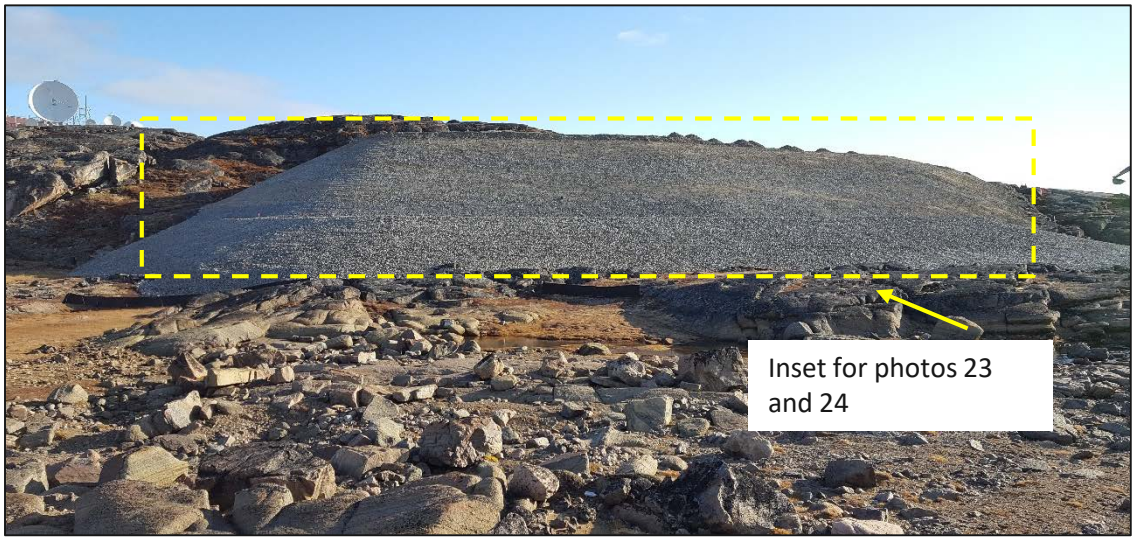


**Photo: 22**

Sep 31, 2017

**Description:**

**(After)** Overview of West of Main Landfill

**Location:**

AEC 3 – Photo Stn 6 looking east

**Photo: 23**

08 October, 2017

**Description:**

**(After)** Overview of west side of landfill

**Location:**

AEC 3 – From above looking southeast

**Photo: 24**

08 October, 2017

**Description:**

**(After)** Overview of West of Main Landfill

**Location:**

AEC 3 – From above looking west

## Project Photographs

2017 Site Remediation Summary Report – Former Iqaluit Metal Dump and Community Landfill, Iqaluit NU

**Photo: 25**

25 July, 2017

**Description:**

**(Before)** AEC-1 Overview, prior to remedial operations

**Location:**

AEC 1 – Looking northeast

**Photo: 26**

Aug 13, 2017

**Description:**

**(During 1)** AEC-1

**Location:**

AEC 1– Looking northeast

**Photo: 27**

29 Sept, 2017

**Description:**

**(After)** Overview of AEC-1 after final cap and grade

**Location:**

AEC 1 – Looking east

## Project Photographs

2017 Site Remediation Summary Report – Former Iqaluit Metal Dump and Community Landfill, Iqaluit NU

**Photo: 28**

04 Oct, 2017

**Description:**

Pallets of various hazardous materials packaged for disposal…

TWA-1 – looking south

**Photo: 29**

08 Oct, 2017

**Description:**

Batteries packaged for disposal

**Location:**

TWA-1 looking east

**Photo: 30**

08 Aug, 2017

**Description:**

Former area of PHC Impacted Soil post remediation

**Location:**

TWA-1 looking west

## Project Photographs

2017 Site Remediation Summary Report – Former Iqaluit Metal Dump and Community Landfill, Iqaluit NU

**Photo: 31**

08 Oct, 2017

**Description:**

TWA-1, storage containers for hazardous metals

**Location:**

TWA-1 – looking south

**Photo: 32**

08 Oct, 2017

**Description:**

Sea can storage contatiners being filled with lead containing products and hazardous metal debris

**Location:**

TWA-1 looking east

**Photo: 33**

08 Aug, 2017

**Description:**

TWA-1 impacted sediment packaged and ready for shipment south

**Location:**

TWA-1 looking southeast

# APPENDIX O

## Contractor Completion Forms

Public Works and Government Services Canada | Travaux publics et Services gouvernementaux Canada

# STATUTORY DECLARATION

Canada
Province or Territory
of Nunavut

**IN THE MATTER OF** a contract bearing no. EW699-180040/001/NCS
and dated the 12th day of July 2017.
between **HER MAJESTY THE QUEEN** in right of Canada, and
Kudlik Construction Ltd
(Insert full name of Contractor)
hereinafter referred to as the Contractor,
for Iqaluit Metal Dump
(Description and Location of Work)
Iqaluit, Nunavut and

**IN THE MATTER OF (indicate by CHECKMARK- ✓in APPLICABLE BOX)**

☐ a **PROGRESS CLAIM** covering work done thereunder
up to the _____ day of _____ _____.
☐ the **CERTIFICATE OF SUBSTANTIAL COMPLETION** relating thereto.
☑ the **CERTIFICATE OF COMPLETION** of the work thereunder.

**TO WIT:**

i, Réal Moreau, of Quebec, QC
(Print or type name of Declarant) (Declarant's address)

do solemnly declare:

(1) that I am Controller
(Print or type Declarant's title or position with the Contractor or state that Declarant is the Contractor)

and as such have personal knowledge of the said Contract and of the facts and matters stated herein.

(2) **(indicate by CHECKMARK - (✓) in APPLICABLE BOX)**

☐ that, up to the date of the attached Progress Claim, the **CONTRACTOR** has complied with all its lawful obligations in respect of the Labour Conditions, discharged all its lawful obligations to workmen in respect of the work contracted for and has discharged all its lawful obligations to its subcontractors and suppliers except for holdback monies properly retained, payments deferred by agreement or amounts whithheld by reason of legitimate dispute which have been identified to the party or parties, from whom payment has been withheld.

☐ that, up to the effective date of the **CERTIFICATE OF SUBSTANTIAL COMPLETION**, the **CONTRACTOR** has complied with all its lawful obligations in respect of the Labour Conditions, fully discharged all its lawful obligations to workmen, its subcontractors and suppliers in respect of the work contracted for and, in the case of a **NON-RESIDENT CONTRACTOR**, to the provincial tax authority respecting the payment of all applicable provincial taxes arising from or related to the performance of the work under the Contract, except for holdback monies properly retained, payments deferred by agreement or amounts whithheld by reason of legitimate dispute which have been identified to the party or parties, from whom payment has been withheld.

☑ that, up to the date of the **CERTIFICATE OF COMPLETION**, the **CONTRACTOR** has complied with all its lawful obligations in respect of the Labour Conditions, fully discharged all its lawful obligations to workmen, its subcontractors and suppliers in respect of the work contracted for and discharged and satisfied all lawful claims against it that arose out of the performance of this Contract except for holdback monies properly retained, payments deferred by agreement or amounts whithheld by reason of legitimate dispute which have been identified to the party or parties, from whom payment has been withheld.

(3) that the total amounts of $ Nil (if nil, state nil) were withheld by reason of legitimate dispute for which a statement is attached as part of this declaration, explaining in detail the reason(s) of the dispute(s) and identifying the party or parties from whom payment has been withheld.

And I make this **SOLEMN DECLARATION** conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath, and by virtue of the **CANADA EVIDENCE ACT**.

**DECLARED** before me at L'ancienne-Lorette

this 23rd day of November, 2017

Danielle L'Heureux
(Signature of person before whom the Declaration is made)

Danielle L'Heureux 109615
(Print name of person before whom the Declaration is made)

A Notary Public, Commissioner, etc. Commissioner

Exp. January 8, 2020
(Please state authority for receiving declarations. Notaries to affix Notarial Seal)

(Signature of Declarant)

**NOTICE**

If this Declaration is not complete in every detail, it will be returned for completion and payment will be delayed. The making of a false or fraudulent declaration is a contravention of the Criminal Code of Canada, and could carry, upon conviction penalties including fines or imprisonment.

# APPENDIX P

## Site Photographs (on DVD to be provided with the Final)

Arcadis Canada Inc.

329 Churchill Avenue North

Suite 200

Ottawa, Ontario  K1Z 5B8

Tel 613 721 0555

Fax 613 721 0029

**www.arcadis-canada.com**