Hope Bay Project
Windy Camp and Patch Lake Facility Updated Closure Plan

Prepared for

TMAC Resources Inc.

Prepared by

SRK Consulting (Canada) Inc.
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May 2014

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Table of Contents

1 Introduction 1
1.1 Background 1
1.1.1 Windy Camp 1
1.1.2 Patch Lake Facility 2
1.1.3 Exploration Drill Hole Reclamation 2
1.2 Closure Objective 2
1.3 Permits and Leases 2
2 Scope of Work 4
2.1 Windy Camp Scope 4
2.2 Patch Lake Facility Scope 4
3 Closure Activities 5
3.1 Windy Camp 5
3.1.1 Salvage 5
3.1.2 Demolition 5
3.1.3 Decommissioning of Diversion Berm 5
3.1.4 Collection and Disposal of Non-Hazardous Waste 5
3.1.5 Collection and Disposal of Hazardous Waste 6
3.1.6 Decommissioning and Reclamation of Fuel Storage Area 6
3.1.7 3Remediation of Permafrost Degradation Areas 6
3.1.8 Remediation of Hydrocarbon Contaminated Soils 7
3.1.9 Drainage Control and Revegetation 8
3.2 Patch Lake Facility 8
3.2.1 Collection and Disposal of Material and Debris 8
3.2.2 Demolition of Secondary Containment Facility 8
3.2.3 Grade Tank Farm Spoil Piles 9
3.2.4 Remediation of Permafrost Degradation Areas 9
3.2.5 Remediation of Hydrocarbon Contaminated Soils 9
3.2.6 Drainage Control and Revegetation 10
3.3 Exploration Drill Hole Reclamation 10
4 Post–Closure Monitoring 11
5 Cost Estimate & Closure Schedule 11
5.1 Cost Estimate 11
5.2 Scheduling 11
6 References 12

List of Figures

Figure 1: Location Map
Figure 2: Windy Camp Site Layout
Figure 3: Windy Camp with Exploration Trenches
Figure 4: Patch Lake Facility Site Layout

List of Tables

Table 1 Table of Concordance for Final Closure of the Windy Camp and Patch Lake Facility

Appendices

Appendix A: EBA Phase 3 Environmental Site Assessments
A1: Phase 3 Environmental Site Assessment for the Windy Lake Camp
A2: Phase 3 Environmental Site Assessment for the Patch Lake Facility Camp
Appendix B: Windy Camp and Patch Lake Facility Closure Cost Estimate
Appendix C: Detailed Comparison of SRK Model and RECLAIM

1 Introduction

The Windy Camp and Patch Lake Facility were part of the Hope Bay Regional Exploration Project, which is located on Inuit Owned Land administered by the Kitikmeot Inuit Association (KIA), in the west Kitikmeot Region of Nunavut, approximately 160 km southwest of Cambridge Bay (Figure 1). Both the Windy Camp and Patch Lake Facility are authorized under Nunavut Water Board (NWB) Type B Water Licence 2BE-HOP1222. In January 2013 the Hope Bay Regional Exploration Project was acquired by TMAC Resources Inc. from Hope Bay Mining Limited (HBML) a wholly owned subsidiary of Newmont Mining Corporation (NMC).

This document presents the closure obligations and the plan for closing both facilities, and demonstrates how the closure obligations are met.

1.1 Background

1.1.1 Windy Camp

The Windy Camp site was used as an exploration camp. The site is located on the eastern shore of Windy Lake, approximately 10 km south of Doris Camp (Figure 1).

Windy Camp ceased operation in October 2008 and has been in care and maintenance since that time. Completed progressive closure and reclamation activities include

- Fuel storage tanks have been relocated to Doris Camp;
- Useable equipment and sleeping cabins have been relocated to Doris Camp;
- The Land Farm was decommissioned in 2008;
- Core stored within 30 m from the Windy Lake shore are being relocated to an alternate storage area;
- A diversion berm was constructed upstream of the former fuel tank farm secondary containment area;
- Investigations have been undertaken to delineate the extent of hydrocarbon contamination on site (WESA 2009a, WESA 2009b; EBA 2010); and
- A Phase 3 Environmental Site Assessment for the Windy Lake Camp (EBA 2012a) is appended to this report (Appendix A1).

Remaining closure work for the Windy Camp is described in Section 3.1.

1.1.2 Patch Lake Facility

The Patch Lake Facility was used as a maintenance yard and workshop for exploration drilling by Major Drilling, a contractor first for BHP Billiton (BHP) in 1998/1999, then Miramar Hope Bay Mining (MHBM) from 2000 to 2007, and briefly for HBML in 2008. This facility had two different fuel tank farms which supported regional exploration in the central and northern areas of the Hope Bay belt. The site is located on a bedrock ridge mostly covered in fine marine sediments, 10 m to 14 m above the high water mark, and 60 m west from the shoreline of Patch Lake (Figure 1).

Completed progressive closure and reclamation activities include the following

- The maintenance yard and workshop at Patch Lake were decommissioned in October 2008;
- Buildings and equipment were demobilized from site during the 2009 sealift;
- The fuel tanks were moved to the Doris North site in June 2010;
- The nature and extent of hydrocarbon impacts have been characterized in several reports (WESA 2009a, WESA 2009b; EBA 2010); and
- The Phase 3 Environmental Site Assessment for the Patch Lake Facility (EBA 2012b) is appended to this report (Appendix A2).

Remaining closure work for the Patch Lake Facility is described in Section 3.2.

1.1.3 Exploration Drill Hole Reclamation

One thousand five hundred thirty five exploration drill holes were completed under NWB Water Licence 2BE-HOP0712. These drill holes will be reclaimed as described in Section 3.3.

1.2 Closure Objective

This Final Closure Plan describes how the Windy Camp and Patch Lake Facility will be permanently closed and reclaimed. The overall closure objective is to establish chemically and physically stable site conditions to protect human health and the environment. Post-closure care and maintenance, including environmental monitoring will be undertaken to ensure that these conditions are met.

1.3 Permits and Leases

Activities at the Windy Camp and Patch Lake Facility are completed in accordance with NWB Licence No. 2BE-HOP1222, and a Land Use Licence with the KIA. Final closure of the site will be completed to satisfy the objectives specified in the Water Licence. Land use requirements in the Land Use Licence have been reviewed and taken into account in preparing this plan. Table 1 provides a Table of Concordance indicating how the conditions specified in the licence are satisfied by this closure plan.

Table 1 Table of Concordance for Final Closure of the Windy Camp and Patch Lake Facility

Licence Ref	Licence Condition (2BE-HOP1222)	Closure Plan Ref	Closure Plan Response/Specification
Part I.1	Submit revised Abandonment and Reclamation Plan consistent with specified closure guidelines	N/A	Requirement satisfied by submission of this updated Final Closure Plan.
Part I.2	Revise plan if not approved by the NWB	N/A	Pending receipt of review comments from NWB once the Closure Plan has been submitted.
Part I.3	Revise plan based on operational/technology changes	N/A	Requirement satisfied by submission of this updated Final Closure Plan.
Part I.4	Complete restoration work prior to Licence expiration (June 30, 2022)	5.2	The works as specified in this plan will not be completed by this date. TMAC has applied for a licence extension.
Part I.5	Complete progressive reclamation of components no longer in use	1.1.1, 1.1.2	Progressive reclamation has been undertaken at the Windy Camp and Patch Lake Facility.
Part I.6	Backfill and restore sumps to pre-existing natural contours	3.1.3, 3.1.6 - 3.1.9, 3.2.2 - 3.2.6	Areas of site disturbance will be filled and recontoured to be consistent with natural contours, provide geotechnical stability, and minimize erosion and sedimentation.
Part I.7	Remove site infrastructure and materials	3.1.2, 3.2.1, 3.2.3	All structures and materials will be removed.
Part I.8	Ensure all rinse water from drum cleaning meets effluent requirements	3.1.6	Rinse water from the washing process will be routed through an oil/water separator. Water that does not meet effluent discharge requirements will be retreated until the quality objective is met. This work was completed in 2010 at the Patch Lake Facility.
Part I.9	Regrade all roads and airstrip to match natural contours and reduce erosion	3.1.9, 3.2.6	Areas will be regarded to blend with existing contours and reduce erosion.
Part I.10	Remove culverts and re-establish drainage path of natural channel	N/A	There are no culverts at Windy Camp or the Patch Lake Facility.
Part I.11	All disturbed areas will be ripped, graded, or scarified to conform to natural topography and promote growth of vegetation	3.1.9, 3.2.6	Areas where the tundra has been disturbed and permafrost degradation is evident will be graded to ensure positive drainage, as far as practicable to be consistent with natural topography, and if possible encourage revegetation.
Part I.12	Remediation of hydrocarbon contaminated soils	3.1.8, 3.2.5	Depending on the nature and extent of hydrocarbon contamination, impacted soils will be remediated to achieve the specified remediation criteria by either in situ bioremediation or excavation and off-site disposal. The option to encapsulate impacted soils in place is also preserved should it be demonstrated that hydrocarbon risk is minimal and/or other remediation methods are ineffective or inappropriate for given area.
Part I.13	Restore drill holes once drilling has been completed	3.3	Drill casing will be cut near the ground surface and capped. Final surfaces contoured to prevent ponding and revegetation promoted as appropriate.
Part I.14	Store drill cores at least thirty (30) metres above ordinary high water mark of the adjacent lake	1.1.1	The drill cores have been stacked on pallets in permanent storage locations which are located more than 30 m from the Windy Lake shoreline.
Part I.15	Contour and stabilize all disturbed areas once closure work has been completed	3.1.9, 3.2.6	Areas where the tundra has been disturbed will be regraded to ensure positive drainage and to be consistent with natural topography.

2 Scope of Work

2.1 Windy Camp Scope

Figures 2 and 3 show the layout of the Windy Camp and surrounding disturbed areas. Specific closure and reclamation tasks for Windy Camp are

- Salvage useable equipment and supplies,
- Demolition of site structures,
- Decommission of diversion berm,
- Decommission and reclamation of the fuel storage area,
- Collection and disposal of hazardous wastes,
- Collection and disposal of non-hazardous wastes,
- Remediation of permafrost degradation areas,
- Remediation of hydrocarbon contaminated soils, and
- Drainage control and revegetation, where appropriate.

Post-closure environmental monitoring will be implemented to confirm compliance with the closure objectives.

2.2 Patch Lake Facility Scope

A photograph of the Patch Lake site is shown in Figure 4. Final closure and reclamation of the Patch site includes

- Collection and removal of debris,
- Demolition of the secondary containment facility,
- Regrade Tank Farm spoil piles,
- Remediation of hydrocarbon contaminated soils,
- Remediation of permafrost degradation areas, and
- Drainage control and revegetation, where appropriate.

Post-closure environmental monitoring will be implemented to confirm compliance with the closure objectives.

3 Closure Activities

3.1 Windy Camp

3.1.1 Salvage

Reusable equipment and supplies will be salvaged from Windy Camp site prior to demolition and relocated to Doris Camp.

3.1.2 Demolition

Structures will be demolished and non-hazardous demolition waste will be segregated in two piles:

- Wood waste will be chipped and/or burned if suitable for burning (pending receipt of necessary approvals).
- Other non-hazardous waste will be packaged for shipment to an off-site landfill.

3.1.3 Decommissioning of Diversion Berm

The run of quarry berm (Figure 2) will be breached for final drainage control once all hydrocarbon contaminated soils have been addressed. Excess material from the berm may be used to stabilize areas of permafrost degradation.

3.1.4 Collection and Disposal of Non-Hazardous Waste

All waste on site will be gathered for proper disposal or reuse where appropriate.

Wood debris will be separated into burnable and non-burnable based on the appropriate guidelines for burning and incineration and/or landfilling (GN 2012, GNWT 2004, particularly Schedules III and IV). Wood waste will either be chipped or burned. Wood waste suitable for burning will be transported to an approved burn pan location. Prior to on-site burning appropriate approvals and permissions will be attained from the NWB. Chipped wood waste may be used for reclamation.

Any wood that cannot be burned or used for reclamation will be disposed of as detailed in Section 3.1.5. The criteria outlined in the Guideline for the General Management of Hazardous Waste in Nunavut (GN 2010) will be followed for such determination.

All remaining non-hazardous waste will be loaded in seacans and transported to the Doris North Waste Management Yard for shipment off-site. Materials shipped off-site will be disposed of in a licensed facility in accordance with appropriate Federal, Provincial, Territorial, or Municipal non-hazardous waste regulations.

Empty fuel tanks and drums will be processed as non-hazardous waste at the Doris North Waste Management Yard. All tanks will be drained into approved drums. The fuel will be relocated to a designated fuel storage area at the Doris Camp site together with any partially filled or full fuel drums. The residual contents will be collected in empty drums and disposed of as hazardous waste (see Section 3.1.5).

Rinse water from the washing process will be routed through an oil/water separator and not discharged to the environment until treated water meets water quality standards specified in the Water Licence. All waste will be managed following the Doris North Waste Management and Hazardous Waste Management plans.

3.1.5 Collection and Disposal of Hazardous Waste

Hazardous wastes and chemicals remaining on site will be collected and stored in appropriately sealed containers and/or empty drums. This includes any remaining fuel, hydraulic oil, antifreeze, batteries, and other lubricating fluids and/or chemicals. Items will be transported to the Doris Waste Management Facility at Roberts Bay. Unusable items will be packaged and manifested at the Waste Management Facility for transport to a licensed facility in accordance with appropriate Federal, Provincial, Territorial, or Municipal hazardous waste regulations.

3.1.6 Decommissioning and Reclamation of Fuel Storage Area

The primary fuel storage area was decommissioned in October 2008, and the tanks relocated to Doris Camp. The diversion berm was constructed to prevent run-on to the existing lined secondary containment facility. This area will be used as the temporary staging area for all remaining site fuel tanks, during decommissioning.

The sand layer on top of the liner will be removed, sampled, and compared to remediation objectives (EBA 2012a). If the material exceeds criteria, it will be shipped off-site for disposal at an appropriate licensed facility. Otherwise the material will be backfill in reclamation. Liner will be cut and transported to the Doris North Waste Management Yard for processing. Confirmatory sampling will be conducted on underlying materials and containment berm for petroleum hydrocarbons, metals and salinity. If remediation objectives are exceeded, the soil will be remediated as described in Section 3.1.8 of this document.

If the containment berms meet hydrocarbon clean up levels they will be levelled and contoured to match the surrounding landscape. This entire area will require further stabilization as described in Section 3.1.7.

3.1.7 Remediation of Permafrost Degradation Areas

Six areas of permafrost degradation that require remediation are as follows:

- Three exploration trenches east of the camp,
- Wheel tracks from the winter roads joining the three exploration trenches east of Windy Camp,
- Core storage areas,
- Sewage treatment outfall location,
- Fuel Storage Area, and
- Land Treatment Area.

With the exception of the fuel storage area, these areas will be remediated as follows:

- Areas of complete vegetation dieback, deep rutting and/or ponding will be covered/filled with overburden, rock fill, wood chips, drill cuttings or a mixture of these. The surface will be regraded to ensure positive drainage and revegetation will be encouraged (Section 3.1.9).
- Areas without ponding will be revegetated (Section 3.1.9).

Hydrocarbons will be remediated in the Fuel Storage Area as described in Section 3.1.8.
The area will then be covered with a layer of geochemically suitable run of quarry rock to mitigate solifluction.

3.1.8 Remediation of Hydrocarbon Contaminated Soils

Five areas of hydrocarbon impacted soils (as compared to the Government of Nunavut criteria for industrial land use and coarse-grained soils) were identified at Windy Camp (EBA 2012a; Appendix A1). These areas are

- Fuel Storage Area,
- Former Land Treatment Area,
- Downgradient of Helipad Area,
- Workshop and Generator Building Area, and
- Camp Tent Frames Area.

Selection of the type of remediation used to address each of these areas is dependent on the following site specific factors:

- Size of the impacted area and volume of impacted soils,
- Type of hydrocarbons present, and
- Ground conditions of the impacted area (i.e. solifluction and/or potential for permafrost degradation).

Impacted soils from the Fuel Storage Area and the former Land Treatment Area will be sampled, compared to remediation objectives (EBA 2012a, Appendix A1) and if impacted, excavated. Excavated soils will be shipped off-site for disposal at an appropriate licenced facility.
The excavation will be backfilled with rock, overburden, drill cuttings, wood chips and/or a mixture of these to prevent surface water ponding and ensure permafrost preservation. Other areas identified by in the Phase 3 ESA will be remediated in-situ using bioremediation. See section 3.2.5 for details regarding bioremediation method.

The option to encapsulate impacted soils in place is also preserved should it be demonstrated that hydrocarbon risk is minimal and/or other remediation methods are ineffective or inappropriate for a given area. Written approval by the NWB will be sought prior to implementation of encapsulation method.

3.1.9 Drainage Control and Revegetation

Once all surface infrastructure has been removed and the area has been cleared of all debris, the site will be regraded to prevent ponding and reduce erosion potential. Regrading will not impact undisturbed areas. Depressions or excavations which cannot be addressed by regrading will be backfilled with rock, overburden, wood chips, drill cuttings and/or a mixture of these. Erosion control measures will be implemented as necessary to prevent sediments from affecting water quality.

Reclaimed areas where there is sufficient soil substrate to support vegetation will be managed to promote revegetation. Areas backfilled with rock or covered by rock fill pads will not be revegetated.

3.2 Patch Lake Facility

3.2.1 Collection and Disposal of Material and Debris

All materials remaining on site will be collected and transported to the Doris North Waste Management Yard. Debris will be collected and segregated into material that can be reused or salvaged, non-hazardous waste and hazardous waste.

Re-useable items will be transported to the Doris Camp. Unusable items will be transported to the Roberts Bay jetty and loaded into specially marked seacans until the shipment off-site.

Wood waste will be chipped and/or burned. Wood waste suitable for burning will be loaded into containers and moved to a suitable burn location. Appropriate approvals will be attained prior to on-site burning. Waste that cannot be burned will be shipped off-site for disposal in a licensed facility at Hay River, NT (or another designated location) in accordance with appropriate Federal, Provincial, Territorial or Municipal non-hazardous waste regulations.

Hazardous wastes remaining on site will be collected and stored in appropriately sealed containers and/or drums. The containers will be transported to Roberts Bay for shipment off-site and disposal at Hay River, NT (or another designated location), in accordance with appropriate Federal, Territorial, Provincial or Municipal hazardous waste regulations.

3.2.2 Demolition of Secondary Containment Facility

The fuel tanks in the tank farm were decommissioned and moved to Doris Camp in 2010. The remaining containment berms will be decommissioned. The protective sand layer on top of the secondary containment facility will be used to backfill depressions around the site. This sand is below the hydrocarbon remediation standards for industrial coarse soils (EBA 2012b). Once exposed, the liner will be cleaned, cut into manageable pieces, and loaded into containers for off-site disposal. The metal containment berm will be dismantled and stored for reuse.

The tank farm is constructed on a bedrock foundation and therefore revegetation is not required. The tank farm base is free draining. Low spots will be filled and graded to prevent ponding.

3.2.3 Grade Tank Farm Spoil Piles

The Patch Lake site includes two unconsolidated rock spoil piles (Figure 4). These piles consist of geochemically inert run of quarry rock mixed with frozen overburden excavated during foundation preparation for the tank farm. Both spoil piles will be graded to ensure geotechnical stability and for positive drainage. The toes of the piles will be graded to prevent ponding.

3.2.4 Remediation of Permafrost Degradation Areas

There are four areas of permafrost degradation (Figure 4). The areas are

- The former fuel storage area at the south edge of the site,
- The winter road track leading south-east from the site towards Patch Lake,
- The winter road track leading west from the site towards Windy Camp, and
- The winter road track leading north-west from the site then curving east towards Patch Lake.

The former fuel storage area has been partially backfilled and is not free-draining. This area will be completely backfilled and graded to drain. The area will be filled by dozing material from the southern tank farm spoil pile over the area, or with rock, overburden, drill cuttings, wood chips and/or a mixture of these. This fill should be at least 1 m thick to prevent permafrost degradation.

The winter road track scars will be remediated. Areas with dead vegetation, deep ruts and/or ponded water will be backfilled with overburden, rock, drill cuttings, wood chips and/or a mixture of these. The surface will be regraded to ensure positive drainage, and scarified to encourage revegetation. Areas with minor vegetation damage will be revegetated, where appropriate.

3.2.5 Remediation of Hydrocarbon Contaminated Soils

Detailed site characterization studies were carried out to determine the extent of hydrocarbon contaminated soils on the project site (WESA 2009a, WESA 2009b; EBA 2010, 2012b). Five localized areas on site (Figure 4) have hydrocarbon concentrations exceeding the standards for industrial use:

- The former drill shop generator, located to the north of the former drill shop (Area P1A),
- A localized spill area south-west of the former drill shop (Area P1B),
- The former drill shop footprint and adjacent areas (Area P1C),
- The incinerator area (Area P3), and
- The former power generator site (Area P5).

This contamination is confined to the active layer.

Two methods of remediation were selected for the hydrocarbon contaminated soils at Hope Bay: in situ bioremediation and excavation and off-site disposal. In situ bioremediation will be used for small localized contaminated areas (P1B and P5). The reclamation method consists of aerobic treatment whereby a proprietary oxygen releasing compound (EHC-O manufactured by Adventus Americas) will be applied to the affected area at an application rate of about 2.5 g EHC-O per kilogram of soil. This compound will be tilled into the active zone of the soil (done in the summer season). At least one season after the compound has been added the impacted soil will be tested to determine if microbial activity has resulted in a reduced hydrocarbon contamination. If the soils still exceed compliance criteria, the treatment may be repeated or the soils will be excavated and removed as described below.

If the excavation and removal option is implemented (areas P1A, P1C, and P3), the active layer (typically 1 m) will be excavated. The excavated soils will be shipped off-site for disposal at a licensed facility at Hay River, NT, (or another designated location) in accordance with appropriate Federal, Provincial, Territorial or Municipal regulations. The excavations will be backfilled with soil or rock to conform to the natural contours and prevent ponding.

The option to encapsulate impacted soils in place is also preserved should it be demonstrated that hydrocarbon risk is minimal and/or other remediation methods are ineffective or inappropriate for a given area. Written approval by the NWB will be sought prior to implementation of encapsulation method.

3.2.6 Drainage Control and Revegetation

Once all debris has been collected and removed, the area will be graded to prevent ponding and blend with existing contours where possible. Grading will not disturb new areas and permafrost will not be excavated. If needed, depressions will be filled with overburden, rock, drill cuttings, wood chips and/or a mixture of these. Erosion control measures will be implemented as necessary to prevent sediments from affecting water quality.

Areas with sufficient soil will be re-vegetated. Areas backfilled with rock or rock pads will not be revegetated. Saline soils will be re-vegetated with salt tolerant vegetation, where possible.

3.3 Exploration Drill Hole Reclamation

A total of 1,535 drill holes were completed under 2BE-HOP0712. A relatively large number of exploration drill holes are located in the vicinity of Windy Camp and the Patch Lake Facility. These are from the exploration of the Naartok and Wolverine deposits. A total number of 412 holes were drilled in the Naartok area and 92 holes were drilled in the Wolverine area. The remaining holes are distributed over the belt.

The extent of reclamation work required will be assessed for each location. Drill casing extending above ground will be cut near ground level and capped to seal the hole. The depressions around the drill holes, if present, will be backfilled with overburden, rock, drill cuttings, wood chips and/or a mixture of these. The area will be graded and/or backfilled to eliminate ponding and control erosion, if needed. Revegetation will be promoted where appropriate.

4 Post–Closure Monitoring

Post-closure monitoring includes the following:

- Water quality in the active layer downgradient of in situ hydrocarbon bioremediation sites, including the former landfarm, will be monitored at existing monitoring locations every two years until site soil remediation objectives have been met. Monitoring will include sampling and analysis of representative samples in accordance with industry best practices.
- Hydrocarbon bioremediation sites will be monitored every two years until site soil remediation objectives have been met.
- The site, including all areas of disturbed tundra and/or permafrost degradation, will be visually inspected by a qualified Professional Geotechnical Engineer annually for three consecutive years to ensure that permafrost degradation areas have stabilized and that site drainage objectives have been met. No thermal monitoring instrumentation will be installed.
- An arctic vegetation specialist will evaluate revegetation efforts. Inspections will be completed at the following intervals, unless otherwise recommended by a vegetation expert: Year 1, Year 3, Year 7, and Year 10 post-closure.

5 Cost Estimate & Closure Schedule

5.1 Cost Estimate

Appendix B provides details of the estimated closure costs. The estimated undiscounted closure cost for both sites is $5.6 M expressed as 2012 CDN dollars. These costs were developed based on equipment and labor rates provided by a contractor, using an NWB approved spreadsheet based cost estimating process that is consistent with the principles of RECLAIM. A detailed comparison between the SRK model and RECLAIM is provided in Appendix C.

5.2 Scheduling

Closure of the Windy Camp and Patch Lake Facility will occur during the care and maintenance period or upon closure of the entire Hope Bay Project. Removal of waste from site, and equipment demobilization will be completed as closure proceeds. In situ hydrocarbon bioremediation and revegetation may take several years.

This report, ***"Hope Bay Project, Windy Camp and Patch Lake Facility Updated Closure Plan,"*** was prepared by SRK Consulting (Canada) Inc.

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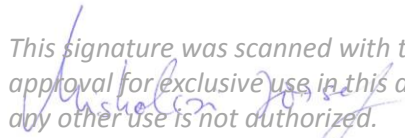

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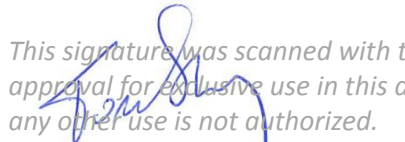

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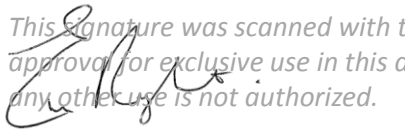

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All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

Disclaimer

"This report and the opinions and conclusions contained herein ("Report") contains the expression of the professional opinion of SRK Consulting (Canada) Inc. ("SRK") as to the matters set out herein, subject to the terms and conditions of the agreement dated [HBML.BOC-CM.PSA.003, September 30, 2008] (the "Agreement") between Consultant and Hope Bay Mining Ltd., as assigned to TMAC Resources Inc. ("TMAC"), the methodology, procedures and sampling techniques used, SRK's assumptions, and the circumstances and constraints under which Services under the Agreement were performed by SRK. This Report is written solely for the purpose stated in the Agreement, and for the sole and exclusive benefit of TMAC, whose remedies are limited to those set out in the Agreement. This Report is meant to be read as a whole, and sections or parts thereof should thus not be read or relied upon out of context. In addition, this report is based in part on information not within the control of SRK. Accordingly, use of such report shall be at the user's sole risk. Such use by users other than TMAC and its corporate affiliates shall constitute a release and agreement to defend and indemnify SRK from and against any liability (including but not limited to liability for special, indirect or consequential damages) in connection with such use. Such release from and indemnification against liability shall apply in contract, tort (including negligence of SRK whether active, passive, joint or concurrent), strict liability, or other theory of legal liability; provided, however, such release, limitation and indemnity provisions shall be effective to, and only to, the maximum extent, scope or amount allowable by law."

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Figures

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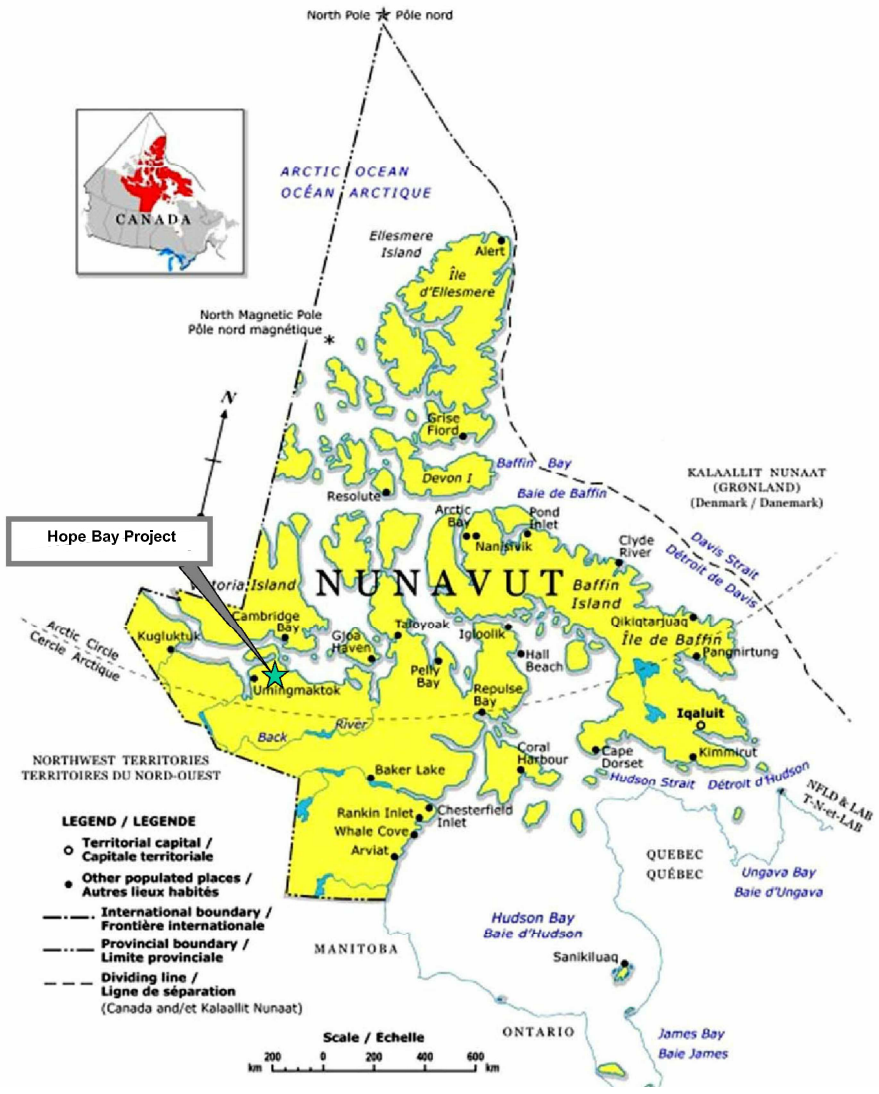
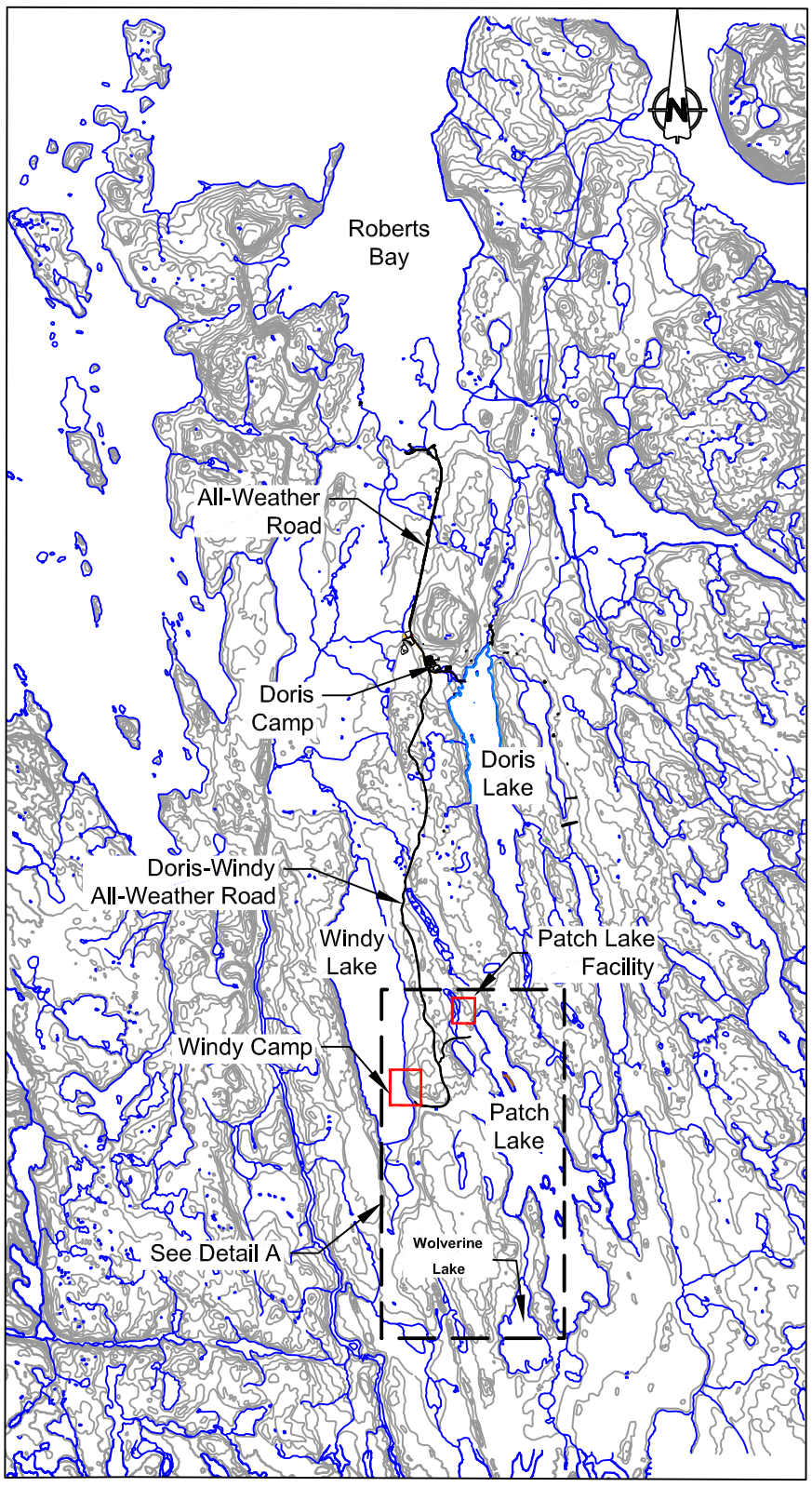
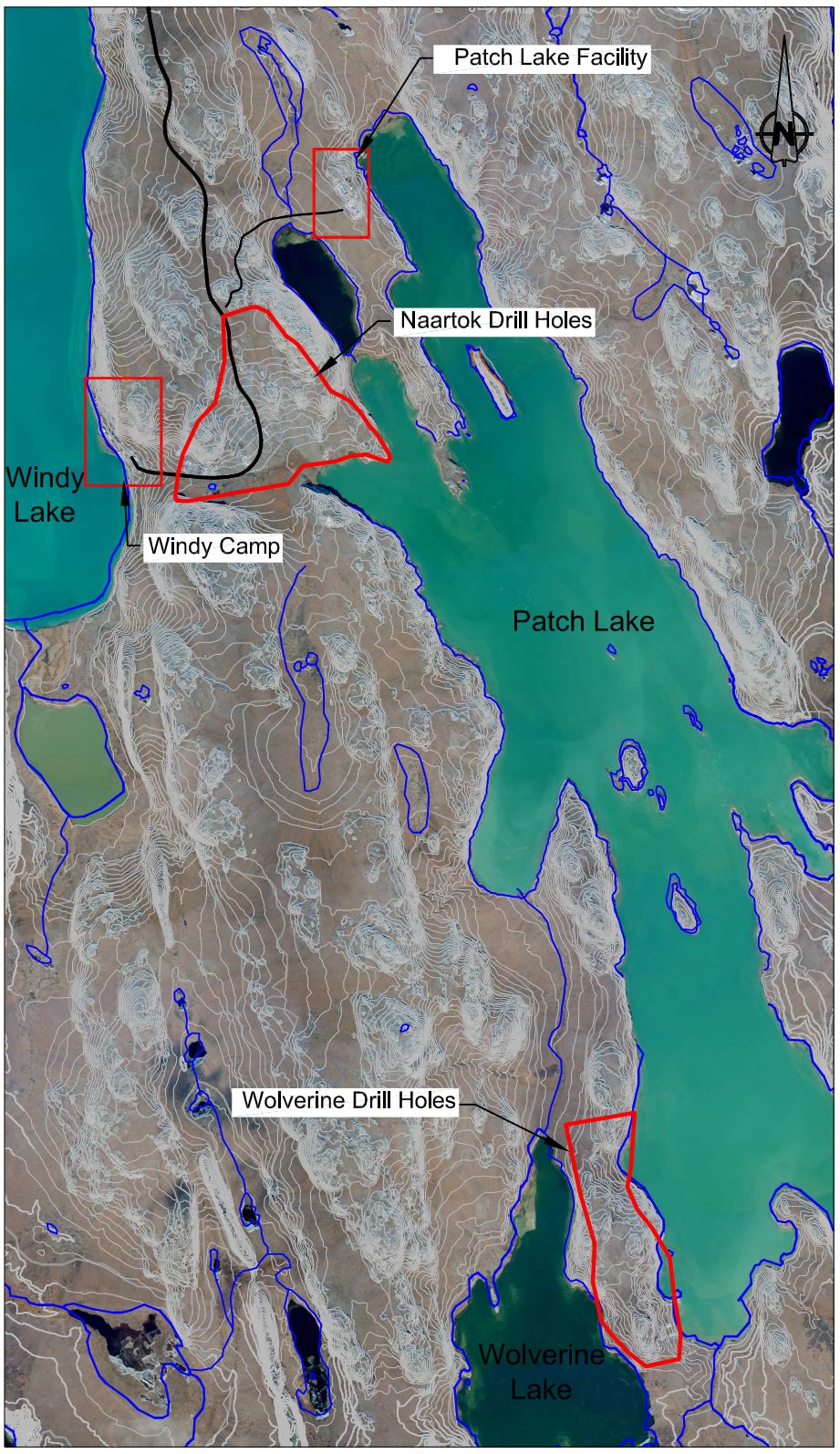


LOCATION MAP



GENERAL SITE LAYOUT

0 1.5 3 4.5 6
Scale in Kilometers



DETAIL A

Not To Scale

Topographic Information Supplied by BHP World Minerals Inc.
National Topographic Series (NTS) Maps
North American Datum (NAD) 1927

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SRK JOB NO.: 1CT022.001.Task 700

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TMAC RESOURCES

TMAC Resources Inc.

Windy Camp and Patch Lake Facility Final Closure Plan

Location Map

DATE:	APPROVED:	FIGURE:
Jan 2014	IM	1

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Photo Taken August 2013

Areas of Permafrost Degradation

Areas of Hydrocarbon Contamination

Areas of hydrocarbon contamination and permafrost degradation are approximate.

srk consulting

Job No: 1CT022.001.700

Filename: Windy_Camp_Flyby_labeled-20140129_Figure2_SA.ppt

TMAC RESOURCES

TMAC Resources Inc.

Windy Camp and Patch Lake Facility Final Closure Plan

Windy Camp Site Layout

Date: April 2012 | Approved IM | Figure: 2

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Core was moved to Central Core Storage in 2012

Sewage Outfall Area

Core was moved to Central Core Storage in 2012

Doris-Windy All Weather Road

Patch Lake

Core was moved to Central Core Storage in 2012

Exploration Trench

Exploration Trench

Exploration Trench

Windy Lake

Core was moved to Central Core Storage in 2012

All-Weather Road

Winter Road Track

Patch Lake

Airphoto: April 2008

LEGEND

Areas of Permafrost Degradation

0 40 80 120 160 200

Scale in Metres

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SRK JOB NO.: 1CT022.001.Task 700

FILE NAME: Figure3_1CT022.001-700_SA_20140129.dwg

TMAC RESOURCES

TMAC Resources Inc.

Windy Camp and Patch Lake Facility Final Closure Plan

Windy Camp with Exploration Trenches

DATE:	APPROVED:	FIGURE:
Jan 2014	IM	3

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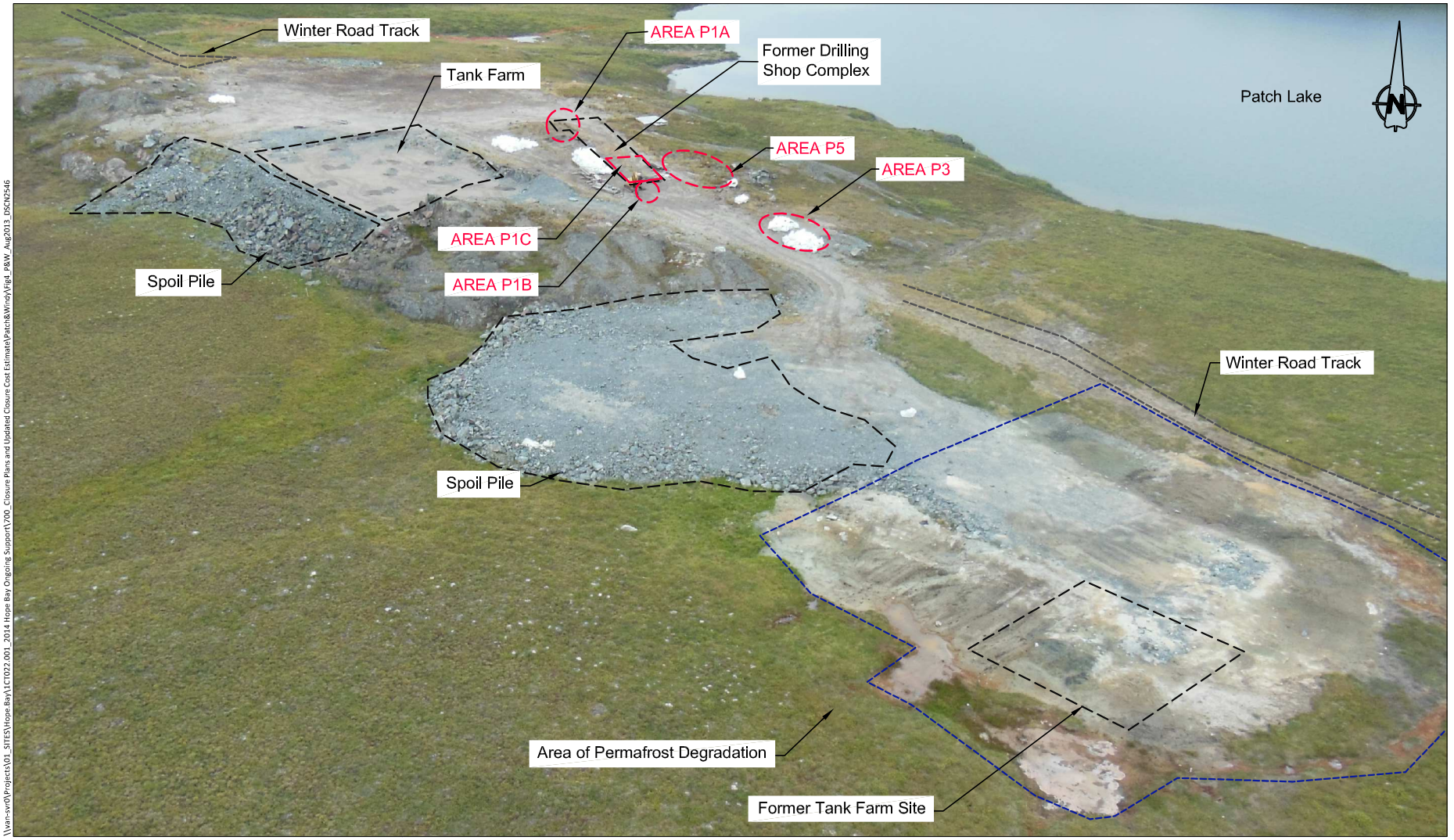

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NOTE: Photo Taken August 2013

LEGEND

- Areas of Permafrost Degradation
- Areas of Hydrocarbon Contamination

srk consulting

SRK JOB NO.: 1CT022.001.Task 700

FILE NAME: Figure4_1CT022.001-700_SA_20140129.dwg

TMAC RESOURCES

TMAC Resources Inc.

Windy Camp and Patch Lake Facility Final Closure Plan

Patch Lake Facility Site Layout

DATE:	APPROVED:	FIGURE:
Jan 2014	IM	4

Appendix A: EBA Phase 3 Environmental Site Assessments

Appendix A1: Phase 3 Environmental Site Assessment for the Windy Lake Camp

HOPE BAY MINING LIMITED

PHASE 3 ENVIRONMENTAL SITE ASSESSMENT AND SOIL BIOTREATABILITY STUDY
OLD WINDY CAMP, HOPE BAY PROJECT, NU

REPORT

JUNE 2012
ISSUED FOR USE
EBA FILE: Y22101187.001

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eba
A TETRA TECH COMPANY

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EXECUTIVE SUMMARY

EBA Engineering Consultants Ltd. operating as EBA, A Tetra Tech Company, (EBA) conducted a Phase 3 Environmental Site Assessment (ESA) and soil biotreatability study at the former Windy Camp (Old Windy Camp) located within the Hope Bay project area. The site is approximately 68 km southeast of Umingmaktok and 160 km southwest of Cambridge Bay, Nunavut. The Phase 3 ESA report is a part of the submissions related to the Final Abandonment and Restoration Plan for the site, as per Licence No. 2BE-HOP0712 Type "B" issued to Hope Bay Mining Ltd. (HBML) by the Nunavut Water Board (NWB).

A Phase 2 ESA at the Old Windy Camp was conducted in 2009 by others. The report indicated that the chemicals of potential concern included the petroleum hydrocarbon (PHC) fraction F2 (diesel fuel). The Phase 2 ESA estimated soils volume requiring remediation was 2,000 m^3. Most of the hydrocarbon impacts were associated with the former generators, the former tankfarm, and the former landfarm.

The objectives of the Phase 3 ESA for the Old Windy Camp were to:

- Delineate the identified constituents of concern (petroleum hydrocarbons) in soil and groundwater.
- Refine the estimated volumes of hydrocarbon-impacted soil.
- Investigate pathways of movement or migration of contaminants through soil and groundwater to refine the site conceptual model as well as the fate and transport and risk assessment models.

The objectives of the bench-scale biotreament testing of petroleum hydrocarbon affected soils for the old Windy Camp were to:

- Evaluate enhanced aerobic and anaerobic biodegradation processes for the F2 hydrocarbon fraction and evaluate the feasibility of conducting field trials.

Based on the known history of the site, previous Phase 2 ESA, and a walk-through of the site upon arrival, the Old Windy Camp was divided into eight areas of potential environmental concern (APEC). The areas are as follows:

Areas of Potential Environmental Concern (APEC) at Old Windy Camp

Area	Description
W1	Seacans and areas downgradient of 2004 hydrocarbon spill
W2	Former landfarm
W3	Former AST near generators
W4	Former generators
W5	Tents
W6	Soils within tankfarm (no fuel tanks present, only soils)
W7	Soils inside shop tent
W8	Former incinerator near beach

Test pitting, soil sampling, and surface water sampling were completed on August 6, 9 and 10, 2011. Testpits were dug by hand, and soils were logged and bagged for field soils screening (hydrocarbon vapours) at approximate intervals of 10 to 30 cm.

A total of 86 logged test pits were advanced by test pitting. Numerous other shallower pits in various locations (and especially in the vicinity of the tents) were dug to check for visual indications of petroleum hydrocarbon impacts. Test pit depths were to the free water surface or to rock refusal. The maximum test pit depth was 1.3 m below surface, which was in the sandy fill deposited for the former generators. No permafrost was encountered in the testpits.

A summary of the Phase 3 ESA results with areas and estimated in-situ volumes of soils with concentrations of petroleum hydrocarbon concentrations higher than the environmental guidelines for Contaminated Site Remediation, Nunavut, for industrial land use industrial guidelines is provided below:

Old Windy Camp Petroleum Hydrocarbon Soils Exceeding Nunavut Environmental Guidelines, Industrial land use, coarse-grained soils

APEC	Hydrocarbon Fraction	Maximum Concentration(s) mg/kg	Area (m^2)	Estimated Depth (m)	Estimated In-Situ Volume (m^3)
W1	F2	380	85	0.5	43
W2	F2	1,600	124	2	248
W3	F2	1,700	23	1	23
W4	F1, F2	F1= 820 F2 = 13,000	44	2.5	132
W5B	F2	2,900	1	0.5	1
W5D	F2	2,100	2	2	4
W5E	Xylenes, F1, F2, F3	Xylenes= 24; F1 = 960; F2 = 10,000; F3 = 1,800	9	2	18
W5G	F2	3,500	4	2	7
W5H	BTEX, F1, F2	Benzene = 0.14; Toluene = 4.6; Ethylbenz. = 4.4; Xylenes = 68; F1 = 1,700; F2 =10,000	20	2	39
W8	F2	490	61	1	61

Old Windy Camp Petroleum Hydrocarbon Soils Exceeding Nunavut Environmental Guidelines, Industrial land use, coarse-grained soils

APEC	Hydrocarbon Fraction	Maximum Concentration(s) mg/kg	Area (m^2)	Estimated Depth (m)	Estimated In-Situ Volume (m^3)
Total			364		575*

* Does not include presumed residual soil impacts below the liner of the tank farm

Tier 1 Environmental Guidelines for Contaminated Site Remediation of Surface Soils for Nunavut (industrial land use and coarse-grained soils)

Parameter	mg/kg
F1	240**
F2	260
F3	1,700
F4	3,300

** Includes protection of potable water

All three (3) groundwater wells installed in 2009 by WESA were dry at the time of the 2011 August site investigation. Four surface water samples in hydrocarbon-impacted areas were collected instead.

The hydrocarbon biotreatability study was conducted on a composite sample of soils taken from Old Windy Camp. The study occurred between October 5, 2011 and February 29, 2012 (147 days, or 5 months) at SiREM Laboratories, in Guelph, Ontario. The purpose of the study was to evaluate intrinsic and enhanced aerobic and anaerobic degradation of petroleum hydrocarbons. Treatments included periodic dosing of soil microcosms with electron acceptors including nitrate (NO_3^-) and sulfate (SO_4^{2-}) under anaerobic conditions, and amendment with a proprietary oxygen releasing compound (Adventus Americas, Illinois) under aerobic conditions. Soil microcosms were kept at 10°C for the duration of the study. Anaerobic treatments were conducted to evaluate whether in-situ treatment would be a viable remediation option for Old Windy Camp, whereas the aerobic treatment provided an indication of the success of ex-situ treatments such as landfarming or biopiles.

Initial concentrations of hydrocarbons in the composite sample from Old Windy Camp were F2 = 2,800 mg/kg and F3 = 410 mg/kg. No change in F2 and F3 concentrations occurred for the anerobic trials over the duration of the study. For the aerobic treatment, 75% removal of the F2 fraction was observed by the end of the study. The final F2 concentration was 700 mg/kg, compared to Nunavut industrial criteria of 260 mg/kg and the Nunavut wildland criteria of 150 mg/kg for coarse-grained soils. No change in F3 concentrations were observed in the study for both the aerobic and the anaerobic treatments.

Approximately 575 m^3 of soils with F2 hydrocarbon fraction concentrations ranging from 260 mg/kg to 13,000 mg/kg were identified. This is the estimated volume of soils that was greater than the Nunavut/CCME guidelines for industrial land use. Only a very small quantity of soils (<20 m^3) was affected by F3-range hydrocarbons, and the concentrations in these soils were only marginally higher than the Nunavut/CCME industrial petroleum hydrocarbon criteria.

Based on an evaluation of the remediation options above, landfarming provides the best balance between remedial effectiveness/use of a demonstrated technology, cost and remedial timeframes. This approach is the preferred remedial alternative for all the petroleum hydrocarbon affected areas, except for W8, the former incinerator area within a wetland area near Windy Lake. The excavated wetland area would be difficult to rehabilitate post-remediation, and use of excavation equipment in could also damage nearby wetland areas. Excavation of the area by hand would be difficult because of the dense rooting system, and hand-excavation would also destroy the vegetation. Monitored natural attenuation would be the preferred remedial approach for this area, assuming that there is no undue risk to wildlife.

The probable range of remedial cost for the excavation and landfarming of the remaining soils volume is estimated to range between $150,000 and $200,000, with a remedial timeframe of two to three summer seasons.

The following recommendations apply to Old Windy Camp:

- Based on an evaluation of remedial options and the outcome of the SiREM biotreatability study, landfarming is the preferred remedial alternative for all the petroleum hydrocarbon affected areas at the Old Windy Camp.
- The petroleum hydrocarbon impacted soils requiring treatment Old Windy Camp could be landfarmed either at a purpose-built facility sited at an appropriate location, or by transporting the soils to the at the Patch Laydown site and adapting the bermed and lined former tank farm area to accommodate the soils for landfarming. This second option would be more cost effective and would be less disruptive to the environment. It would require a winter road to be built to Patch Laydown from the all-weather Doris to Windy Camp road.
- One exception to landfarming is the petroleum hydrocarbon affected soils near the former incinerator in the wetland, where monitored natural attenuation would be the preferred remedial approach, assuming that there is no undue risk to wildlife.
- Considering that the proposed excavation volumes are small and occur in previously-disturbed areas of the site, and not within areas identified as being susceptible to solifluction, the potential for solifluction caused by remedial activities is low.
- Any fuel remaining in above ground storage tanks on the site should be collected in order to prevent any possible further hydrocarbon soil impacts, if applicable.
- Contact water sampled in the former fuel facility did not meet Water Licence discharge criteria at the time of the site investigation (August 2011).
- Decommissioning the former tank farm will avoid the future collection of contact water in the lined berm.
- The petroleum hydrocarbon concentrations in soils underlying the liner (site of 2004 fuel spill) need to be assessed when the berm facility is decommissioned.

TABLE OF CONTENTS

EXECUTIVE SUMMARY i

1.0 INTRODUCTION 1
1.1 General 1
1.2 Authorization 1
1.3 Scope of Work 1

2.0 BACKGROUND INFORMATION 2
2.1 Site Details 2
2.2 Location, Ownership and Current Land Use 3
2.3 Site History and General Description of Site 3
2.4 Climate 4
2.5 Site Topography and Vegetation 4
2.6 Regional Quaternary Geology 4
2.7 Regional Bedrock Geology 5
2.7.1 Regional and Local Surficial Soils 5
2.7.2 Hydrogeology 6

3.0 ENVIRONMENTAL CRITERIA 6
3.1 Regulatory Guidelines 6
3.2 Land Use Assessment 6
3.3 Particle Size Designation 7
3.4 Applicable Exposure Pathways 7
3.4.1 Human Pathways 7
3.4.2 Ecological Pathways 7
3.5 Applicable Guidelines 7

4.0 PHASE 3 SITE WORK AND RESULTS 11
4.1 Site Safety 11
4.2 Test Pitting and Soil Sampling Program 11
4.3 Surface Water Sampling 12
4.4 Soils and Surface Waters Results 13

5.0 BIOTREATABILITY RESULTS 19

6.0 REMEDIAL OPTIONS 21

7.0 RECOMMENDATIONS 25

8.0 CLOSURE 26

REFERENCES 27

TABLES

Table 1 Soil Analytical Results for Hydrocarbons and Regulated Metals at W1
Table 2 Soil Analytical Results for Hydrocarbons at W2
Table 3 Soil Analytical Results for Hydrocarbons and Regulated Metals at W3
Table 4 Soil Analytical Results for Hydrocarbons at W4
Table 5 Soil Analytical Results for Hydrocarbons at W5
Table 6 Soil Analytical Results for Hydrocarbons and Salinity at W6
Table 7 Soil Analytical Results for Hydrocarbons at W7
Table8 Soil Analytical Results for Hydrocarbons at W8
Table 9 Water analytical Results for Hydrocarbons, routine Parameters and Regulated Metals at Windy Lake

FIGURES

Figure 1 Hope Bay Project Location
Figure 2 Old Windy Camp Layout
Figure 3A W1 – Seacans and Downgradient of 2004 Spill
Figure 3B W2 – Former Landfarm
Figure 3C W3 – Former AST near Generators and Shop Tent
Figure 3D W4 – Former Generators
Figure 3Ei-3Eiii W5 – Tents
Figure 3F W6 – Soils with Tankfarm (no ASTs)
Figure 3G W7 – Soils inside Shop Tent
Figure 3H W8 – Former Incinerator near Beach
Figure 4 Surface Water Sampling Locations

APPENDICES

Appendix A Laboratory Analytical Results
Appendix B Sirem Biotreatability Proposal
Appendix C Sirem Biotreatability Study Graphs
Appendix D Sirem Biotreatability Study Final Report
Appendix E General Conditions

1.0 INTRODUCTION

1.1 General

EBA Engineering Consultants Ltd., operating as EBA, A Tetra Tech Company, (EBA) is pleased to provide this report to Hope Bay Mining Ltd. (HBML) on the Phase 3 Environmental Site Assessment (ESA) and soil biotreatability study conducted at the old Windy Camp located within the Hope Bay project area. The site is approximately 68 km southeast of Umingmaktok and 160 km southwest of Cambridge Bay, Nunavut (Figure 1). The Phase 3 ESA report is a part of the submissions related to the Final Abandonment and Restoration Plan for the site, as per Licence No. 2BE-HOP0712 Type "B" issued to HBML by the Nunavut Water Board (NWB).

The objectives of the Phase 3 ESA for the Old Windy Camp were to:

- Delineate the identified constituents of concern (petroleum hydrocarbons) in soil and groundwater.
- Refine the estimated volumes of hydrocarbon-impacted soil.
- Investigate pathways of movement or migration of contaminants through soil and groundwater to refine the site conceptual model as well as the fate and transport and risk assessment models.

The objectives of the bench-scale biotreament testing of petroleum hydrocarbon affected soils for the Old Windy Camp were to:

- Evaluate enhanced aerobic and anaerobic biodegradation processes for the F2 hydrocarbon fraction and evaluate the feasibility of conducting field trials.

1.2 Authorization

Mr. WRC Langley, Commercial Manager at HBML authorized EBA to proceed with the work on May 11, 2011. The Professional Services Agreement number is PSA-HB-10-KE-001 and the Work Order Number is CR-0053.

1.3 Scope of Work

EBA developed the work plan based on a Phase 2 ESA completed in 2009 by WESA Group Inc. The scope of work for the Phase 3 ESA, as outlined in proposal EBA File: PY22101172 letter dated August 15, 2011 and adjusted during the work, was as follows:

- Prepare a health and safety plan for the field program using EBA's in house Safe Work Form (SWF). A safety meeting including a field level risk assessment was conducted on site prior to the start of the field program. All workers on site agreed to the conditions of the SWF before work commenced. In addition, EBA staff completed HMBL's in-house site orientation and site-specific training.
- Conduct a Phase 3 ESA to delineate petroleum hydrocarbon impacts, with a sufficient data density to estimate weighted-average soil volume estimates for the F1 to F4 petroleum hydrocarbon soil fractions and to evaluate areas where the soils are affected by diesel, waste oil, other types of hydrocarbons, or combinations of spills.

- Obtain soil samples at regular intervals from all testpits. Examine soil samples for staining and obvious odour. Measure the photoionization potential on samples using a photoionization detector (PID). Log soil stratigraphy correspondingly for each test pit.
- Submit 60 soil samples to Maxxam Analytics Inc. of Edmonton for the analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX), and PHC fractions F1 through F4. Submit select samples for sieve analysis, salinity, and CCME regulated metals. Submit four surface water samples for the analysis of BTEX, PHC fraction F1, and dissolved metals.
- Collect soil samples for site-specific information relevant to a bioremediation option (landfarming and biopile), including soil pH, type/texture, grain size analysis, soil moisture content and field capacity, and soil organic/inorganic carbon.
- Collect a composite soil sample of hydrocarbon-affected soils to evaluate enhanced aerobic and anaerobic biodegradation processes for the F2 fraction by conducting a bench-scale biotreatment study at SiREM laboratories in Guelph, Ontario. Details of SiREM's study were included in the August 15, 2011 proposal and are included in Section 5 of this report. Aerobic treatments include simulated tilling with a proprietary oxygen releasing compound and nutrients. Anaerobic treatments included undisturbed applications of nitrate and sulphate.
- Prepare a Phase 3 ESA report discussing field observations and analytical results.

2.0 BACKGROUND INFORMATION

2.1 Site Details

Old Windy Camp was a remote exploration camp operated by Miramar Hope Bay Ltd. (Miramar) that was acquired by HBML (wholly owned by Newmont Mining Corporation) in December 2007. The site is on leased Inuit-owned land within the West Kitikmeot region of Nunavut located at approximately 68°4'24"N, 106°35'25"W.

The footprint of the former camp spans approximately 600 m along the shoreline of Windy Lake, and the width of the camp activities measured from a distance perpendicular to the shore ranges from approximately 20 m to 120 m. The site is currently uninhabited and is under care and maintenance with regular inspections conducted by Hope Bay Project personnel. As per the terms of the NWB Licence No. 2BE-HOP0712, HBML is currently preparing a Final Abandonment and Restoration Plan for the site, prepared in accordance with the Mine Site Reclamation Guidelines for the Northwest Territories, 2006 and the INAC Mine Site Reclamation Policy for Nunavut, 2002.

The primary chemicals of concern include petroleum hydrocarbons (PHC) which originated from historic spills and storage of fuel when Miramar owned the site. The largest spill occurred on June 16, 2004, when approximately 19,000 L of diesel fuel from a 50,000-litre above ground storage tank (Spill Number 04-388). The approximate location of the former spill is shown in Figure 2. As part of the emergency response, containment trenches were excavated to redirect natural surface runoff away from the impacted area, or in the case of impacted runoff, into the containment area on the frozen lake surface.

Hydrocarbon-absorbent booms were installed on the surface of the lake ice and around meltwater pools containing diesel at locations where possible containment breaches could occur. Free diesel fuel was recovered using absorbent pads placed on the surface of the frozen lake. Other fuel was recovered manually and placed into 205-litre barrels for disposal. In accordance with acceptable practices at the time, the residual free diesel fuel present on the lake ice was combusted. A lined landfarm was constructed approximately 600 m^2 in size. Approximately 100 m^3 of hydrocarbon-impacted soil was contained in the area. The total surface area affected by the spill on both land and water, was estimated to be in the order of 3,500 m^2. Remediation efforts following the spill are documented in the *Windy Camp Nunavut, Diesel Fuel Spill Assessment and Remediation Report* by EBA (June 2004, draft).

After HMBL purchased the Hope Bay properties in late 2007, potential risks to the nearby Windy Lake receptor (approximately 30 m from the former landfarm) were mitigated in 2008 by off-site disposal of the impacted soil and decommissioning of the landfarm facility. The re-contoured area was covered with coconut matting to stabilize the residual soils. Testing of the quality of these residual former landfarm soils was included in the current site assessment.

A Phase 2 ESA at Windy Camp was conducted in 2009. The Phase 2 ESA Report (WESA 2009) indicated that the chemicals of potential concern included the petroleum hydrocarbon (PHC) fraction F2 (diesel fuel). The Phase 2 ESA estimated soils volume requiring remediation was 2,000 m^3. Most of the hydrocarbon impacts were associated with the former generators, the former tankfarm, and the former landfarm. The additional soil testing completed for current study and has reduced the estimated soils volume requiring remediation to 550 m^3 to 600 m^3.

2.2 Location, Ownership and Current Land Use

The Hope Bay Project is on Inuit-owned land administered by the Kitikmeot Inuit Association (KIA), with minerals development authority vested within Nunavut Tunngavik Inc. (NTI). Depending on the location of land within the Hope Bay project area, three entities administer surface and subsurface mine leases on behalf of the Inuit; the KIA (surface rights), the NTI (subsurface rights), and Aboriginal Affairs and Northern Development Canada (both surface and subsurface rights).

HBML has secured access and mineral rights to the Hope Bay Project through land use and commercial land leases negotiated with these stakeholders.

The current land use is classified as Industrial. There is no current or future anticipated groundwater use at the site.

2.3 Site History and General Description of Site

Windy Camp was established in 1993, with the original Water Licence NWB2HOP0002 issued to Cambiex Exploration Inc. by the NWB on March 15, 2000. The camp operated until 2009 and supported the exploration of the Doris and Madrid deposit. The camp housed approximately 40 people. Other facilities included generators, bulk fuel storage, offices, and core shacks, a shop tent, helipads, and laydown areas containing scrap metal, barrels, and equipment. Drill core was stored at various locations around the camp. Refer to Figure 2 for a diagram of former and current site facilities and features.

Septic and greywater was treated by an RBC rotodisk water treatment plant, and effluent was conveyed to an intermediate staged holding tank. Final discharge of water was at a location uphill of the camp approximately 122 m from the shore of Windy Lake. Sewage sludges were collected in 45 gallon drums and transported to the Boston Camp for disposal.

Newmont Mining Corporation acquired the Hope Bay Project in December 2007. In the winter of 2007 and 2008, the airstrip for the new Doris Camp was constructed. The environmental assessment and rehabilitation of Windy Camp commenced in 2009.

Other recent work in the area includes the partial construction of an all-weather road between Doris Camp and the old Windy Camp, the expansion of the capacity and facilities of the main Doris Camp, and the construction of a new Windy Camp/Quarry D approximately 1 km north of the old Windy Camp location.

2.4 Climate

Based on meteorological data from weather stations at Cambridge Bay approximately 170 km northeast of the site and Contwoyto Lake approximately 280 km southwest of the site, the mean annual temperature is -15°C for the former and -12°C for the latter. Based on 68 complete months of data at the Hope Bay project, the mean monthly air temperatures for Doris station (30 masl) ranged from -33.2°C in February 2008 to 13.2°C in July 2007. The annual average temperatures for 2002 to 2009, using only complete years of available data, were -11.7°C and -11.1°C at Boston and Doris stations, respectively (Rescan, 2009).

Total annual rainfall from 2002 to 2009 (based on available complete years) averaged 30 mm and 85 mm at Boston and Doris stations, respectively (Rescan, 2009). The 1971 to 2000 climate normal annual precipitation at Cambridge Bay regional station is 139 mm, comprised of 70 mm of rainfall and 69 mm of snow water equivalent (SWE).

2.5 Site Topography and Vegetation

The Hope Bay Project generally has a low to moderate surface relief, and the old Windy Camp site has approximately 70 m of differential elevation between the low point (shore of Windy Lake) and the high point (adjacent rock outcrop). The surficial deposits that overlie the bedrock consist of glacial till, marine sediments, glaciofluvial deposits, lacustrine deposits, and alluvial deposits.

The areas north of the abandoned camp buildings consist of steep rocky outcrops of bedrock. To the east is a valley cut in the bedrock that rises gently for approximately 500 m before descending to Patch Lake.

Areas of felsenmeer are common and swampy areas are also present. Tundra and moss cover the ground even at higher elevations. Vegetation consists primarily of lichen, moss, dwarf willows, and birches.

2.6 Regional Quaternary Geology

The region was subjected to multiple glaciations during the Quaternary period. During each glaciation, the area was overridden by the northwestern sector of the Laurentide Ice Sheet. Evidence of only the most recent (Late Wisconsin) glaciation is preserved in the present-day landscape. Striations, orientation of eskers, grooves, and drumlins indicate that the predominant glacial ice movement was north-northwest.

The project area became ice-free about 8,800 years ago as the southwest to northeast trending ice sheet melted back toward the southeast (Dyke and Prest, 1986) leaving a blanket of basal till as the ice retreated. Immediately following deglaciations, the sea level was about 200 m higher than at present (Dyke and Dredge, 1989). The entire project area was submerged and the edge of the ice sheet abutted the open sea. Meltwater streams from the ice carried fine grained sediments toward the sea, resulting in the accumulation of marine sediments on top of the till with the greatest accumulated thickness in the deeper water zones, which now form the valley bottoms.

Following glaciation, isostatic rebound caused a relative decline in sea level. During emergence, the land surface was washed by waves. Easily erodible surfaces such as marine sediments, till, and glaciofluvial sands and gravels were reworked and redistributed by waves, currents, and sea ice. Some present-day rock outcrops were exposed as the thin soil washed off the uplands and accumulated in the valley bottoms. Current outcrop cover varies from 35% to 80% in the region. Outcrops tend to form relatively continuous, north-northwest trending ridges throughout the area with broad tundra-covered flat valleys. Lakes are also elongated in a north-northwest direction. Since emergence, natural slope processes, frost action, and permafrost have contributed to the present day landscape.

2.7 Regional Bedrock Geology

Regional bedrock geology consists of sedimentary and volcanic rocks of the Arctic Platform (NRCAN, 1957). The Hope Bay project region is underlain by the late Archean Hope Bay Greenstone Belt, which is approximately 42 km and consists of mostly mafic volcanic rocks.

2.7.1 Regional and Local Surficial Soils

The Geological Survey of Canada (Sharpe, 1993) indicates that glacial till deposits are predominant. Pleistocene deposits are buried beneath marine sediments consisting of clay, silt, and sand. Marine sediments represent the dominant surficial material and the material may be saline. The overburden soil pore water can also have high salinity concentrations, often exceeding that of seawater (HBML, 2011). Soils developed on marine sediments are generally fine textured with textures ranging from clay to silty clay with traces of sand (EBA, 1996). The overburden soils are normally consolidated, typically have low structural integrity, and are subject to compaction when wet.

According to HBML Phase 2 Project Proposal (HBML, 2011), marine silts and clays in the area can contain significant (up to 50% by volume) ground ice, while the till contains low to moderate ice contents (5 to 25%). Solifluction and other slope movement features related to the thawing of poorly-drained and weak saturated soils on slopes can result in thaw flow slides known as earthflows and mudflows.

The bedrock contact zone generally consists of a small rubble zone ranging from a few centimeters to up to 2 m in thickness.

Most of the soils encountered at Old Windy Camp were fine- to medium-grained sands with some silt. Where vegetation was present in undisturbed areas, the organic layer ranged from 10 to 30 cm. The nearby beach to the west is sandy with a small amount of rounded cobble.

2.7.2 Hydrogeology

The project area is coastal lowland with numerous lakes and ponds separated by glacial landforms and parallel geological intrusions including diabase dykes and sills. The drainage basins are generally long and narrow and predominantly oriented along the north-south axis. The predominant drainage in the area is north into Hope Bay.

Continuous permafrost extends to -560 m. (Heginbottom et. al., 1995). Ground temperature measurements in the project area indicate an active zone thickness ranging between 1.5 to 2.6 m and the depth of zero annual amplitude varying between 11 and 17 m (EBA 1996).

Groundwater in the continuous permafrost zone is confined to this shallow active layer. Based on the regional geology and the presence of permafrost, the groundwater flow is likely complex and controlled by topography, surface water bodies, and bedrock structure. Vertical groundwater flow is limited by the shallow permafrost. The period of groundwater flow is highly influenced by climatic conditions and flow is also likely limited to the short summer season when the active layer thaws, thus allowing water to flow in this horizon. It is expected that the surface water bodies are expressions of the water table.

Water flow in the active layer is expected to follow surface topography, which is from the high bedrock ridge to the west, into Windy Lake.

3.0 ENVIRONMENTAL CRITERIA

3.1 Regulatory Guidelines

The following subsections outline the rationale for the selection of applicable generic risk management guidelines for soil and surface water. The guideline documents relevant to the site consist of the following:

3.2 Land Use Assessment

CCME land use criteria and Government of Nunavut land use criteria currently recognize four different types of land use:

- Agricultural land use: lands used for growing crops or producing livestock, and that are agricultural in nature. These also include lands that provide habitat for resident and transitory wildlife and native flora.
- Residential/Parkland land use: lands where the primary activity is occupation for residency and recreational purposes. These include lands used as buffer zones between areas of residence, but do not include wildlands, such as national and provincial parks, other than campground areas.
- Commercial land use: lands where the primary activity is related to commercial operations, such as the provision of goods and services (e.g., shopping mall) and occupancy is not for residential or manufacturing purposes. These do not include operations where the growing of food is the primary activity (i.e. agricultural).
- Industrial land use: lands where the primary activity involved the production, manufacture, construction, and/or assembly of goods.

Canadian soil quality guidelines are derived for the protection of receptors under these four different land uses. The site use is currently classified as industrial. This land use will be applicable during exploration phases and through the life of mine until closure, after which the land use will revert to wildland. On industrial lands, the primary land use activities are not directly dependent on the need to sustain a high level of ecological processes. However, the same key ecological receptors are considered as for agricultural and residential/parkland uses.

3.3 Particle Size Designation

A coarse-grained soil is defined as having a median grain size (D_{50}) of 75 µm or greater, whereas a fine-grained soil has a D_{50} of less than 75 µm. A review of the particles size analyses results for the Phase 3 ESA and the previous Phase 2 ESA study indicates that the soils are predominantly coarse-grained. These results corroborate soil textural observations in the field and additional particle size analyses conducted for this study.

3.4 Applicable Exposure Pathways

3.4.1 Human Pathways

The site is covered with sand, gravel, boulders, grassy areas, and sub-arctic tundra vegetation. The majority of the site consists of short grass with sparse vegetation. Soil and water direct contact (dermal contact and ingestion) pathways are considered applicable at the site during remedial activities.

Soil and water direct contact (dermal contact and ingestion) pathways are considered applicable pathways. There are no buildings in use, and given the future anticipated use of the site, the vapour inhalation pathway can be excluded.

The drinking water pathway will be applicable when the new Windy Camp is built, since drinking water will come from Windy Lake. Windy Lake may also be a future source of drinking water for the existing Doris Camp.

3.4.2 Ecological Pathways

Under this current land use, the eco-soil contact pathway is applicable. Given the proximity of the Windy Lake, the protection of groundwater for aquatic life (freshwater) is applicable.

3.5 Applicable Guidelines

Various regulatory guideline documents were consulted and are summarized below. These documents provide a generic set of guidelines against which the analytical results are compared to provide a general site condition.

Canadian Soil Quality Guidelines consider both human health and ecological receptors, and are intended as general guidance for the protection, maintenance, and improvement of specific uses of land and water. Based on the existing site usage and surrounding land use, the Nunavut/CCME industrial guidelines for soil are applicable.

SOIL CRITERIA

General Soil Criteria and Metals

- Canadian Council of Ministers of the Environment (CCME), Soil Quality Guideline for the Protection of Environmental and Human Health –Industrial Land Use (coarse-grained soils);
- Canadian Council of Ministers of the Environment (CCME) Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil; and
- Environmental Protection Division, Department of Environment, Government of Nunavut, Environmental Guideline for Contaminated site Remediation (March 2009 Revised) – Industrial Land Use (coarse-grained soils).

Metal concentrations in surficial soils are dependent upon variations of metal content in naturally-occurring media (i.e. bedrock, soil). Soils and stream sediments developed from metal-rich parent materials and bedrock may also be naturally enriched in regulated metals, and contribute to the cycling of metals in the environment including in water and vegetation. As observed during the Phase 3 ESA and has based on background sampling, many small ponds and wet areas in undisturbed terrain contain reddish sediment, suggestive of natural iron oxides in the environment. The biogeochemistry of metals in natural systems is complex; however an understanding of local and regional geochemical processes is necessary to evaluate the effects of metals on the surrounding environment. Natural background soil and sediment metals concentrations impose technical constraints on generic environmental soil criteria for regulated metals, such as the Canadian Council for Ministers of the Environment (CCME) criteria. However, for the current assessment, CCME-regulated metals were compared to Nunavut/CCME Soil Quality Guidelines for the Protection of Environmental and Human Health Industrial Criteria.

Petroleum Hydrocarbons

The Canada-Wide Standard for Petroleum Hydrocarbons in Soil (CWS PHC) is a specialized case of Canadian (CCME) Soil Quality Guidelines (CCME, 2008). Hydrocarbons are subdivided into four broad physico-chemical fractions as defined by the US Total Petroleum Hydrocarbons Criteria Working Group. The fractions are defined in equivalent carbon numbers as follows:

- F1: C6 to C10
- F2: >C10 to C16
- F3: >C16 to C34
- F4: C34+

Aliphatic and aromatic sub-fractions are considered separately in a human health assessment.

Whereas the primary focus in PHC CWS standard development is prevention of toxic effects from F1-F4 on the receptors in certain situations these pathways may be of little immediate concern and PHC management is governed by other factors including:

- ignition hazard

- odour and appearance
- effects on buried infrastructure
- formation of non-aqueous phase liquids (NAPL)
- socio-economics and technological capabilities

Soil Quality Guidelines can be used as benchmarks to evaluate the need for further investigation or remediation with respect to a specified land use. Guidelines are applied to identify and classify sites, to assess the general degree of contamination at a site and to determine the need for further action, and as a basis for remediation objectives.

In the present study, soil petroleum hydrocarbon analyses were compared to the Government of Nunavut Tier 1 Environmental Guideline for Contaminated Site Remediation for Nunavut (industrial land use and coarse-grained soils). These criteria are harmonized with the Tier 1 CCME Canada-Wide Standards (CWS) for petroleum hydrocarbons in soil. These criteria are:

Tier 1 Environmental Guidelines for Contaminated Site Remediation of Surface Soils for Nunavut (industrial land use and coarse-grained soils)

Parameter	mg/kg
F1	240*
F2	260
F3	1,700
F4	3,300

* Includes protection of potable water

Water Licence

Water Licence No. 2BE-HOP0712 lists the following industrial remediation soil criteria for the Old Windy Camp:

Water Licence Soil Remediation Criteria for Petroleum Affected Soils at Windy

Parameter	mg/kg
Total Petroleum Hydrocarbons (TPH)	2,500
Benzene	0.5
Toluene	0.8
Ethylbenzene	20
Lead	400

The TPH criterion is no longer considered the best standard to evaluate the risk associated with hydrocarbons in soil, and reflects earlier CCME 1991 Interim Criteria that were in effect at the time the subject water licence was issued. The criteria are provided for reference. Government of Nunavut Tier 1 petroleum hydrocarbon (PHC) criteria for industrial land use and coarse-grained soils were used for comparison in this assessment.

WATER CRITERIA

General Criteria

For the purpose of this assessment, water quality parameters were compared to:

- Canadian Council of Ministers of the Environment (CCME), Canadian Water Quality Guidelines for Protection of Fresh/ Marine Water Aquatic Life.

As in the case of soils, the geochemical cycling of CCME-regulated metals naturally present in the environment, especially in mining areas enriched in metals, may cause ambient water quality parameters to exceed the Tier 1 environmental guidelines. However, water quality results obtained in the August 2011 surface water quality sampling event were compared to generic Tier 1 criteria for the purpose of the present assessment. Mining activities that cause site disturbance and changes in pH and soil salinity are factors that may contribute to resulting above-background metals concentrations in water, even if natural waters contain CCME-regulated metals in concentrations higher than the Tier 1 criteria.

The Canadian Council of Ministers of the Environment (CCME) does not have established water quality guidelines for the protection of aquatic life for total dissolved solids (TDS) or calcium (CCME, 2007).

Chlorides

For the purpose of this assessment, chloride concentrations were compared to:

- CCME (Canadian Council of Ministers of the Environment). 2011. Canadian water quality guidelines for the protection of aquatic life: Chloride. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg.

In 2011 the CCME released a water guideline for chloride for the protection of aquatic life, including a long-term exposure guideline of 128 mg/L chloride and a short-term benchmark concentration of 586 mg/L chloride. The long-term exposure guideline is intended to protect all forms of aquatic life for an indefinite exposure period, whereas the short-term benchmark concentration is a concentration at which severe effects are likely to be observed (CCME, 2011).

Water Licence

As per Water Licence No. 2BE-HOP0712, the following water criteria apply to the still-active water monitoring program stations.

Water Licence Water Discharge Requirements for Station HOP-5 (Tank Farm)

Parameter	Maximum Average Concentration (mg/L)
Oil and Grease	15
Benzene	0.370
Toluene	0.002
Ethylbenzene	0.090
Lead	0.001

4.0 PHASE 3 SITE WORK AND RESULTS

4.1 Site Safety

In accordance with HBML's policies, EBA staff including Ms. Daniela Felske and Mr. Michel Hebert, participated in a one-day site orientation and safety training, in addition to a bear awareness course and hands-on training for the use of bear deterrents. EBA completed its in-house Safe Work Form, which was updated and signed daily. Contents of the EBA Safe Work Form were explained to and accepted by the student field assistants assigned to EBA for the day. Pre-job hazard assessments were completed prior to going in the field, and were updated with a field-level assessment once on site. EBA participated in the staff safety meetings each morning, and prepared a trip planner each field day prior to going to site.

4.2 Test Pitting and Soil Sampling Program

Based on the known history of the site, previous Phase 2 ESA, and a walk-through of the site upon arrival, the Windy Lake site was divided into eight areas of potential environmental concern (APEC). A summary key of the areas is provided on Figure 2, and detailed features of the areas are provided on Figures 3A to 3H. The areas are as follows:

Areas of Potential Environmental Concern (APEC) at Old Windy Camp

Area	Description
W1	Seacans and areas downgradient of 2004 spill
W2	Former landfarm
W3	Former fuel tank near generators
W4	Former generators
W5	Tents
W6	Soils within tankfarm (no fuel tanks present, only soils)
W7	Soils inside shop tent
W8	Former incinerator near beach

Test-pitting, soil sampling, and surface water sampling were completed on August 6, 9, and 10, 2011. Testpits were dug by hand, and soils were visually logged and bagged for field soils screening (hydrocarbon vapours) at approximate intervals of 10 to 30 cm.

A total of 86 logged test pits were dug. Numerous other shallower pits in various locations (and especially in the vicinity of the tests) were dug to check for visual indications of petroleum hydrocarbon impacts. Test pit depths were to the free water surface or to rock refusal. The maximum test pit depth was 1.3 m below surface, which was in the sandy fill deposited for the former generators. No permafrost was encountered in the testpits.

The organic layer in the vegetated areas ranged from 10 cm to 30 cm. Soils in nearly all locations consisted of brown sand or brown silty sand to about 0.4 m below grade, underlain with fine to medium grained sand that was more yellowish in color. Some gravel was encountered mixed with the sand in a few locations,

and large boulders and cobble, or bedrock, was encountered in some areas and in the tent areas in particular. Soils were moist to dry, although saturated soils were encountered in the following areas:

- W1 – Seacans and areas downgradient of former spill. Sampling also included a gully, soils near a rivulet from the bedrock areas to Windy Lake, and small marshy area. Refer to photos on Figure 3A.
- W2 - Former landfarm. Areas near Windy Lake were saturated approximately 20 cm below surface. Refer to photo on Figure 3B.
- W6 - Tankfarm. Some areas of the tankfarm had standing water. Refer to Figure 3F for photos.
- W8 – Former incinerator near beach. This entire area is in a grassy wetland. Refer to photo on Figure 3H.

Soil samples were field screened using the ambient temperature headspace method, where soil samples were placed in plastic bags, allowed to adjust to outdoor air temperature, and the airspace within the bag analyzed for combustible gases using a photo-ionization detector (PID) MiniRae instrument calibrated to isobutylene. Select PID screening results and depths of screened samples are shown next to the sample location on Figures 3A to 3H.

Soil samples were also collected directly from the test pit and packed with zero headspace in laboratory supplied jars, and stored in an insulated cooler with ice for transport to Maxxam Analytics International Corporation in Edmonton, Alberta. Surface water samples were collected in designated laboratory-provided bottles, and preserved and/or field filtered as required. Field protocols and QA/QC procedures during sampling were in accordance with standard industry protocols. Holding times for all water and soil samples were within acceptable limits. All coolers still had ice present upon receipt at the laboratory, and the temperature range within the various coolers ranged between 4°C and 13°C. No samples were broken or lost during transport.

Sixty three (63) samples were analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX), petroleum hydrocarbon fractions F1 to F4, six (6) samples were analyzed for metals and ten (10) samples were analyzed for particle size analysis (PSA).

4.3 Surface Water Sampling

All three (3) groundwater wells installed in 2009 by WESA were dry at the time of the site investigation, including MW-1 near the water's edge. The pipe above grade at well MW-1 was broken, but the well was still intact below grade to a depth of approximately 1 m. There was no cap on this well. Well MW-2 was installed to a depth of 0.83 m below grade, and well MW-3 was installed to a depth of about 0.57 m below grade.

Four surface water samples were collected for the Phase 3 ESA:

- The area of ponded water downgradient of the 2004 diesel spill (W1),
- The tank farm (W6 and also monitoring point HOP-5 on the Water Licence), and
- Two locations in the grassy marsh where the former incinerator was located (W8).

Surface water sample W1-1 was collected southeast of the historic 2004 spill, W6-1 was collected within the fuel farm, and W8-1 and W8-2 were collected downgradient of the incinerator. One sample was collected from Windy Lake for the analysis of field parameters, however, this sample was not sent for laboratory analysis.

The pH, conductivity (EC), temperature, dissolved oxygen, and ORP were measured at the sampling locations on August 10, 2011, as summarized below:

Surface Water Field Parameters

Surface Water Sample	pH	EC (uS/cm)	Temperature (°C)	Dissolved Oxygen (mg/L)	ORP (mV)
	5.1	402	7.9	9.18	102.6
W1-1	9.6	381	6.9	1.50	-134.6
W6-1	3.4	3,700	6.8	4.62	191.1
W8-1	8.0	512	5.7	1.15	-60.3
W8-2	7.3	390	5.0	0.44	-23.4

Electrical conductivity results measured in the field and the lab were consistent with each other.

Chemically reducing conditions with low dissolved oxygen were encountered at the wetland areas including W1 and W8. The pH varied across the site, including acidic water in the tank farm (pH = 3.4) and alkaline water at W1-1 (pH = 9.6). The water in the wetland near the incinerator was near neutral. Windy Lake was slightly acidic at the time of sampling (pH = 5.1). For comparison, the pH of clean rain water is 5.6.

Surface water sample locations are shown on Figure 4, along with analytical results.

4.4 Soils and Surface Waters Results

Results of petroleum hydrocarbon sampling for soils are shown on Figures 3A to 3H, and surface waters results are shown on Figure 4. Full analytical results are provided in the Tables section of the report, and complete laboratory reports are provided in Appendix A. A summary of the Phase 3 results with areas and estimated in-situ volumes of soils having concentrations of petroleum hydrocarbon concentrations higher than the Nunavut/CCME guidelines is provided below, followed by a summary of observations for each of the eight (8) areas.

Windy Lake Petroleum Hydrocarbon Soils Exceeding CCME Industrial Soil Criteria (coarse grained)

APEC	Hydrocarbon Fraction	Maximum Concentration(s) mg/kg	Area (m^2)	Estimated Depth (m)	Estimated In-Situ Volume (m^3)
W1	F2	380	85	0.5	43
W2	F2	1,600	124	2	248
W3	F2	1,700	23	1	23
W4	F1, F2	F1= 820 F2 = 13,000	44	2.5	132
W5B	F2	2,900	1	0.5	1
W5D	F2	2,100	2	2	4
W5E	Xylenes, F1, F2, F3	Xylenes= 24; F1 = 960; F2 = 10,000; F3 = 1,800	9	2	18
W5G	F2	3,500	4	2	7
W5H	BTEX, F1, F2	Benzene = 0.14; Toluene = 4.6; Ethylbenz. = 4.4; Xylenes = 68; F1 = 1,700; F2 =10,000	20	2	39
W8	F2	490	61	1	61
Total			364		575*

* Does not include presumed residual soil impacts below the liner of the tank farm

Tier 1 Environmental Guidelines for Contaminated Site Remediation of Surface Soils for Nunavut (industrial land use and coarse-grained soils)

Parameter	mg/kg
F1	240*
F2	260
F3	1,700
F4	3,300

W1 – Seacans and Downgradient Area of the 2004 Diesel Spill

Referring to Figure 3A, the photoionization detector (PID) screening samples and analytical results show a distinct path suggestive of how the diesel spill in 2004 flowed downslope towards Windy Lake. Soil screening and visual cues suggest that soil impacts were confined to the uppermost 0.5 m of soil. For location W1-1, vertical closure was obtained at 0.15 m below grade (i.e., soils below this depth met the applicable soil guidelines).

Areas under the tank farm could not be assessed because the facility has not yet been decommissioned. It is likely that some residual hydrocarbon may be present below this area. The 2004 EBA report indicates that the area topographically downgradient of the former above-ground storage tank (AST) was the primary location of diesel soil impacts. The report also indicates that in order to maintain the stability of the AST, some diesel-affected soils near and beneath the former tank were left in place. Only soils within the land farm were analyzed for hydrocarbons in 2004, so it is not known what the chemical quality was of the soils left in place.

The estimated volume of hydrocarbon-affected soils higher than the applicable guidelines was calculated to be 43 m^3.

Surface water sample W1-1 was taken at the corresponding soils sample location. The area was situated in a wet area of ponded water that had sparse vegetation and a distinct layer of reddish iron oxides on the surface. A photo of the sampling location is provided on Figure 3A. Water concentrations exceeded the Canadian Water Quality Guidelines (protection of aquatic life, total metals) for aluminum (20 mg/L), chromium (60 µg/L), copper (11 µg/L), iron (47 mg/L), lead (1.1 µg/L) and zinc (80 µg/L).

Summary water results are provided in Figure 4, and the full results are provided in Table 9 in the Tables section.

W2 – Former Landfarm

The landfarm was decommissioned by HBML in 2009. In order to complete the assessment, a small area of protective coconut matting had to be cut away in order to reach the underlying soils. All soils within the footprint of the former landfarm met the industrial Nunavut/CCME guidelines for hydrocarbons (and met agricultural/wildland hydrocarbon criteria as well). Based on field observations and laboratory analysis, the areas with the highest residual hydrocarbon impacts are soils to the northwest of the former facility, in the vicinity of W2-8.

Soils north of the former landfarm facility, on the west side of the south berm of the tank farm facility did not meet petroleum hydrocarbon guidelines, as shown on Figure 3B. Berm soils were well-compacted and contained a significant proportion of boulders. For this reason the area could not be assessed to depths lower than 0.5 m even with pickaxe. Depth of impact was assumed to be 2 m in this area for the purpose of volume calculation, even though closure was obtained at 0.5 m below grade for location W2-18.

W3 – Former AST near Generators

Expanding on the Phase 2 findings in this area, ten testpits were dug in the vicinity of a former AST near the shop tent and generators. A surficial soil sample taken from this area in 2009 during the Phase 2 ESA had F2 concentrations of 1,970 mg/kg (WLF09-SS-33). This previous result corresponds to the most highly-

impacted soils encountered during the Phase 3 ESA, which were soils at W3-01 taken at 0.20 m below grade (1,700 mg/kg). As confirmed by analytical testing in conjunction with photoinization detector (PID) readings, hydrocarbon impacts not meeting regulatory guidelines were confined to an area of approximately 23 m^2. The soils in W3 consisted of sandy silt and also gravelly fill, and were highly compacted. For this reason, it was not possible to hand excavate soils below 0.5 m. The volume of soils higher than the Nunavut/CCME criteria was estimated to be 23 m^3. Refer to Figure 3C for PHC data and a photo of the area. Complete soil analytical results for PHC and metals are provided on Table 3.

Soils met the other Nunavut/CCME criteria for hydrocarbons, including benzene, toluene, ethylbenzene, and xylenes (BTEX), and all regulated metals. Although the Water Licence only specifically refers to soils remediated in the landfarm, based on the current results, all of the soils in this area would meet the Water Licence criteria for PHC and lead.

W4 – Former Generators

EBA attempted to locate the Phase 2 surface sample location WLF09-SS-092 next to the shop that had F2 concentrations of 1,280 mg/kg, but hydrocarbon impacts in this were minimal (see sample W4-8). However, significant hydrocarbon impacts were found in the vicinity of the former generator shown on Figure 3D. Most impacts occurred within a rectangular mound of fill approximately 1 m high beneath the former generator. This area did not appear to be sampled in 2009.

The most highly-impacted soils were found at location W4-1, at a depth of 0.5 m below grade (F1 concentrations were 820 mg/kg and F2 concentrations were 13,000 mg/kg). Soils at a depth of 0.75 m met the F1 criterion, and F2 concentrations decreased to 7,000 mg/kg. Vertical delineation was not achieved at this location, although it is anticipated that the total depth of impacted soils not meeting F2 criterion is 1.5 m below grade (2 m was assumed for the volume calculation). Refer to Figure 3D for PHC data and a photo of the area. Complete soil analytical results for PHC are provided on Table 4.

Owing to the coarse texture of the sandy soils and the likelihood that spills associated with this generator were small drips occurring over many years, the lateral extent of contaminated soils is likely to be limited, as was verified by PID soil screening and soil analyses. The downgradient/downslope sample W4-9 had very low concentrations of hydrocarbons. To build in conservative assumptions in the volume estimation a large area was selected, resulting in a volume of approximately 105 m^3 of soil higher than the Nunavut PHC criteria in this location.

Soils at W4 would not meet the Water Licence soil criteria for TPH.

W5 – Tents

Post-2008, tents were supplied by a network of 1,240 L above ground storage tanks and lengths of supply pipe along the back of each row of tents. Individual tents were supplied with fuel by T-joints. Previous heating systems included individual tanks (a modified drum) connected to waste fuel furnaces inside each tent. As some of the infrastructure has been removed, the soils at areas where joints would have been located in the past were visually inspected and testpitted to detect possible past leakage. Soils around the tanks were not sampled during the Phase 2 ESA in 2009.

Other joints that potentially could have leaked were the connections between the fuel tanks and the supply pipe, as was the case for area W5-B shown on Figure 3Ei.

Seven tents were initially identified as having PHC soil impacts. Of these seven tents, five had hydrocarbon impacts higher than regulatory criteria as confirmed by laboratory-analysis. These tents included the AST to pipe joint at Tent 38 (W5B), the AST at the Driller's Dry (W5E), and the former T-joints at Tent 41 (W5D), Tent 18 (W5G), and Tent 12 (W5H). All the areas are shown on Figure 3Ei to 3Eiii. Complete soil analytical results for PHC are provided on Table 5.

It was noted at the time of the assessment that some ASTs still contained fuel. Spills at The Driller's Dry had xylenes concentrations that were higher than the Canadian Soils Quality Guidelines (CSQG), and Tent 12 had BTEX concentrations that were higher than the CSQGs as well. These results suggest more recent diesel fuel spills.

The total volume of impacted soils was approximately 80 m^3, with the largest spills occurring at the Driller's Dry and Tent 41. The soils in the five areas would neither meet the Water Licence TPH criterion nor the BTEX criteria.

W6 - Tank Farm

Refer to Figure 3F for petroleum hydrocarbon (PHC) data and photos of the facility. Complete soil analytical results for PHC, metals and salinity parameters are provided on Table 6. Soils within the tank farm (W6) met the Nunavut/CCME hydrocarbon criteria for industrial land use, including lead. The soils contained with the tank farm may not meet Nunavut industrial criteria for soluble conductivity based on one analysis of salinity parameters (refer to Table 6 in the Tables section). Salinity remediation criteria are not specified in HBML's current Water Licence, and saline soils naturally occur in permafrost soils in the area.

The average depth of soils in the facility was approximately 25 cm. Based on a facility size of 40 by 20 m, the approximate volume of soils is 200 m^3.

Surface water sample collected at W6-1 (also Water Licence location HOP-6) the Canadian Water Quality Guidelines (protection of aquatic life, total metals) for aluminum (2.4 mg/L), arsenic (9.1 µg/L), copper (28 µg/L), iron (7.9 mg/L), and lead (1.7 µg/L). At the time of sampling, the water quality did not meet the Water Licence criterion for lead (1 µg/L). The water also contained higher concentrations of chlorides (770 mg/L) than the 2011 CCME freshwater aquatic guidelines. Other studies of lakes in the area have found concentrations of some total metals (aluminum, iron, copper, cadmium, chromium, lead, and manganese) that exceed Canadian Water Quality Guidelines (CWQG) on a seasonal basis in some lakes (Miramar, 2003 and Rescan 2010). Water in the lakes in this area is neutral to slightly alkaline.

Summary water results are provided in Figure 4, and the full results are provided in Table 9 in the Tables section.

Soils in the tank farm were not sampled during the Phase 2 ESA in 2009.

W7 – Soils inside Shop Tent

During the Phase 3 ESA, it was noted that areas of soils in the tent were stained by past minor spills of fuels and lubricating oils. Soils were screened and two samples were submitted for laboratory analysis. No exceedances of the industrial guidelines for petroleum hydrocarbons (PHC) in soils were found. Refer to Figure 3G for PHC data and a photo of the shop tent area. Completed soil analytical results are provided on Table 7. Soils at W7 would meet the Water Licence soil criteria for TPH.

Soils in the shop tent were not sampled during the Phase 2 ESA in 2009.

W8 – Former Incinerator

Black staining was noted in a wetland area about 10 m from Windy Lake. The area is downgradient of the former incinerator. Vigorous growth of sedges and grasses was observed in the wetland, including the former incinerator area. Many wetland species of vegetation can tolerate relatively high concentrations of dissolved metals, and can bioaccumulate these metals in the roots and aerial parts. The favourable microclimate at Old Windy Camp and shoreline wetland attracts numerous species of birds and mammals to feed.

Soils at W8 did not meet CCME/Nunavut soil criteria for the F2 hydrocarbon fraction, but would meet the Water Licence soil criteria for total petroleum hydrocarbons (TPH). Refer to Figure 3H for the petroleum hydrocarbon laboratory data and a photo of the area. Complete soil analytical results are provided on Table 8.

Two surface water samples were taken at W8, at two of the four soil sample locations. Summary water results are provided in Figure 4, and the full results are provided in Table 9 in the Tables section. Surface water sample W8-1 exceeded the Canadian Water Quality Guidelines (protection of aquatic life, total metals) for aluminum (13 mg/L) arsenic (13 µg/L), chromium (40 µg/L) copper (87 µg/L), iron (38 mg/L), lead (16 µg/L), and zinc (90 µg/L). Surface water sample W8-2 exceeded guidelines (total metals) for copper (2.1 µg/L) and iron (1.7 mg/L). Other studies of lakes in the area have found concentrations of some total metals (aluminum, iron, copper, cadmium, chromium, lead, and manganese) that exceed Canadian Water Quality Guidelines on a seasonal basis in some lakes (Miramar, 2003 and Rescan 2010). Water in the lakes in this area is neutral to slightly alkaline. The total metals concentrations in water may reflect natural surface water concentrations in this wetland environment. Background samples collected in a nearby wetland area would be required for comparison.

Because of the high water table, dense rooting system of the sedges and grasses and associated microorganisms, as well as visual observations of the sands below the organic layer, it is anticipated that the depth of hydrocarbon impacts is shallow (likely to 0.25 m below grade). Because of the sensitivity of the nearby aquatic receptor (Windy Lake), the limited number of soil samples, and the potential for hydrocarbons to have been transported to adjacent wetland areas not identified during the Phase 3 study, a potential remediation depth of 1 m was assigned to this area, for a total in-situ volume of 61 m3.

Soils near the incinerator were not sampled during the Phase 2 ESA in 2009.

5.0 BIOTREATABILITY RESULTS

To support bioremediation of soils by the activity of intrinsic soil microorganisms as a remedial option at the old Windy Camp site, EBA collected a composite soils sample comprised of approximately equal amounts of soils form W2-20, W4-10, and W2-8. Soils were collected for the purpose of bench-scale biotreatability trials, started in October 2011 at SiREM laboratories in Guelph, Ontario. The objectives of the five month bench-scale test were to:

- Evaluate enhanced aerobic biodegradation for the F2 hydrocarbon fraction. Aerobic treatments included an oxygen releasing compound containing nutrients (nitrogen and phosphorus).
- Evaluate anaerobic (undisturbed) biodegradation for the F2 hydrocarbon fraction, including nitrate and sulfates addition as electron acceptors. The purpose of the anaerobic treatments study was to attempt to demonstrate that biodegradation could be a successful remediation approach while maintaining undisturbed, anaerobic conditions with only the application of electron acceptors as amendments.

Details of the study are included in SiREM's proposal dated March 11, 2011 (Si-1274-030111, refer to Appendix B).

A summary of the treatments is as follows:

Summary of Microcosm Controls, Treatments and Amendments

Microcosm Name	Description
Active control	No amendments added. Distilled water was added periodically during the study to maintain the target moisture content (50% of the water holding capacity). On Day 58, the bottles were sealed and anerobic conditions were maintained for the remainder of the study.
Aerobic Treatment (EHC-O Amended)	Amended with 0.5 g of proprietary oxygen releasing compound (EHC-O) on Day 0 and re-amended with 0.5 g of EHC-O on Day 50. Weighed throughout the duration of the study to verify that moisture content remained at 50% of the water holding capacity. This commercial amendment does contain some soil microbe nutrients including nitrogen and phosphorus.
Anaerobic Treatment (Nitrate Amended)	Amended with 30 µL of 200 g/L $NaNO_3$ stock solution to a target concentration of 200 mg/kg as nitrogen. Re-amended with 6.1 mL of 200g/ L $NaNO_3$ stock solution to a target concentration of 200 mg/kg as Nitrogen on Day 50. Weighed the microcosm throughout the duration of the study to verify that the moisture content remained at 50% of the water holding capacity.
Anaerobic Treatment (Sulphate Amended)	Amended with 51 µL of 200 g/L Na_2SO_4 stock solution to a target concentration of 200 mg/kg as sulfur. Re-amended with 4.4 mL of 200g/L Na_2SO_4 stock solution to a target concentration of 200 mg/kg as sulfur on Day 50. Weighed microcosm throughout the duration of the study to verify that the moisture content remained at 50% of the water holding capacity.

The water holding capacity for the composite sample of soils from Old Windy Camp was determined to be 0.47 mL water per gram of dry soil. In general, approximately one half of the water holding capacity of the soil is recommended in order to maintain adequate soil moisture without waterlogging the soils. Too much moisture can inhibit intrinsic bioremediation processes. Water was added to the soil microcosms periodically throughout the study to maintain the target moisture content.

Aerobic treatment was achieved amending soils with 0.5 g of a proprietary oxygen releasing compound (2.5 g EHC-O/kg of soil) as recommended by the manufacturer, Adventus Americas.

Nitrate and sulphate were evaluated as electron acceptors for anaerobic biodegradation. Homogenized soil (1,800 g) microcosms were amended with 270 µL of a 200 g/L sodium nitrate ($NaNO_3$) stock solution to achieve a target concentration of 124 mg/L, or 2 millimolar (mM), in the pore volume. This concentration was selected to provide sufficient nitrate without exceeding the microbial toxicity limit of 2 mM (as recommended by Dr. Elizabeth Edwards, University of Toronto). Additionally, 1,800 g of homogenized soil was amended with 460 µL of a 200 g/L sodium sulfate (Na_2SO_4) stock solution to achieve a target of 192 mg/L or 2 mM in the pore volume. This concentration was equivalent to the nitrate concentration on a molar basis.

Both anaerobic treatments were constructed and sealed with screw caps and anaerobic tape under anaerobic conditions and stored in an incubator at 10°C.

The dates for the SiREM biotreatability sampling were:

- October 5, 2011 (baseline)
- November 2, 2011 (Day 28, Sample Event #1)
- December 7, 2011 (Day 63, Sample Event #2)
- January 18, 2012 (Day 105, Sample Event #3)
- February 29, 2012 (Day 147, Sample Event #4 and conclusion of study).

The average F2 concentration at the start of the study was 2,800 mg/kg and the average F3 fraction was 480 mg/kg. Water content of the soil was adjusted to be optimal for the type of soil (50-70% of field capacity). The soils were maintained at a temperature of 10°C throughout the study. Treatments were applied as follows:

Graphs of the F1 to F4 concentrations are shown in the graphs provided in Appendix C, which are extracted from SiREM's final report for the study provided in Appendix D. The graphs show the F1 to F4 hydrocarbon fraction concentrations on the left-hand axis plotted against time.

A summary of results is as follows:

- Graph 1 presents the control. Samples were irrigated to maintain optimal moisture condition;
- Graph 2 is the aerobic treatment, which consisted of the application of a proprietary oxygen-releasing compound supplemented with nutrients;
- Graph 3 is one anaerobic treatment using nitrates as an electron acceptor; and
- Graph 4 is the second anaerobic treatment using sulphates as an electron acceptor.

For the control, the F2 concentrations decreased from 2,800 mg/kg to 1,950 mg/kg by the end of the study (30% removal), and the F3 concentrations remained unchanged.

For the soils treated with the proprietary oxygen release compound, the F2 concentrations at the end of the study had decreased from 2,800 mg/kg to about 700 mg/kg, representing 75% removal. F3 concentrations

did not change. Neither anaerobic treatment caused reductions in F2 or F3 hydrocarbon concentrations during the course of the study. A detailed summary of analytical results is provided in the tables in SiREM's final report provided in Appendix D.

The study suggests that undisturbed, anaerobic treatment of F2 and F3 impacted soils would not be effective for the soils at Old Windy Camp. Alternately, a remedial option involving the aeration of soils (tilling) and/or the addition of oxygen to soils by mixing in an oxygen releasing compound would be and effective remedial strategy.

A volume-based weighted average calculated with the maximum concentrations detected in each area of concern is 5,000 mg/kg for F2. A conservative (high) estimate of the bulk F2 concentration of the soil is 80% of this value, or 4,000 mg/kg for the 575 m^3 of PHC-impacted soil on the site. Based on the results of the biotreatability study for the F2 fraction (a removal rate of 75% after 5 months of treatment) and assuming weekly tilling with optimal nutrient and moisture conditions, the projected F2 concentrations after one season of landfarming treatment would be around 1,000 mg/kg for F2. Because of the limited bench-scale data it is difficult to project how much more time would be required to remediate the soils at Old Windy Camp to concentrations less than the Nunavut/CCME industrial guidelines; however, based on the current study, it is anticipated that soil remediation would be complete in two to three landfarming treatment seasons, with appropriate tilling frequencies, amendment application, and moisture control.

6.0 REMEDIAL OPTIONS

Based on the results of the Phase 2 ESA by WESA (and completed prior to the Phase 3 ESA), EBA prepared a cold climate bioremediation literature review in 2010 and ranked potential remediation options for the Old Windy Camp (EBA, 2010).

Established soil treatment options that were evaluated for this report, from most rapid to the most protracted, included physical treatments, such as excavation and landfilling (encapsulation), incineration, thermal desorption, landfarming, or biopile remediation, surfactant addition, soil washing, and monitored natural attenuation.

A summary of remediation options with Arctic/Antarctic case studies was provided along with a listing of the advantages and disadvantages of each. Proposed remedial options for the two sites were ranked using an approach based on the life cycle framework assessment for remediation options developed by Diamond et al. (1999). According to some accounts, permafrost degradation in some areas has caused the potential for solifluction at Old Windy Camp. Based on the outcome of the analysis including this consideration, the preferred remedial approach for Windy Camp was in-situ bioremediation, with ex-situ landfarming as the second preferred remedial alternative. However, the SiREM study suggests that the bioremediation of F2 impacted soils by undisturbed, anaerobic techniques would be protracted or not effective at all. In addition, the Phase 3 ESA suggests that individual areas requiring excavation are relatively small, and that any potential damage to permafrost could be mitigated by rapid backfilling and avoiding the collection of standing water in the excavations. None of the impacted soils are within areas previously identified to be susceptible to solifluction, and all the affected soils are within previously-disturbed areas. Conventional landfarming with nutrient addition or the application of oxygen-releasing compounds would be more effective remedial techniques.

A summary of the remedial alternatives for the petroleum hydrocarbon impacted areas is provided below:

Summary of Remediation Options for Old Windy Camp Soils

Areas	Predominant Hydrocarbon Fraction Requiring Treatment	Remedial Alternative
W1, W2, W3, W4, W5B, W5D, W5E, W5G, W5H, W8.	PHC: F2 fraction. Source: historic diesel fuel spills. Concentrations: up to 13,000 mg/kg.	**Excavation and Off-Site Disposal** Advantages: ▪ Quick remedial timeframe. Disadvantages: ▪ Requires importation of clean backfill. ▪ Backfilling should be done soon after excavation in order to mitigate possible permafrost damage. ▪ Generally most expensive option.
		Landfarming: Hydrocarbon affected soils are spread out in a layer about 0.3 m to 0.5 m thick, nutrients are added, and periodically the soils are mixed (i.e., by tilling). Soil moisture may also be adjusted. Other amendments including proprietary oxygen releasing compounds may be added. Advantages: ▪ Proven technology in the arctic. ▪ Cost effective, and coarse-grained soils requiring treatment for the F2 fraction (diesel) ▪ Treated soils can be used as backfill where appropriate. Disadvantages: ▪ Treatment season in the arctic is short (generally three months). ▪ Excavations in arctic generally require rapid importation of clean backfill in order to prevent permafrost damage. ▪ Requires monitoring and periodic tilling effort. ▪ Requires the addition of amendments (nitrogen and phosphorous sources) ▪ Facility requires permitting and periodic inspections. ▪ May be difficult to achieve most stringent remedial criteria (Tier 1 remedial objectives for wildland land use). ▪ Facility collects precipitation and snowmelt that may require treatment prior to disposal.
		Biopiles: A bioremediation technique whereby the soil is piled over an air distribution system and aerated. The air distribution system can also be used to provide heat to the soil. Advantages: ▪ For a given volume of soils requiring treatment, biopiles require less area than a landfarm. ▪ Stockpiling soil reduces the rate of heat loss by increasing the volume/surface ratio, effectively extending the length of the treatment season. Disadvantages: ▪ Require significant engineering and entail higher construction/operation costs than a landfarm.

Summary of Remediation Options for Old Windy Camp Soils

Areas	Predominant Hydrocarbon Fraction Requiring Treatment	Remedial Alternative
		▪ Excavations generally require importation of clean backfill in order to prevent permafrost damage. ▪ Forced air generally reduces remedial timeframes but there is a requirement for a power supply. Wind-powered systems may not be effective to achieve remedial goals. ▪ Construction materials (i.e., PVC pipe) must be disposed of at the end of remediation.
		Enhanced Anaerobic Biodegradation: Solutions of electron acceptors (nitrates and or sulphates) are applied to soils in-situ to enhance natural anaerobic biodegradation processes. Advantages: ▪ Less site disturbance and damage to permafrost compared to excavating soils. Disadvantages: ▪ Anaerobic degradation of hydrocarbons by microbes in polar climates is not well understood and there is little published research to establish this as a viable remedial alternative in the arctic. ▪ Requires chemical inputs that must be controlled to avoid adverse effects on nearby water bodies (introduction of nitrates and sulphates into the environment). ▪ The five month bench-scale study did not suggest that this option would be successful for the Old Windy Camp soils.
		Surfactant Soil Washing: On-site set-up to agitate soils in a surfactant solution (or water) to remove petroleum hydrocarbons. Advantages: ▪ Can be less time-consuming than bioremediation and natural treatment systems. ▪ Best suited for coarse-grained soils, like those at Old Windy Camp. Disadvantages: ▪ Chemical inputs can disrupt soil properties and nutrient cycling. ▪ Technology produces a liquid stream that that must be treated separately. ▪ Resulting treated soil typically requires dewatering prior to backfilling, as it has little to no bearing strength post-treatment. ▪ Large manpower and energy requirements
		Monitored Natural Attenuation: In-situ a remediation approach including variety of physical, chemical, or biological processes that can act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil. Advantages: ▪ Minimizes or avoids air and land emissions, tundra damage, and non-renewable resource depletion.
		▪ Good alternative for areas that are difficult to access (soils under buildings or wetlands). ▪ Allows cleanup workers to avoid contact with contaminated soils. ▪ Less equipment and labor than most methods.

Summary of Remediation Options for Old Windy Camp Soils

Areas	Predominant Hydrocarbon Fraction Requiring Treatment	Remedial Alternative
		▪ Less expensive. ▪ Sampling and testing over years can be costly, but it may still cost less than other methods. Disadvantages: ▪ Remedial timeframe may be protracted. ▪ Difficult to demonstrate in advance that approach will work. For this reason, approach may not be acceptable to stakeholders.

Approximately 575 m^3 of soils with F2 hydrocarbon fraction concentrations ranging from 260 mg/kg to 13,000 mg/kg were identified. This is the estimated volume of soils that was greater than the Nunavut/CCME guidelines for industrial land use. Only a small quantity of soils (<20 m^3) was affected by F3-range hydrocarbons, and the concentrations in these soils were only marginally higher than the Nunavut/CCME industrial petroleum hydrocarbon criteria.

Based on an evaluation of the remediation options above, landfarming provides the best balance between remedial effectiveness/use of a demonstrated technology, cost and remedial timeframes. This approach is the preferred remedial alternative for all the petroleum hydrocarbon affected areas, except for W8, the former incinerator area. The excavated wetland area would be difficult to rehabilitate post-remediation, and use of excavation equipment in could also damage nearby wetland areas. Excavation of the area by hand would be difficult because of the dense rooting system, and hand-excavation would also destroy the vegetation. Monitored natural attenuation would be the preferred remedial approach for this area, assuming that there is no undue risk to wildlife.

The probable range of remedial cost for the excavation and landfarming of the other soils is estimated to range between $150,000 and $200,000, with a remedial timeframe of two to three treatment seasons. This estimate was developed based on the assumed completion of the road to Old Windy Camp, and does not include permitting costs, engineering costs related to the design of the facility, and periodic engineering effort to monitor and sample the water and soils at the facility. The estimated size of the required landfarm facility to treat all the F2 and F3 affected soils is 40 m x 40 m. Containerization and off-site shipping and disposal of the soils would cost two to three times more than the estimated excavation and landfarming cost.

Landfarming with the application of an oxygen release compound could be considered to enhance biodegradation processes, but material costs of the remediation project would be increased by an estimated $30,000 to $50,000 versus conventional landfarming with nutrient amendments. The biotreatability study did not indicate whether an improved end result could be achieved using the proprietary oxygen release compound versus conventional landfarming in terms of meeting the remedial objectives or shortening the time of treatment.

7.0 RECOMMENDATIONS

The following recommendations apply to Old Windy Camp:

- Based on an evaluation of remedial options and the outcome of the SiREM biotreatability study, landfarming is the preferred remedial alternative for all the petroleum hydrocarbon affected areas at the Old Windy Camp.
- The petroleum hydrocarbon impacted soils requiring treatment Old Windy Camp could be landfarmed either at a purpose-built facility sited at an appropriate location, or by transporting the soils to the at the Patch Laydown site and adapting the bermed and lined former tank farm area to accommodate the soils for landfarming. This second option would be more cost effective and less disruptive to the environment. It would require a winter road to be built to Patch Laydown from the all-weather Doris to Windy Camp road.
- One exception is the petroleum hydrocarbon affected soils near the former incinerator in the wetland, where monitored natural attenuation would be the preferred remedial approach, assuming that there is no undue risk to wildlife.
- Considering that the proposed excavation volumes are small and occur in previously-disturbed areas of the site, and not within areas identified as being susceptible to solifluction, the potential for solifluction caused by remedial activities is low.
- Any fuel remaining in above ground storage tanks on the site should be collected in order to prevent any possible further hydrocarbon soil impacts, if applicable.
- Contact water sampled in the former fuel facility did not meet Water Licence discharge criteria at the time of the site investigation (August 2011).
- Decommissioning the former tank farm will avoid the future collection of contact water in the lined berm.
- The petroleum hydrocarbon concentrations in soils underlying the liner (site of 2004 fuel spill) need to be assessed when the berm facility is decommissioned.

8.0 CLOSURE

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Sincerely,
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The Association of Professional Engineers, Geologists and Geophysicists of the NWT / NU

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TABLES

Table 1	Soil Analytical Results for Hydrocarbons and Regulated Metals at W1
Table 2	Soil Analytical Results for Hydrocarbons at W2
Table 3	Soil Analytical Results for Hydrocarbons and Regulated Metals at W3
Table 4	Soil Analytical Results for Hydrocarbons at W4
Table 5	Soil Analytical Results for Hydrocarbons at W5
Table 6	Soil Analytical Results for Hydrocarbons and Salinity at W6
Table 7	Soil Analytical Results for Hydrocarbons at W7
Table8	Soil Analytical Results for Hydrocarbons at W8
Table 9	Water Analytical Results for Hydrocarbons, Routine Parameters and Regulated Metals at Windy Lake

Table 1: Soil Analytical Results for Hydrocarbons and Regulated Metals at W1 (Seacans South of Former Tankfarm, Old Windy Camp)

Test Parameter	Unit	Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarse-Grain)[1]	11W1_01 0 - 0.05 m	11W1_01 0.15 m	11W1_01 0 - 0.15 m	11W1_05 0.25 m	11W1_09 0.20 m	11W1_24 0.20 m
BTEX and Hydrocarbon Fractions F1 to F4								
Benzene	mg/kg	0.03	<0.0050	<0.0050	-	<0.0050	<0.0050	<0.0050
Toluene	mg/kg	0.37	0.033	<0.020	-	0.033	<0.020	<0.020
Ethylbenzene	mg/kg	0.082	<0.010	<0.010	-	<0.010	<0.010	<0.010
Xylenes	mg/kg	11	0.26	<0.040	-	<0.040	<0.040	<0.040
F1 (C6 - C10)	mg/kg	240	29	<12	-	<12	<12	<12
F2 (>C10 - C16)	mg/kg	260	**340**	<10	-	**380**	<10	14
F3 (>C16 - C34)	mg/kg	1,700	320	11	-	290	19	19
F4 (>C34 - C50)	mg/kg	3,300	<10	<10	-	24	12	<10
Metals								
Boron (B)	mg/kg	-	-	-	0	-	-	-
Hex. Chromium Cr 6+	mg/kg	1.4	-	-	<0.15	-	-	-
Antimony (Sb)	mg/kg	40	-	-	<1	-	-	-
Arsenic (As)	mg/kg	12.0	-	-	1	-	-	-
Barium (Ba)	mg/kg	2,000	-	-	24	-	-	-
Beryllium (Be)	mg/kg	8	-	-	<0.4	-	-	-
Cadmium (Cd)	mg/kg	22	-	-	<0.1	-	-	-
Chromium (Cr), total	mg/kg	87	-	-	22	-	-	-
Cobalt (Co)	mg/kg	300	-	-	5	-	-	-
Copper (Cu)	mg/kg	91	-	-	18	-	-	-
Lead (Pb)	mg/kg	600	-	-	2	-	-	-
Mercury (inorganic)	mg/kg	50	-	-	<0.05	-	-	-
Molybdenum (Mo)	mg/kg	40	-	-	<0.4	-	-	-
Nickel (Ni)	mg/kg	50	-	-	14	-	-	-
Selenium (Se)	mg/kg	2.9	-	-	<0.5	-	-	-
Silver (Ag)	mg/kg	40	-	-	<1	-	-	-
Thallium (Tl)	mg/kg	1	-	-	<0.3	-	-	-
Tin (Sn)	mg/kg	300	-	-	<1	-	-	-
Uranium (U)	mg/kg	300	-	-	<1	-	-	-
Vanadium (V)	mg/kg	130	-	-	32	-	-	-
Zinc (Zn)	mg/kg	360	-	-	26	-	-	-
Calculated Parameters - Salinity								
Anion Sum	meq/L	-	-	-	7.1	-	-	-
Calculated Boron	mg/kg	-	-	-	0.08	-	-	-
Cation Sum	meq/L	-	-	-	7.2	-	-	-
Cation/ED Ratio	-	-	-	-	11	-	-	-
Ion Balance	-	-	-	-	1.0	-	-	-
Calculated Calcium (Ca)	mg/kg	-	-	-	17	-	-	-
Calculated Magnesium (Mg)	mg/kg	-	-	-	9.7	-	-	-
Calculated Sodium (Na)	mg/kg	-	-	-	18	-	-	-
Calculated Potassium (K)	mg/kg	-	-	-	1.7	-	-	-
Calculated Chloride (Cl)	mg/kg	-	-	-	26	-	-	-
Calculated Sulphate (SO_4)	mg/kg	-	-	-	81	-	-	-
Soluble Parameters - Salinity								
Soluble Calcium (Ca)	mg/L	-	-	-	48	-	-	-
Soluble Magnesium (Mg)	mg/L	-	-	-	28	-	-	-
Soluble Potassium (K)	mg/L	-	-	-	4.9	-	-	-
Soluble Sodium (Na)	mg/L	-	-	-	53	-	-	-
Soluble Chloride (Cl)	mg/L	-	-	-	76	-	-	-
Sodium Absorption Ratio (SAR)	-	12	-	-	1.5	-	-	-
Soluble Sulfur (as SO_4)	mg/L	-	-	-	240	-	-	-
% Saturation	%	-	-	-	34	-	-	-
Soluble Conductivity	dS/m	4	-	-	0.63	-	-	-
Theoretical Gypsum Requirement	tonnes/ha	-	-	-	<0.1	-	-	-
Soluble ($CaCl_2$) pH	-	6 to 8	-	-	5.38	-	-	-
Soil Texture								
Grain Size (%>75 µm)	%	-	-	-	81	-	93	-
Soil Type	-	-	-	-	COARSE	-	COARSE	-

Notes:

[1] Environmental Guidelines for Contaminated Site Remediation, Nunavut, for Industrial, coarse-grained soil

[2] All soil samples were collected on August 10, 2011

- = Not detected/not analyzed/no unit/no guidelines

Bold = Greater than the referenced guideline

Table 2: Soil Analytical Results for Hydrocarbons at W2 (Landfarm, Old Windy Camp)

Test Parameter	Unit	Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarse-Grain)[1]	11W2_2 0.20 m	11W2_4 0.25 m	11W2_7 0.20 m	11W2_8 0.20 m	11W2_10 0.25 m	11W2_13 0.25 m	11W2_17 0.20 m	11W2_18 0.25 m	11W2_18 0.50 m	11W02_18 COMPOSITE	11W2_19 0.20 m	11W2_20 0.25 m	11W2_21 0.25 m	11W2_23 0.30 m
BTEX and Hydrocarbon Fractions F1 to F4																
Benzene	mg/kg	0.03	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	<0.0050	<0.0050	<0.0050	<0.0050
Toluene	mg/kg	0.37	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	-	<0.020	<0.020	0.028	<0.020
Ethylbenzene	mg/kg	0.082	<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
Xylenes	mg/kg	11	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	-	<0.040	<0.040	<0.040	<0.040
F1 (C6 - C10)	mg/kg	240	<12	<12	<12	14	<12	<12	<12	32	<12	-	<12	<12	<12	<12
F2 (>C10 - C16)	mg/kg	260	95	32	<10	170	<10	13	<10	**1,600**	110	-	<10	**550**	93	33
F3 (>C16 - C34)	mg/kg	1,700	160	100	39	140	130	44	74	320	45	-	23	**570**	220	55
F4 (>C34 - C50)	mg/kg	3,300	20	17	<10	20	18	<10	11	<10	<10	-	<10	51	39	<10
Metals																
Boron (B)	mg/kg	-	-	-	-	-	-	-	-	-	-	1.0	-	-	-	-
Hex. Chromium Cr 6+	mg/kg	1.4	-	-	-	-	-	-	-	-	-	<0.15	-	-	-	-
Antimony (Sb)	mg/kg	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-
Arsenic (As)	mg/kg	12.0	-	-	-	-	-	-	-	-	-	2	-	-	-	-
Barium (Ba)	mg/kg	2000	-	-	-	-	-	-	-	-	-	31	-	-	-	-
Beryllium (Be)	mg/kg	-	-	-	-	-	-	-	-	-	-	<0.4	-	-	-	-
Cadmium (Cd)	mg/kg	22	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-
Chromium (Cr), total	mg/kg	87	-	-	-	-	-	-	-	-	-	27	-	-	-	-
Cobalt (Co)	mg/kg	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-
Copper (Cu)	mg/kg	91	-	-	-	-	-	-	-	-	-	14	-	-	-	-
Lead (Pb)	mg/kg	600	-	-	-	-	-	-	-	-	-	3	-	-	-	-
Mercury (inorganic)	mg/kg	50	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-
Molybdenum (Mo)	mg/kg	-	-	-	-	-	-	-	-	-	-	1.0	-	-	-	-
Nickel (Ni)	mg/kg	50	-	-	-	-	-	-	-	-	-	17	-	-	-	-
Selenium (Se)	mg/kg	2.9	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-
Silver (Ag)	mg/kg	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-
Thallium (Tl)	mg/kg	1	-	-	-	-	-	-	-	-	-	<0.3	-	-	-	-
Tin (Sn)	mg/kg	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-
Uranium (U)	mg/kg	300	-	-	-	-	-	-	-	-	-	<1	-	-	-	-
Vanadium (V)	mg/kg	130	-	-	-	-	-	-	-	-	-	34	-	-	-	-
Zinc (Zn)	mg/kg	360	-	-	-	-	-	-	-	-	-	29	-	-	-	-
Nutrients																
Available (KCl) Nitrate plus Nitrite (N)	mg/kg	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-
Available (KCl) Nitrite (N)	mg/kg	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-
Available (Mod Kel) Phosphorus (P)	mg/kg	-	-	-	-	-	-	-	-	-	-	<4	-	-	-	-
Available (Mod Kel) Potassium (P)	mg/kg	-	-	-	-	-	-	-	-	-	-	26	-	-	-	-
Available ($CaCl_2$) Sulphur (S)	mg/kg	-	-	-	-	-	-	-	-	-	-	122	-	-	-	-
Calculated Parameters																
Available (KCl) Nitrate (N)	mg/kg	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-
Calculated Parameters - Salinity																
Anion Sum	meq/L	-	-	-	-	-	-	-	-	-	-	47	-	-	-	-
Calculated Boron	mg/kg	-	-	-	-	-	-	-	-	-	-	0.31	-	-	-	-
Cation Sum	meq/L	-	-	-	-	-	-	-	-	-	-	48	-	-	-	-
Cation/ED Ratio	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	-
Ion Balance	-	-	-	-	-	-	-	-	-	-	-	1.0	-	-	-	-
Calculated Calcium (Ca)	mg/kg	-	-	-	-	-	-	-	-	-	-	120	-	-	-	-
Calculated Magnesium (Mg)	mg/kg	-	-	-	-	-	-	-	-	-	-	56	-	-	-	-
Calculated Sodium (Na)	mg/kg	-	-	-	-	-	-	-	-	-	-	140	-	-	-	-
Calculated Potassium (K)	mg/kg	-	-	-	-	-	-	-	-	-	-	3.3	-	-	-	-
Calculated Chloride (Cl)	mg/kg	-	-	-	-	-	-	-	-	-	-	200	-	-	-	-
Calculated Sulphate (SO_4)	mg/kg	-	-	-	-	-	-	-	-	-	-	520	-	-	-	-
Soluble Parameters - Salinity																
Soluble Calcium (Ca)	mg/L	-	-	-	-	-	-	-	-	-	-	340	-	-	-	-
Soluble Magnesium (Mg)	mg/L	-	-	-	-	-	-	-	-	-	-	160	-	-	-	-
Soluble Potassium (K)	mg/L	-	-	-	-	-	-	-	-	-	-	9.3	-	-	-	-
Soluble Sodium (Na)	mg/L	-	-	-	-	-	-	-	-	-	-	410	-	-	-	-
Soluble Chloride (Cl)	mg/L	-	-	-	-	-	-	-	-	-	-	580	-	-	-	-
Sodium Absorption Ratio (SAR)	-	12	-	-	-	-	-	-	-	-	-	4.6	-	-	-	-
Soluble Sulfur (as SO_4)	mg/L	-	-	-	-	-	-	-	-	-	-	1,500	-	-	-	-
% Saturation	%	-	-	-	-	-	-	-	-	-	-	35	-	-	-	-
Soluble Conductivity	dS/m	4	-	-	-	-	-	-	-	-	-	3.8	-	-	-	-
Theoretical Gypsum Requirement	tonnes/ha	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-
Soluble ($CaCl_2$) pH	-	6 to 8	-	-	-	-	-	-	-	-	-	6.09	-	-	-	-
Soil Texture																
Grain Size (%>75 µm)	%	-	60	-	71	-	-	-	-	-	-	39	-	-	-	-
Soil Type	-	-	COARSE	-	COARSE	-	-	-	-	-	-	FINE	-	-	-	-

Notes:

[1] Environmental Guidelines for Contaminated Site Remediation, Nunavut, for Industrial, coarse-grained soil

[2] All soil samples were collected on August 10, 2011

- = Not detected/not analyzed/no unit/no guidelines

Bold = Greater than the referenced guideline

Table 3: Soil Analytical Results For Hydrocarbons and Metals at W3 (Former AST Near Generator, Old Windy Camp)

Test Parameter	Unit	Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarse-Grain)[1]	11W3_01 0.20 m	11W3_02 0.10 m	11W3_04 0.25 m	11W3_10 0.50 m
BTEX and Hydrocarbon Fractions F1 to F4						
Benzene	mg/kg	0.03	<0.0050	<0.0050	<0.0050	<0.0050
Toluene	mg/kg	0.37	<0.020	<0.020	0.028	<0.020
Ethylbenzene	mg/kg	0.082	<0.010	<0.010	0.018	<0.010
Xylenes	mg/kg	11	<0.040	<0.040	<0.040	<0.040
F1 (C6 - C10)	mg/kg	240	13	20	<12	<12
F2 (>C10 - C16)	mg/kg	260	**1,700**	**460**	91	210
F3 (>C16 - C34)	mg/kg	1,700	290	61	120	110
F4 (>C34 - C50)	mg/kg	3,300	16	<10	<10	36
Metals						
Boron (B)	mg/kg	-	-	0.4	-	-
Hex. Chromium Cr 6+	mg/kg	1.4	-	<0.15	-	-
Antimony (Sb)	mg/kg	40	-	<1	-	-
Arsenic (As)	mg/kg	12	-	4	-	-
Barium (Ba)	mg/kg	2,000	-	74	-	-
Beryllium (Be)	mg/kg	8	-	0	-	-
Cadmium (Cd)	mg/kg	22	-	<0.1	-	-
Chromium (Cr), total	mg/kg	87	-	45	-	-
Cobalt (Co)	mg/kg	300	-	9	-	-
Copper (Cu)	mg/kg	91	-	21	-	-
Lead (Pb)	mg/kg	600	-	6	-	-
Mercury (inorganic)	mg/kg	50	-	<0.05	-	-
Molybdenum (Mo)	mg/kg	40	-	1	-	-
Nickel (Ni)	mg/kg	50	-	24	-	-
Selenium (Se)	mg/kg	2.9	-	<0.5	-	-
Silver (Ag)	mg/kg	40	-	<1	-	-
Thallium (Tl)	mg/kg	1	-	<0.3	-	-
Tin (Sn)	mg/kg	300	-	<1	-	-
Uranium (U)	mg/kg	300	-	1	-	-
Vanadium (V)	mg/kg	130	-	47	-	-
Zinc (Zn)	mg/kg	360	-	41	-	-
Soil Texture						
Grain Size (%>75 µm)	%	-	-	-	84	-
Soil Type	-	-	-	-	COARSE	-

Notes:

[1] Environmental Guidelines for Contaminated Site Remediation, Nunavut, for Industrial, coarse-grained soil

[2] All samples were collected on August 9, 2011

- = Not detected/not analyzed/no unit/no guidelines

Bold = Greater than the referenced guideline

Table 4: Soil Analytical Results For Hydrocarbons at W4 (Generator, Old Windy Camp)

Sample Number	Sample Depth (m)	BTEX and Hydrocarbon Fractions F1 to F4 (mg/kg)								Soil Texture
		Benzene	Toluene	Ethylbenzene	Xylene	F1 (C6-C10)	F2 (>C10-C16)	F3 (>C16-C34)	F4 (>C34-C50)	Grain Size (% 75 µm)
11W4_01	0.25	<0.0050	<0.020	<0.010	<0.040	220	**6,400**	940	<10	89
11W4_01	0.75	<0.0050	<0.020	<0.010	<0.040	200	**7,000**	770	<10	-
11W4_02	0.30	<0.0050	<0.020	<0.010	<0.040	<12	**1,000**	380	<10	-
11W4_07	0.25	<0.0050	<0.020	<0.010	<0.040	<12	16	67	<10	-
11W4_08	0.20	<0.0050	<0.020	<0.010	<0.040	<12	15	41	<10	-
11W4_09	0.25	<0.0050	<0.020	<0.010	<0.040	<12	11	<10	<10	-
11W4_10	0.50	<0.0050	<0.020	<0.010	<0.040	**820**	**13,000**	1500	13	-
Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarse-Grain)[1]	**-**	**0.03**	**0.37**	**0.082**	**11**	**240**	**260**	**1,700**	**3,300**	**-**

Notes:

[1] Environmental Guidelines for Contaminated Site Remediation, Nunavut, for Industrial, coarse-grained soil

[2] All soil samples were collected on August 9, 2011

- = Not detected/not analyzed/no unit/no guidelines

Bold = Greater than the referenced guideline

Table 5: Soil Analytical Results for Hydrocarbons at W5 (Tents W5A to W5G, Old Windy Camp)

Test Parameter	Unit	Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarse-Grain)[1]	11W5A_01 0.20 m	11W5B_01 0.10 m	11W5C_01 0.10 m	11W5D_01 0.10 m	11W5D_01 0.30 m	11W5E_01 0.15 m	11W5E_01 0.50 m	11W5E_01 0.85 m	11W5E_02 0.20 m	11W5E_04 0.20 m	11W5F_02 0.10 m	11W5G_01 0.10 m	11W5G_01 0.30 m	11W5G_04 0.10 m	11W5H_01 0.50 m	11W5H_02 0.20 m	11W5H_04 0.20 m
BTEX and Hydrocarbon Fractions F1 to F4																			
Benzene	mg/kg	0.03	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	**0.14**	<0.0050	<0.0050
Toluene	mg/kg	0.37	0.035	0.024	<0.020	0.037	<0.020	<0.020	0.032	0.035	0.029	<0.020	<0.020	<0.020	<0.020	<0.020	**4.6**	<0.020	0.18
Ethylbenzene	mg/kg	0.082	<0.010	<0.010	<0.010	<0.010	<0.010	0.054	<3.7 (1)	0.027	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**4.4**	<0.010	**0.085**
Xylenes	mg/kg	11	<0.040	<0.040	<0.040	0.056	<0.040	6.9	**14**	**24**	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	**68**	<0.040	4.9
F1 (C6 - C10)	mg/kg	240	<12	<12	<12	<12	<12	430	**460**	**960**	<12	<12	<12	110	73	<12	**1,700**	<12	**260**
F2 (>C10 - C16)	mg/kg	260	<10	**2,900**	<10	**2,100**	180	**10,000**	**6,400**	**5,900**	11	<10	10	**3,300**	**3,500**	<10	**10,000**	49	**3800**
F3 (>C16 - C34)	mg/kg	1,700	49	900	60	83	23	1800	1200	920	69	11	<10	420	440	10	1600	33	500
F4 (>C34 - C50)	mg/kg	3,300	14	13	22	<10	<10	<10	<10	<10	16	<10	<10	<10	<10	<10	<10	<10	<10
Soil Texture																			
Grain Size (%>75 µm)	%	-	-	96	-	-	-	-	-	89	-	67	-	-	-	-	-	-	-
Soil Type	-	-	-	COARSE	-	-	-	-	-	COARSE	-	COARSE	-	-	-	-	-	-	-

Notes:

[1] Environmental Guidelines for Contaminated Site Remediation, Nunavut, for Industrial, coarse-grained soil

[2] All soil samples were collected on August 9, 2011

- = Not detected/not analyzed/no unit/no guidelines

(1) Detection Limit raised due to qualifying ion outside of acceptance criteria. Results are potentially biased high due to possible interferent

Bold = Greater than the referenced guideline

Table 6: Soil Analytical Results For Hydrocarbons and Salinity at W6 (Tankfarm, Old Windy Camp)

Test Parameter	Unit	Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarse-Grain)[1]	11W6_01 0 - 0.05 m	11W6_01 0.30 m	11W6_02 0.20 m	11W6_03 0.25 m	11W6_04 0.15 m	11W6_05 0.25 m	11W06_1 COMPOSITE 0.25 m
BTEX and Hydrocarbon Fractions F1 to F4									
Benzene	mg/kg	0.03	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Toluene	mg/kg	0.37	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Ethylbenzene	mg/kg	0.082	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Xylenes	mg/kg	11	<0.040	0.75	<0.040	<0.040	<0.040	<0.040	<0.040
F1 (C6 - C10)	mg/kg	240	21	88	<12	<12	<12	<12	<12
F2 (>C10 - C16)	mg/kg	260	220	240	13	<10	<10	18	120
F3 (>C16 - C34)	mg/kg	1,700	100	73	25	13	13	13	660
F4 (>C34 - C50)	mg/kg	3,300	<10	<10	<10	<10	<10	<10	48
Metals									
Boron (B)	mg/kg	-	1	-	-	-	1	-	-
Hex. Chromium Cr 6+	mg/kg	1.4	<0.15	-	-	-	<0.15	-	-
Antimony (Sb)	mg/kg	-	<1	-	-	-	<1	-	-
Arsenic (As)	mg/kg	12.0	2	-	-	-	2	-	-
Barium (Ba)	mg/kg	2,000	19	-	-	-	26	-	-
Beryllium (Be)	mg/kg	-	<0.4	-	-	-	<0.4	-	-
Cadmium (Cd)	mg/kg	22	<0.1	-	-	-	<0.1	-	-
Chromium (Cr), total	mg/kg	87	20	-	-	-	25	-	-
Cobalt (Co)	mg/kg	-	5	-	-	-	8	-	-
Copper (Cu)	mg/kg	91	12	-	-	-	21	-	-
Lead (Pb)	mg/kg	600	2	-	-	-	2	-	-
Mercury (inorganic)	mg/kg	50	<0.05	-	-	-	<0.05	-	-
Molybdenum (Mo)	mg/kg	-	<0.4	-	-	-	<0.4	-	-
Nickel (Ni)	mg/kg	50	12	-	-	-	19	-	-
Selenium (Se)	mg/kg	2.9	<0.5	-	-	-	<0.5	-	-
Silver (Ag)	mg/kg	-	<1	-	-	-	<1	-	-
Thallium (Tl)	mg/kg	1	<0.3	-	-	-	<0.3	-	-
Tin (Sn)	mg/kg	-	<1	-	-	-	<1	-	-
Uranium (U)	mg/kg	300	<1	-	-	-	<1	-	-
Vanadium (V)	mg/kg	130	24	-	-	-	54	-	-
Zinc (Zn)	mg/kg	360	23	-	-	-	34	-	-
Calculated Parameters Salinity									
Anion Sum	meq/L	-	-	140	-	-	-	-	-
Calculated Boron	mg/kg	-	-	0.05	-	-	-	-	-
Cation Sum	meq/L	-	-	130	-	-	-	-	-
Cation/ED Ratio	-	-	-	11	-	-	-	-	-
Ion Balance	-	-	-	0.95	-	-	-	-	-
Calculated Calcium (Ca)	mg/kg	-	-	250	-	-	-	-	-
Calculated Magnesium (Mg)	mg/kg	-	-	130	-	-	-	-	-
Calculated Sodium (Na)	mg/kg	-	-	470	-	-	-	-	-
Calculated Potassium (K)	mg/kg	-	-	4.7	-	-	-	-	-
Calculated Chloride (Cl)	mg/kg	-	-	1200.0	-	-	-	-	-
Calculated Sulphate (SO_4)	mg/kg	-	-	580	-	-	-	-	-
Soluble Parameters - Salinity									
Soluble Calcium (Ca)	mg/L	-	-	740	-	-	-	-	-
Soluble Magnesium (Mg)	mg/L	-	-	390	-	-	-	-	-
Soluble Potassium (K)	mg/L	-	-	14	-	-	-	-	-
Soluble Sodium (Na)	mg/L	-	-	1,400	-	-	-	-	-
Soluble Chloride (Cl)	mg/L	-	-	3,600 (1)	-	-	-	-	-
Sodium Absorption Ratio (SAR)	-	12	-	11	-	-	-	-	-
Soluble Sulfur (as SO_4)	mg/L	-	-	1,800	-	-	-	-	-
% Saturation	%	-	-	33	-	-	-	-	-
Soluble Conductivity	dS/m	4	-	**12.0**	-	-	-	-	-
Theoretical Gypsum Requirement	tonnes/ha	-	-	<0.1	-	-	-	-	-
Soluble ($CaCl_2$) pH	-	6 to 8	-	6.47	-	-	-	-	-
Soil Texture									
Grain Size (%>75 µm)	%	-	-	-	-	91	-	-	-
Soil Type	-	-	-	-	-	COARSE	-	-	-

Notes:

[1] Environmental Guidelines for Contaminated Site Remediation, Nunavut, for Industrial, coarse-grained soil

[2] All soil samples were collected on August 10, 2011

- = Not detected/not analyzed/no unit/no guidelines

(1) Detection Limit raised due to dilution to bring analyte within the calibrated range

Bold = Greater than the referenced guideline

Table 7: Soil Analytical Results for Hydrocarbons at W7 (Inside Shop Tent, Old Windy Camp)

Sample Number	Sample Depth (m)	BTEX and Hydrocarbon Fractions F1 to F4 (mg/kg)							
		Benzene	Toluene	Ethylbenzene	Xylene	F1 (C6-C10)	F2 (>C10-C16)	F3 (>C16-C34)	F4 (>C34-C50)
11W7_02	0.10	<0.0050	<0.020	<0.010	<0.040	<12	49	58	<10
11W7_03	0.10	<0.0050	<0.020	<0.010	<0.040	<12	29	730	68
Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarse-Grain)[1]	**-**	**0.03**	**0.37**	**0.082**	**11**	**240**	**260**	**1,700**	**3,300**

Notes:

[1] Environmental Guidelines for Contaminated Site Remediation, Nunavut, for Industrial, coarse-grained soil

[2] All soil samples were collected on August 9, 2011

- = Not detected/not analyzed/no unit/no guidelines

Bold = Greater than the referenced guideline

Table 8:Soil Analytical Results For Hydrocarbons at W8 (Incinerator Near Beach, Old Windy Camp)

Sample Number	Sample Depth (m)	BTEX and Hydrocarbon Fractions F1 to F4 (mg/kg)								Soil Texture
		Benzene	Toluene	Ethylbenzene	Xylene	F1 (C6-C10)	F2 (>C10-C16)	F3 (>C16-C34)	F4 (>C34-C50)	Grain Size (% 75 µm)
11W8_01	0.10	<0.0050	**0.47**	<0.010	<0.040	<12	**290**	1,400	210	-
11W8_02	0.10	<0.0050	<0.020	<0.010	<0.040	<12	**420**	71	<10	-
11W8_03	0.15	<0.0050	<0.020	<0.010	<0.040	15	180	71	<10	85
11W8_04	0.10	<0.0050	<0.020	<0.010	<0.040	<12	<10	<10	**<10**	-
11W8_05	0.10	<0.0050	<0.020	<0.010	<0.040	<12	56	13	<10	-
Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarse-Grain)[1]	**-**	**0.03**	**0.37**	**0.082**	**11**	**240**	**260**	**1,700**	**3,300**	**-**

Notes:

[1] Environmental Guidelines for Contaminated Site Remediation, Nunavut, for Industrial, coarse-grained soil

[2] All soil samples were collected on August 9, 2011

- = Not detected/not analyzed/no unit/no guidelines

Bold = Greater than the referenced guideline

Table 9: Surface Water Analytical Results for Hydrocarbons, Routine Water and Regulated Metals at Old Windy Camp

Test Parameter	Unit	CCME[1]	Licence No. 2BE-HOP0712	11W1-1	11W6-1	11W8-1	11W8-2
BTEX and Hydrocarbon Fractions F1 to F2							
Benzene	mg/L	0.370	0.370	<0.0004	<0.0004	<0.0004	<0.0004
Toluene	mg/L	0.002	0.002	<0.0004	<0.0004	<0.0004	<0.0004
Ethylbenzene	mg/L	0.090	0.090	<0.0004	<0.0004	<0.0004	<0.0004
Xylenes	mg/L	-	-	<0.0008	<0.0008	<0.0008	<0.0008
F1 (C6 - C10)	mg/L	-	-	<0.1	<0.1	<0.1	<0.1
F2 (>C10 - C16)	mg/L	-	-	<0.1	<0.1	3.3	<0.1
Routine Water and Diss. Regulated Metals Misc. Inorganics							
Conductivity	uS/cm	-		410	3,900	570	420
pH	-	6.5 to 9		7.28	7.97	7.1	7.7
Routine Water and Diss. Regulated Metals Calculated Parameters							
Anion Sum	meq/L	-		3.9	37	5.7	4.4
Cation Sum	meq/L	-		4.3	32	5.9	4.4
Hardness ($CaCO_3$)	mg/L	-		170	710	200	170
Ion Balance	-	-		1.1	0.87	1	0.99
Dissolved Nitrate (N)	mg/L	-		0.2	0.45	<0.003	0.008
Dissolved Nitrate (NO_3)	mg/L	13		0.89	2	<0.01	0.04
Nitrate plus Nitrite (N)	mg/L	-		0.2	0.45	<0.003	0.008
Dissolved Nitrite (N)	mg/L	-		<0.003	<0.003	<0.003	<0.003
Dissolved Nitrite (NO_2)	mg/L	0.06		<0.01	<0.01	<0.01	<0.01
Total Dissolved Solids	mg/L	-		210	2000	290	230
Routine Water and Diss. Regulated Metals Anions							
Alkalinity (PP as $CaCO_3$)	mg/L	-		<0.5	<0.5	<0.5	<0.5
Alkalinity (Total as $CaCO_3$)	mg/L	-		110	430	250	170
Bicarbonate (HCO_3)	mg/L	-		140	530	310	210
Carbonate (CO_3)	mg/L	-		<0.5	<0.5	<0.5	<0.5
Hydroxide (OH)	mg/L	-		<0.5	<0.5	<0.5	<0.5
Dissolved Sulphate (SO_4)	mg/L	-		7	320	18	19
Dissolved Chloride (Cl)	mg/L	120		53	**770**	10	23
Routine Water and Diss. Regulated Metals Elements							
Dissolved Aluminum (Al)	mg/L	0.1		**0.22**	0.037	0.075	0.009
Dissolved Antimony (Sb)	mg/L	-		<0.0006	0.0008	0.001	<0.0006
Dissolved Arsenic (As)	mg/L	0.005		0.0031	0.0042	0.0033	0.0009
Dissolved Barium (Ba)	mg/L	-		0.03	0.08	0.04	<0.01
Dissolved Beryllium (Be)	mg/L	-		<0.001	<0.001	<0.001	<0.001
Dissolved Boron (B)	mg/L	-		0.04	0.09	0.14	0.15
Dissolved Cadmium (Cd)	mg/L	0.06*		0.00012	0.00005	0.000012	0.000009
Dissolved Calcium (Ca)	mg/L	-		51	140	52	44
Dissolved Chromium (Cr), Trivalent	mg/L	0.0089		0.001	0.002	<0.001	<0.001
Dissolved Cobalt (Co)	mg/L	-		0.004	0.0034	0.0018	0.0005
Dissolved Copper (Cu)	mg/L	0.00428*		**0.0053**	**0.014**	0.0033	0.0019
Dissolved Iron (Fe)	mg/L	0.3		**4.8**	**0.87**	**6.6**	**0.59**
Dissolved Lead (Pb)	mg/L	0.00769*	0.001	0.0006	<0.0002	<0.0002	<0.0002
Dissolved Lithium (Li)	mg/L	-		<0.02	<0.02	<0.02	<0.02
Dissolved Magnesium (Mg)	mg/L	-		11	88	17	14
Dissolved Manganese (Mn)	mg/L	-		0.78	3.2	0.39	0.11
Dissolved Molybdenum (Mo)	mg/L	-		0.0006	0.0071	0.0007	<0.0002
Dissolved Nickel (Ni)	mg/L	0.162*		0.0044	0.0081	0.0032	0.0018
Dissolved Phosphorus (P)	mg/L	-		0.2	0.1	0.2	<0.1
Dissolved Potassium (K)	mg/L	-		3.7	14	3.6	2.4
Dissolved Selenium (Se)	mg/L	0.001		<0.0002	0.0009	<0.0002	<0.0002
Dissolved Silicon (Si)	mg/L	-		7.7	7.6	6.6	3.8
Dissolved Silver (Ag)	mg/L	0.0001		<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Sodium (Na)	mg/L	-		11	410	35	22
Dissolved Strontium (Sr)	mg/L	-		0.17	0.38	0.11	0.09
Dissolved Sulphur (S)	mg/L	-		3.1	110	5.4	6.3
Dissolved Thallium (Tl)	mg/L	0.0008		<0.0002	<0.0002	<0.0002	<0.0002
Dissolved Tin (Sn)	mg/L	-		<0.001	<0.001	<0.001	<0.001
Dissolved Titanium (Ti)	mg/L	-		0.005	0.003	0.001	<0.001
Dissolved Uranium (U)	mg/L	0.015		0.0004	0.0058	0.0004	0.0002
Dissolved Vanadium (V)	mg/L	-		0.004	0.008	0.002	<0.001
Dissolved Zinc (Zn)	mg/L	0.03		0.012	0.009	0.013	0.008
Total Regulated Metals Elements							
Total Aluminum (Al)	mg/L	0.1		20	2.4	13	0.072
Total Antimony (Sb)	mg/L	-		<0.006	<0.0006	<0.006	0.0008
Total Arsenic (As)	mg/L	0.005		**0.011**	**0.0091**	**0.013**	0.0015
Total Barium (Ba)	mg/L	-		0.19	0.12	0.16	<0.01
Total Beryllium (Be)	mg/L	-		<0.01	<0.001	<0.01	<0.001
Total Boron (B)	mg/L	-		0.03	0.08	0.12	0.14
Total Cadmium (Cd)	mg/L	0.06*		0.00021	0.00011	0.00035	0.00001
Total Calcium (Ca)	mg/L	-		61	150	63	49
Total Chromium (Cr), Trivalent	mg/L	0.0089		**0.06**	**0.009**	**0.04**	<0.001
Total Cobalt (Co)	mg/L	-		0.018	0.0063	0.013	0.0008
Total Copper (Cu)	mg/L	0.00428*		**0.11**	**0.028**	**0.087**	**0.0021**
Total Iron (Fe)	mg/L	0.3		**47**	**7.9**	**38**	**1.7**
Total Lead (Pb)	mg/L	0.00769*	0.001	**0.011**	**0.0017**	**0.016**	<0.0002
Total Lithium (Li)	mg/L	-		0.05	<0.02	0.03	<0.02
Total Magnesium (Mg)	mg/L	-		25	96	26	15
Total Manganese (Mn)	mg/L	-		1.2	3.6	0.69	0.12
Total Molybdenum (Mo)	mg/L	-		<0.002	0.0074	<0.002	<0.0002
Total Nickel (Ni)	mg/L	0.162*		0.041	0.013	0.029	0.0022
Total Phosphorus (P)	mg/L	-		0.6	0.2	0.8	<0.1
Total Potassium (K)	mg/L	-		9	15	8	2.1
Total Selenium (Se)	mg/L	0.001		<0.002	0.0012	<0.002	<0.0002
Total Silicon (Si)	mg/L	-		37	14	27	4.2
Total Silver (Ag)	mg/L	0.0001		<0.001	<0.0001	<0.001	<0.0001
Total Sodium (Na)	mg/L	-		11	430	33	18
Total Strontium (Sr)	mg/L	-		0.21	0.41	0.14	0.09
Total Sulphur (S)	mg/L	-		3.5	110	5.6	4.5
Total Thallium (Tl)	mg/L	0.0008		<0.002	<0.0002	<0.002	<0.0002
Total Tin (Sn)	mg/L	-		<0.01	<0.001	<0.01	<0.001
Total Titanium (Ti)	mg/L	-		1.2	0.17	0.7	0.004
Total Uranium (U)	mg/L	0.015		0.002	0.0062	0.002	0.0002
Total Vanadium (V)	mg/L	-		0.1	0.023	0.06	0.002
Total Zinc (Zn)	mg/L	0.03		**0.08**	0.012	**0.09**	<0.003

Notes:

[1] Canadian Water Quality Guidelines for Protection of Aquatic Life - Freshwater

-' = Not detected/not analyzed/no unit/no guidelines

* Based on hardness of 200 mg/L

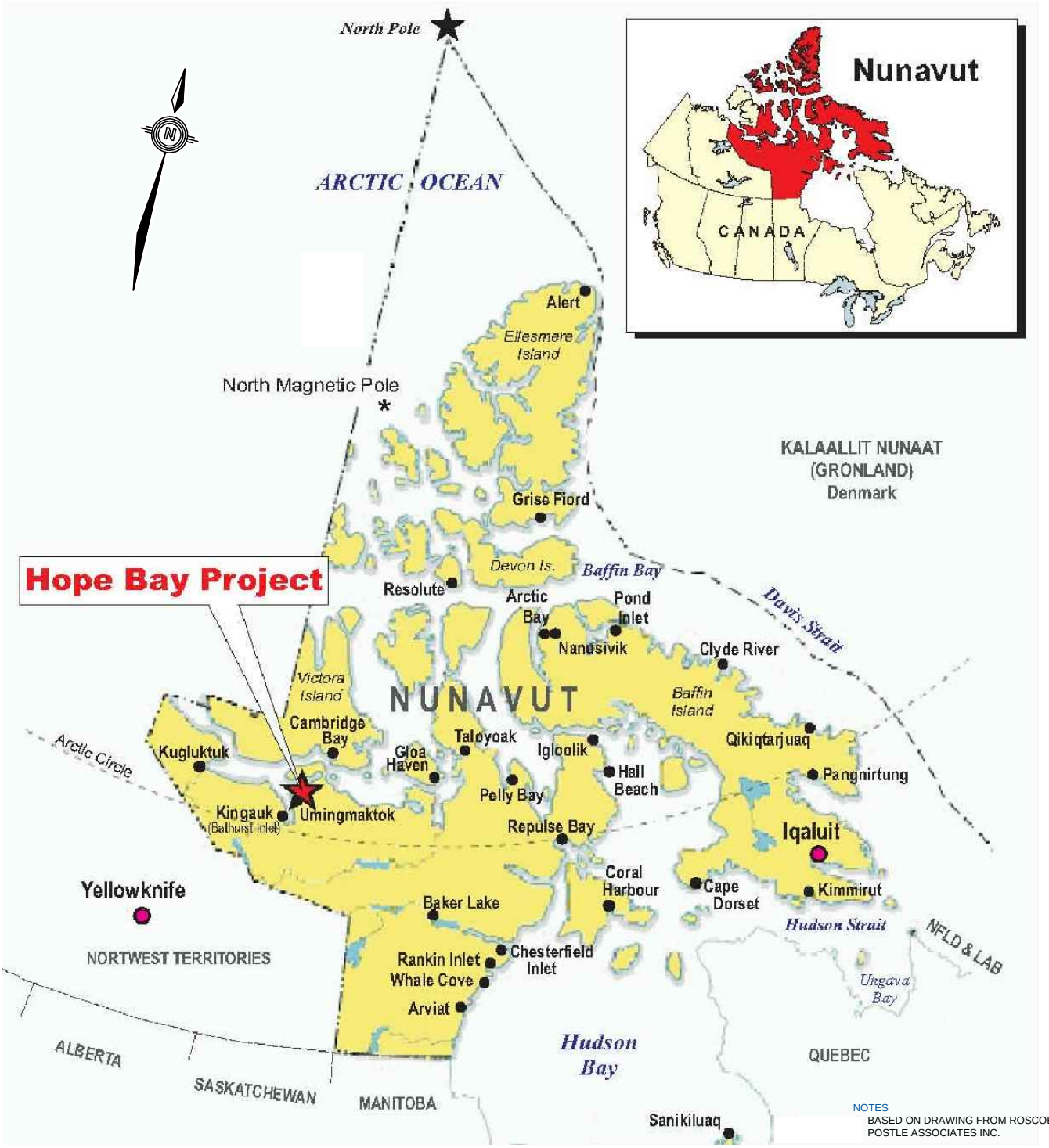
(1) Detection Limit raised based on sample volume used for analysis/ due to dilution to bring analyte within calibrated range

(2) Detection Limits raised due to matrix interference

Bold = Greater than the referenced guideline

FIGURES

Figure 1	Hope Bay Project Location
Figure 2	Old Windy Camp Layout
Figure 3A	W1 – Seacans and Downgradient of 2004 Spill
Figure 3B	W2 – Former Landfarm
Figure 3C	W3 – Former AST near Generators and Shop Tent
Figure 3D	W4 – Former Generators
Figure 3Ei-3Eiii	W5 – Tents
Figure 3F	W6 – Soils with Tankfarm (no ASTs)
Figure 3G	W7 – Soils inside Shop Tent
Figure 3H	W8 – Former Incinerator near Beach
Figure 4	Surface Water Sampling Locations



NOTES
BASED ON DRAWING FROM ROSCOE POSTLE ASSOCIATES INC.

STATUS
ISSUED FOR USE

0 1 000 m
Scale: 1: 20 000

CLIENT
NEWMONT

eba
A TETRA TECH COMPANY

PHASE III ENVIRONMENTAL SITE ASSESSMENT
OLD WINDY CAMP
HOPE BAY GOLD PROJECT, NUNAVUT

HOPE BAY PROJECT LOCATION

PROJECT NO.	DWN	CKD	REV
Y22101187.001	EL	DF	1

OFFICE	DATE
EDM	June 2012

Figure 1

Q:\Edmonton\Drafting\PROJECTS\Y221\Y22101187\001\AutoCAD\Windy\Y22101187.001-Windy_FIG 2_R0.dwg [FIGURE 2] June 15, 2012 - 8:05:52 am (BY: KIROS, TIGISTI)

0 100 m

Scale: 1: 2 000

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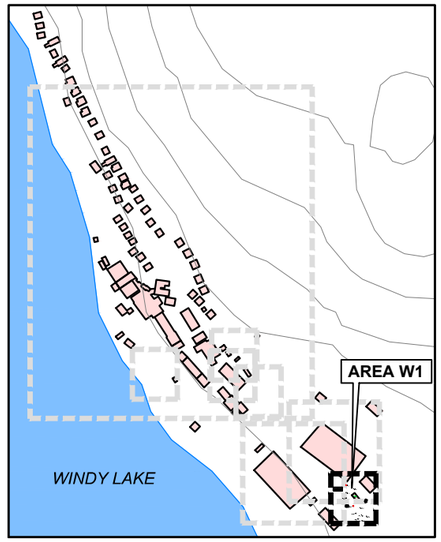
PHASE III ENVIRONMENTAL SITE ASSESSMENT
OLD WINDY CAMP
HOPE BAY GOLD PROJECT, NUNAVUT

WINDY CAMP LAYOUT

PROJECT NO.	DWN	CKD	REV
Y22101187.001	EL	DF	1

OFFICE	DATE
EDM	June 2012

Figure 2



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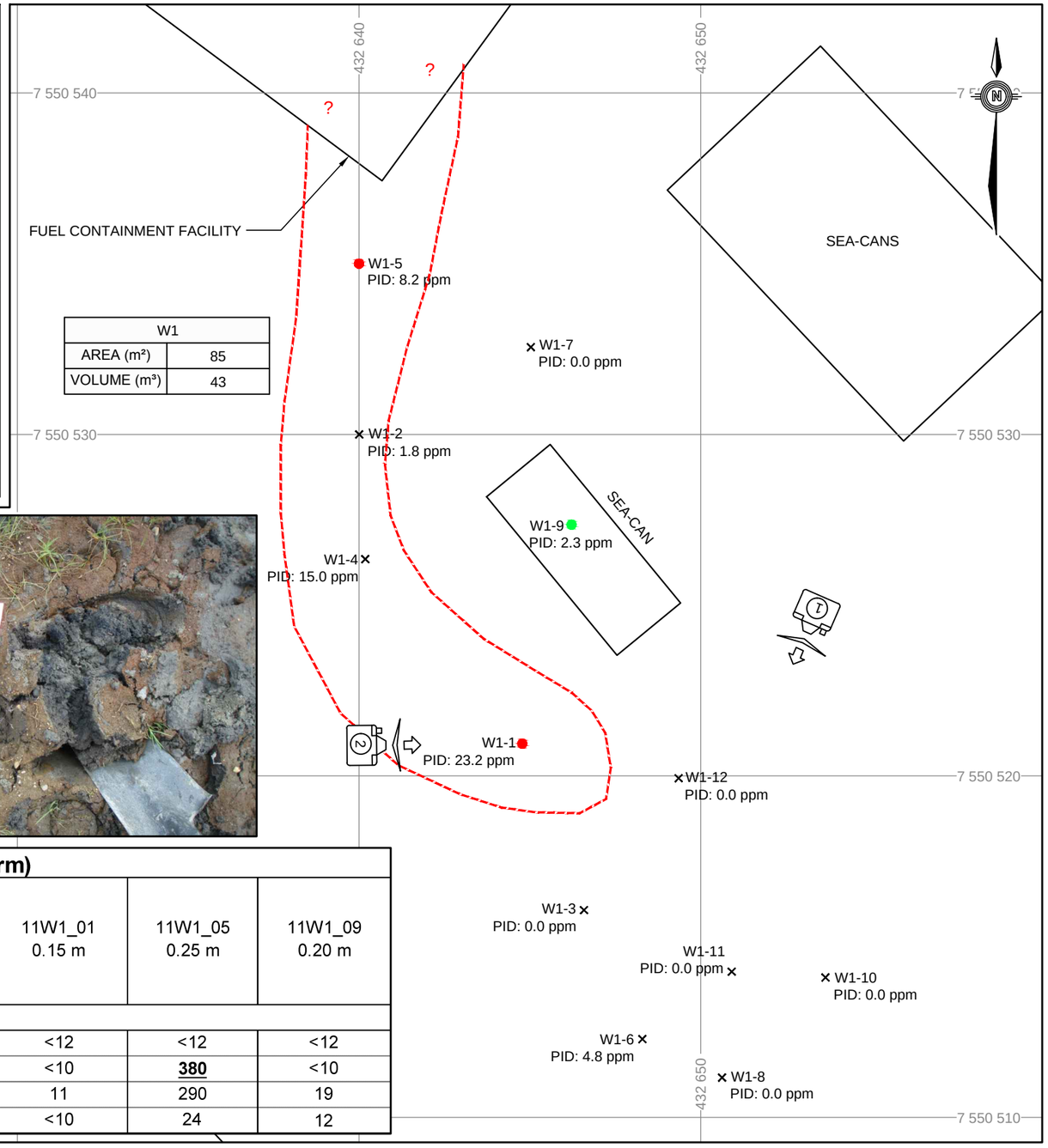
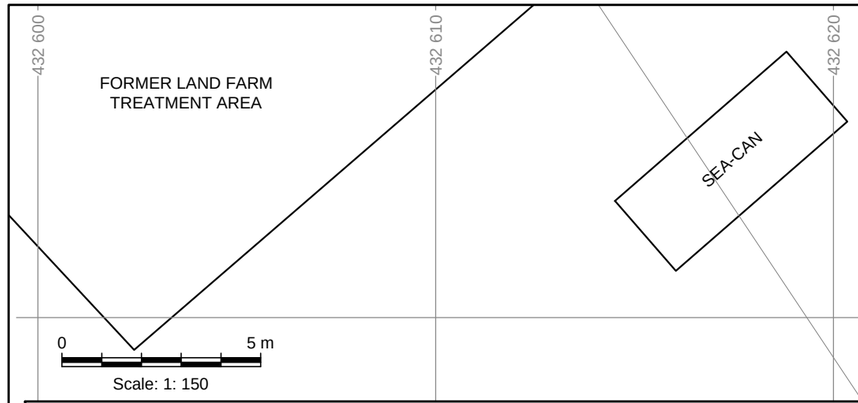


W1	
AREA (m²)	85
VOLUME (m³)	43



Confirmatory Soil Analytical Results for Hydrocarbons at W1 (Seacans South of Former Tankfarm)

Test Parameter	Unit	Tier 1 Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarse-Grained Soil)		11W1_01 0 - 0.05 m	11W1_01 0.15 m	11W1_05 0.25 m	11W1_09 0.20 m
		Industrial	Wildland				
Hydrocarbon Fractions F1 to F4							
F1 (C6 - C10)	mg/kg	240	30	29	<12	<12	<12
F2 (>C10 - C 16)	mg/kg	260	150	**340**	<10	**380**	<10
F3 (>C16 - C34)	mg/kg	1,700	300	320	11	290	19
F4 (>C34 - C50)	mg/kg	3,300	2,800	<10	<10	24	12

LEGEND
- ✕ - SOIL SCREENING POINT
- ● - SAMPLE BELOW TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION
- ● - SAMPLE ABOVE TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION
- - - - AREA HIGHER THAN INDUSTRIAL GUIDELINE

NOTES
- GPS POINTS WERE COLLECTED IN UTM WITH NAD83 DATUM, ZONE 13, METER; CENTRAL MERIDIAN 105d W.
- **BOLD AND UNDERLINED**; VALUE GREATER THAN THE INDUSTRIAL GUIDELINE
- DEPTH SHOWN IS IN METRES BELOW BELOW GRADE

STATUS
ISSUED FOR USE

CLIENT
NEWMONT

PHASE III ENVIRONMENTAL SITE ASSESSMENT
OLD WINDY CAMP
HOPE BAY GOLD PROJECT, NUNAVUT

W1 - SEACANS SOUTH OF FORMER TANK FARM

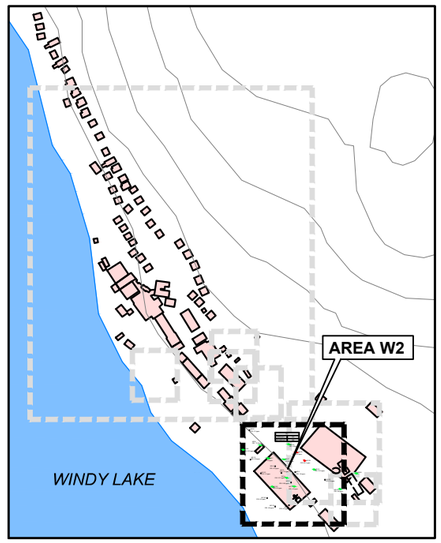
eba A TETRA TECH COMPANY

PROJECT NO.	DWN	CKD	REV
Y22101187.001	EL	DF	1

OFFICE: EDM
DATE: June 2012

Figure 3A

Q:\Edmonton\Drafting\PROJECTS\Y2211\Y22101187001\AutoCAD\Windy\Y22101187.001-Windy_FIG 3A_R0.dwg [FIGURE 3A] June 15, 2012 - 1:15:14 pm (BY: KIROS, TIGIST)



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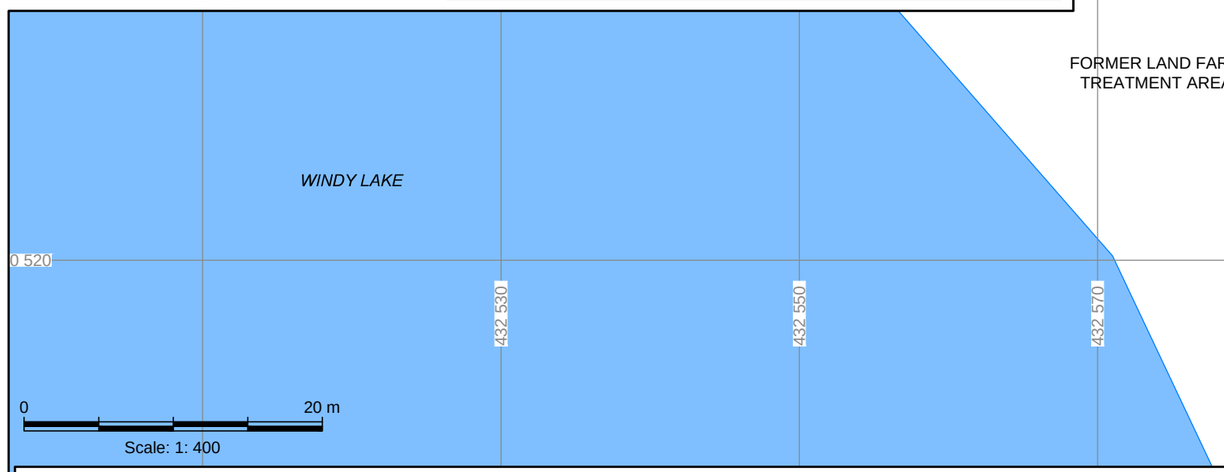

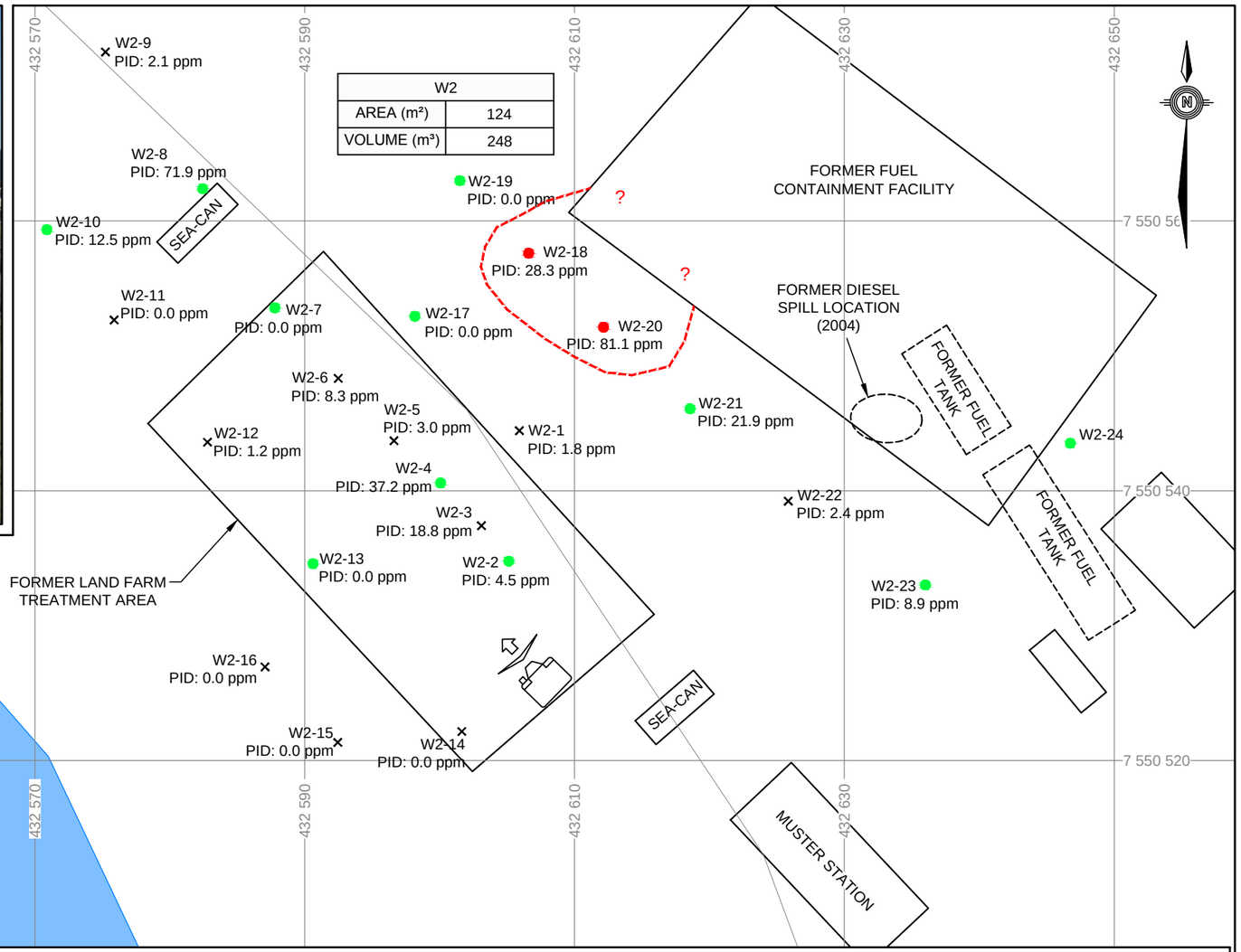

Confirmatory Soil Analytical Results for Hydrocarbons at W2 (Landfarm)

Test Parameter	Unit	Tier 1 Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarse-Grained Soil)		11W2_2 0.20 m	11W2_4 0.25 m	11W2_7 0.20 m	11W2_8 0.20 m	11W2_10 0.25 m	11W2_13 0.25 m	11W2_17 0.20 m	11W2_18 0.25 m	11W2_18 0.50 m	11W2_19 0.20 m	11W2_20 0.25 m	11W2_21 0.25 m	11W2_23 0.30 m	11W1_24 0.20 m
		Industrial	Wildland														
Hydrocarbon Fractions F1 to F4																	
F1 (C6 - C10)	mg/kg	240	30	<12	<12	<12	14	<12	<12	<12	32	<12	<12	<12	<12	<12	<12
F2 (>C10 - C 16)	mg/kg	260	150	95	32	<10	170	<10	13	<10	**1,600**	110	<10	**550**	93	33	14
F3 (>C16 - C34)	mg/kg	1,700	300	160	100	39	140	130	44	74	320	45	23	570	220	55	19
F4 (>C34 - C50)	mg/kg	3,300	2,800	20	17	<10	20	18	<10	11	<10	<10	<10	51	39	<10	<10

LEGEND
- ✕ - SOIL SCREENING POINT
- ● - SAMPLE BELOW TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION
- ● - SAMPLE ABOVE TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION
- – – – – - FORMER FACILITY LOCATION
- – – – – - AREA HIGHER THAN INDUSTRIAL GUIDELINE

NOTES
- GPS POINTS WERE COLLECTED IN UTM WITH NAD83 DATUM, ZONE 13, METER; CENTRAL MERIDIAN 105d W.
- **BOLD AND UNDERLINED**: VALUE GREATER THAN THE INDUSTRIAL GUIDELINE
- DEPTH SHOWN IS IN METRES BELOW BELOW GRADE

STATUS
ISSUED FOR USE

CLIENT
NEWMONT

PHASE III ENVIRONMENTAL SITE ASSESSMENT
OLD WINDY CAMP
HOPE BAY GOLD PROJECT, NUNAVUT

W2 - LANDFARM

eba A TETRA TECH COMPANY

PROJECT NO.	DWN	CKD	REV
Y22101187.001	EL	DF	1
OFFICE: EDM	DATE: June 2012		

Figure 3B

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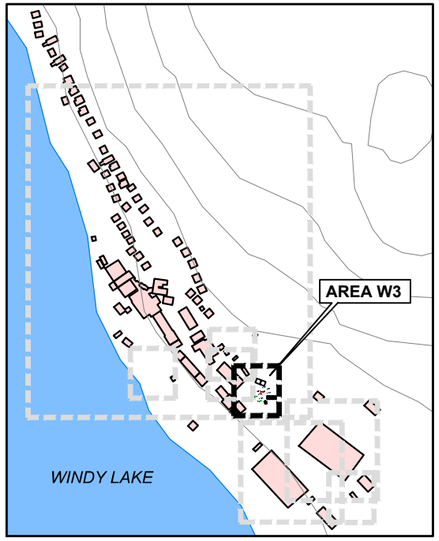

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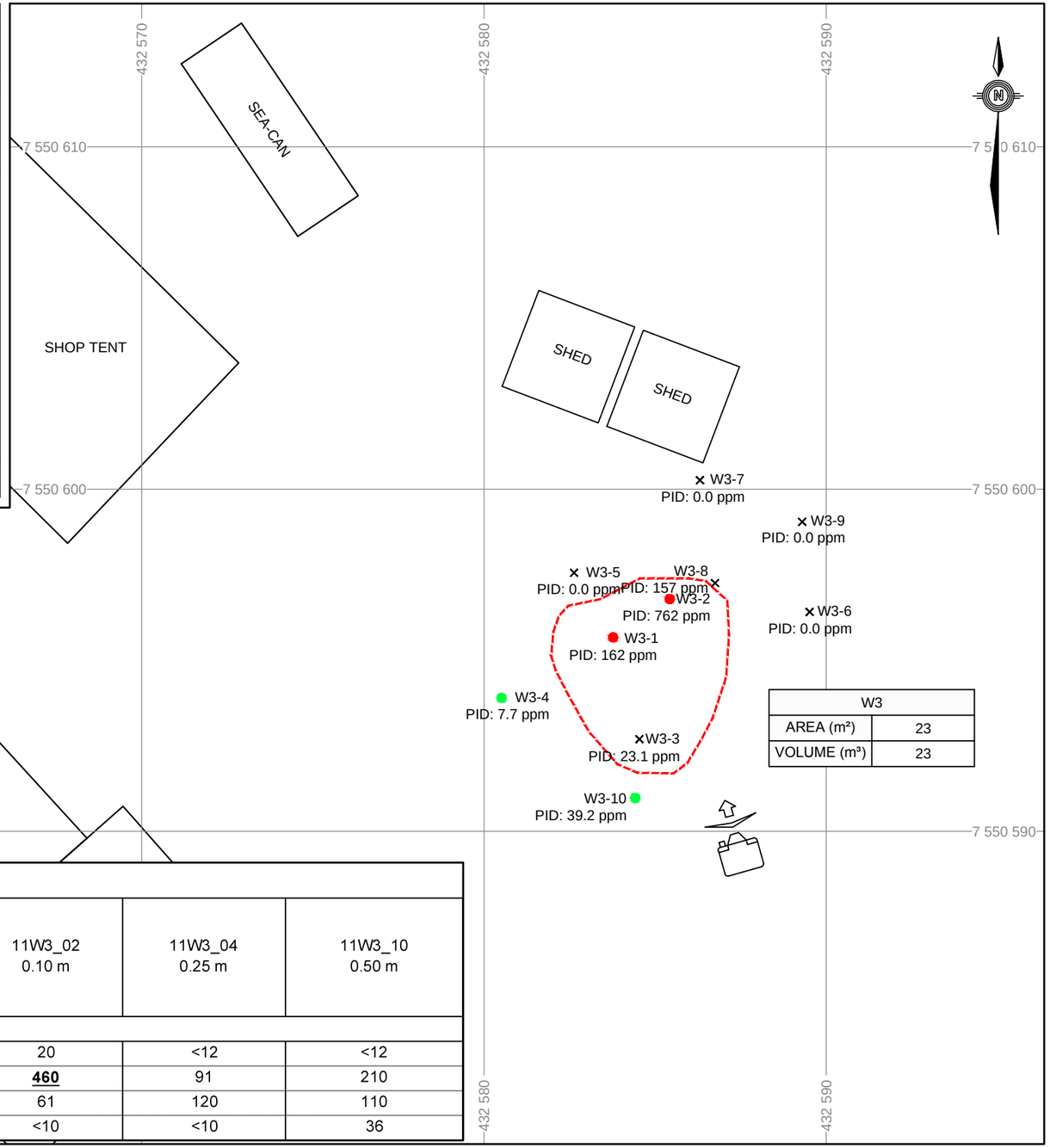

W3	
AREA (m²)	23
VOLUME (m³)	23

Confirmatory Soil Analytical Results For Hydrocarbons at W3 (Former AST Near Generator)

Test Parameter	Unit	Tier 1 Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarse-Grained Soil)		11W3_01 0.20 m	11W3_02 0.10 m	11W3_04 0.25 m	11W3_10 0.50 m
		Industrial	Wildland				
Hydrocarbon Fractions F1 to F4							
F1 (C6 - C10)	mg/kg	240	30	13	20	<12	<12
F2 (>C10 - C 16)	mg/kg	260	150	**1,700**	**460**	91	210
F3 (>C16 - C34)	mg/kg	1,700	300	290	61	120	110
F4 (>C34 - C50)	mg/kg	3,300	2,800	16	<10	<10	36

LEGEND
- ✕ - SOIL SCREENING POINT
- ● - SAMPLE BELOW TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION
- ● - SAMPLE ABOVE TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION
- - - - - AREA HIGHER THAN INDUSTRIAL GUIDELINE

NOTES
- GPS POINTS WERE COLLECTED IN UTM WITH NAD83 DATUM, ZONE 13, METER; CENTRAL MERIDIAN 105d W.
- **BOLD AND UNDERLINED**: VALUE GREATER THAN THE INDUSTRIAL GUIDELINE
- DEPTH SHOWN IS IN METRES BELOW BELOW GRADE

STATUS
ISSUED FOR USE

CLIENT
NEWMONT

PHASE III ENVIRONMENTAL SITE ASSESSMENT
OLD WINDY CAMP
HOPE BAY GOLD PROJECT, NUNAVUT

W3 - FORMER AST NEAR GENERATORS

eba A TETRA TECH COMPANY

PROJECT NO.	DWN	CKD	REV
Y22101187.001	EL	DF	1
OFFICE: EDM	DATE: June 2012		

Figure 3C

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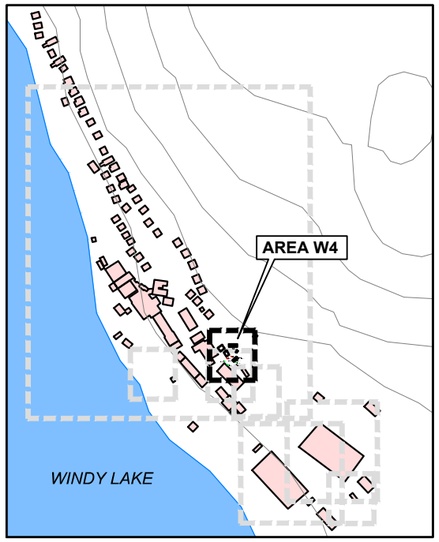

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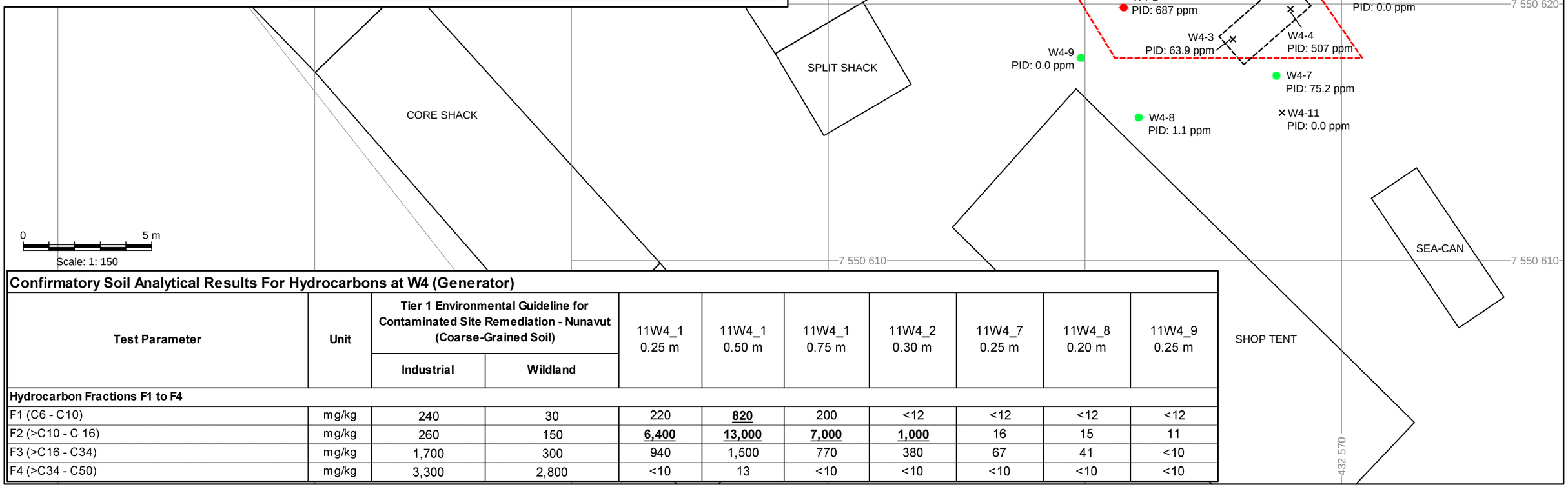


Confirmatory Soil Analytical Results For Hydrocarbons at W4 (Generator)

Test Parameter	Unit	Tier 1 Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarse-Grained Soil)		11W4_1 0.25 m	11W4_1 0.50 m	11W4_1 0.75 m	11W4_2 0.30 m	11W4_7 0.25 m	11W4_8 0.20 m	11W4_9 0.25 m
		Industrial	Wildland							
Hydrocarbon Fractions F1 to F4										
F1 (C6 - C10)	mg/kg	240	30	220	**820**	200	<12	<12	<12	<12
F2 (>C10 - C 16)	mg/kg	260	150	**6,400**	**13,000**	**7,000**	**1,000**	16	15	11
F3 (>C16 - C34)	mg/kg	1,700	300	940	1,500	770	380	67	41	<10
F4 (>C34 - C50)	mg/kg	3,300	2,800	<10	13	<10	<10	<10	<10	<10

LEGEND
- ✕ - SOIL SCREENING POINT
- ● - SAMPLE BELOW TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION
- ● - SAMPLE ABOVE TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION
- ------ - AREA HIGHER THAN INDUSTRIAL GUIDELINE

NOTES
- GPS POINTS WERE COLLECTED IN UTM WITH NAD83 DATUM, ZONE 13, METER; CENTRAL MERIDIAN 105d W.
- **BOLD AND UNDERLINED**; VALUE GREATER THAN THE INDUSTRIAL GUIDELINE
- DEPTH SHOWN IS IN METRES BELOW BELOW GRADE

STATUS
ISSUED FOR USE

CLIENT
NEWMONT

PHASE III ENVIRONMENTAL SITE ASSESSMENT
OLD WINDY CAMP
HOPE BAY GOLD PROJECT, NUNAVUT

W4 - GENERATOR

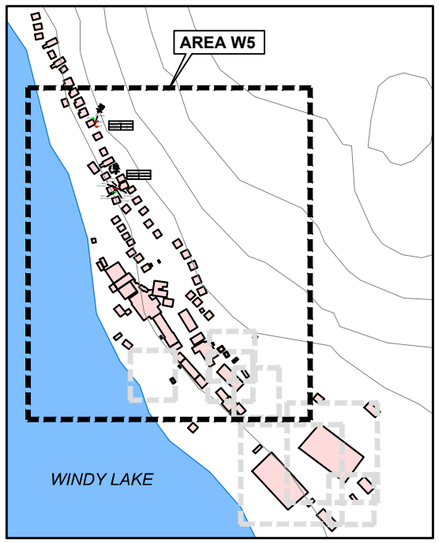
PROJECT NO.	DWN	CKD	REV
Y22101187.001	EL	DF	1

OFFICE: EDM
DATE: June 2012

Figure 3D

eba A TETRA TECH COMPANY

Q:\Edmonton\Drafting\PROJECTS\Y22\Y22101187\0001\AutoCAD\Windy\Y22101187-001-Windy_FIG 3D_R0.dwg [FIGURE 3D] June 15, 2012 - 8:12:07 am (BY: KIROS, TIGIST)



KEY PLAN
1:4000

0 20 m
Scale: 1: 400

W5E	
AREA (m²)	9
VOLUME (m³)	18

W5D	
AREA (m²)	2
VOLUME (m³)	4

W5E-3
PID: 639 ppm @ 15 cm
W5E-5
W5E-1
PID: 704 ppm @ 50 cm
W5E-2
PID: 0.0 ppm
W5E-4
PID: 0.0 ppm
DRILLERS' DRY
W5D-2
PID: 0.0 ppm
W5D-1
PID: 109 ppm @ 10 cm
0 ppm @ 30 cm
W5D-4
PID: 0.0 ppm
TENT 41
W5D-3
PID: 0.0 ppm
CORE SHACK
CORE SHACK
W5A-1
PID: 0.0 ppm
W5A-2
PID: 0.0 ppm
FORMER GENERATOR
W5F-2
PID: 0.0 ppm
W5F-1
PID: 92.6 ppm
REGIONAL ANNEX
FORMER INCINERATOR
2 500
432 550
755
20

Confirmatory Soil Analytical Results for Hydrocarbons at W5 (Tents W5A, W5D, W5E and W5F)

Test Parameter	Unit	Tier 1 Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarse-Grained Soil)		Core Shack	Drillers Dry					Tent 41		Core Shack
		Industrial	Wildland	11W5A_01 0.20	11W5E_01 0.15	11W5E_01 0.50	11W5E_01 0.85	11W5E_02 0.20	11W5E_04 0.20	11W5D_01 0.10	11W5D_01 0.30	11W5F_02 0.10
Hydrocarbon Fractions F1 to F4												
F1 (C6 - C10)	mg/kg	240	30	<12	**430**	**460**	**960**	<12	<12	<12	<12	<12
F2 (>C10 - C 16)	mg/kg	260	150	<10	**10,000**	**6,400**	**5,900**	11	<10	**2,100**	180	10
F3 (>C16 - C34)	mg/kg	1,700	300	49	**1,800**	**1,200**	**920**	69	11	83	23	<10
F4 (>C34 - C50)	mg/kg	3,300	2,800	14	<10	<10	<10	16	<10	<10	<10	<10

LEGEND
- ✕ - SOIL SCREENING POINT
- ● - SAMPLE BELOW TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION
- ● - SAMPLE ABOVE TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION
- ▭ - HEATING FUEL TANK LOCATION
- ▭ - FORMER HEATING FUEL TANK LOCATION
- ▬ - AREA HIGHER THAN INDUSTRIAL GUIDELINE

NOTES
- GPS POINTS WERE COLLECTED IN UTM WITH NAD83 DATUM, ZONE 13, METER; CENTRAL MERIDIAN 105d W.
- EBA's HAND HELD GPS UNIT HAS AN ACCURACY OF ±2-3 m
- **BOLD AND UNDERLINED**: VALUE GREATER THAN THE INDUSTRIAL GUIDELINE
- DEPTH SHOWN IS IN METRES BELOW BELOW GRADE

STATUS
ISSUED FOR USE

CLIENT
NEWMONT

eba A TETRA TECH COMPANY

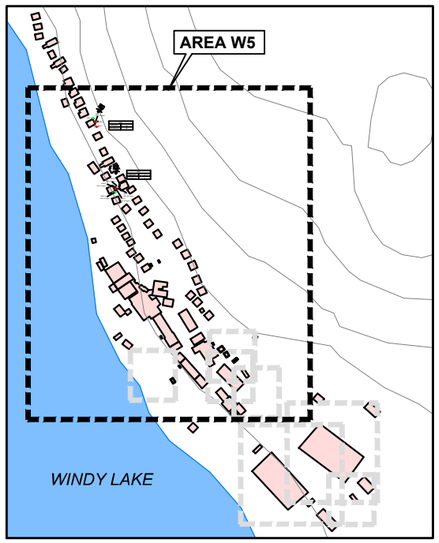
PHASE III ENVIRONMENTAL SITE ASSESSMENT
OLD WINDY CAMP
HOPE BAY GOLD PROJECT, NUNAVUT

W5 - TENTS (W5A - W5G)

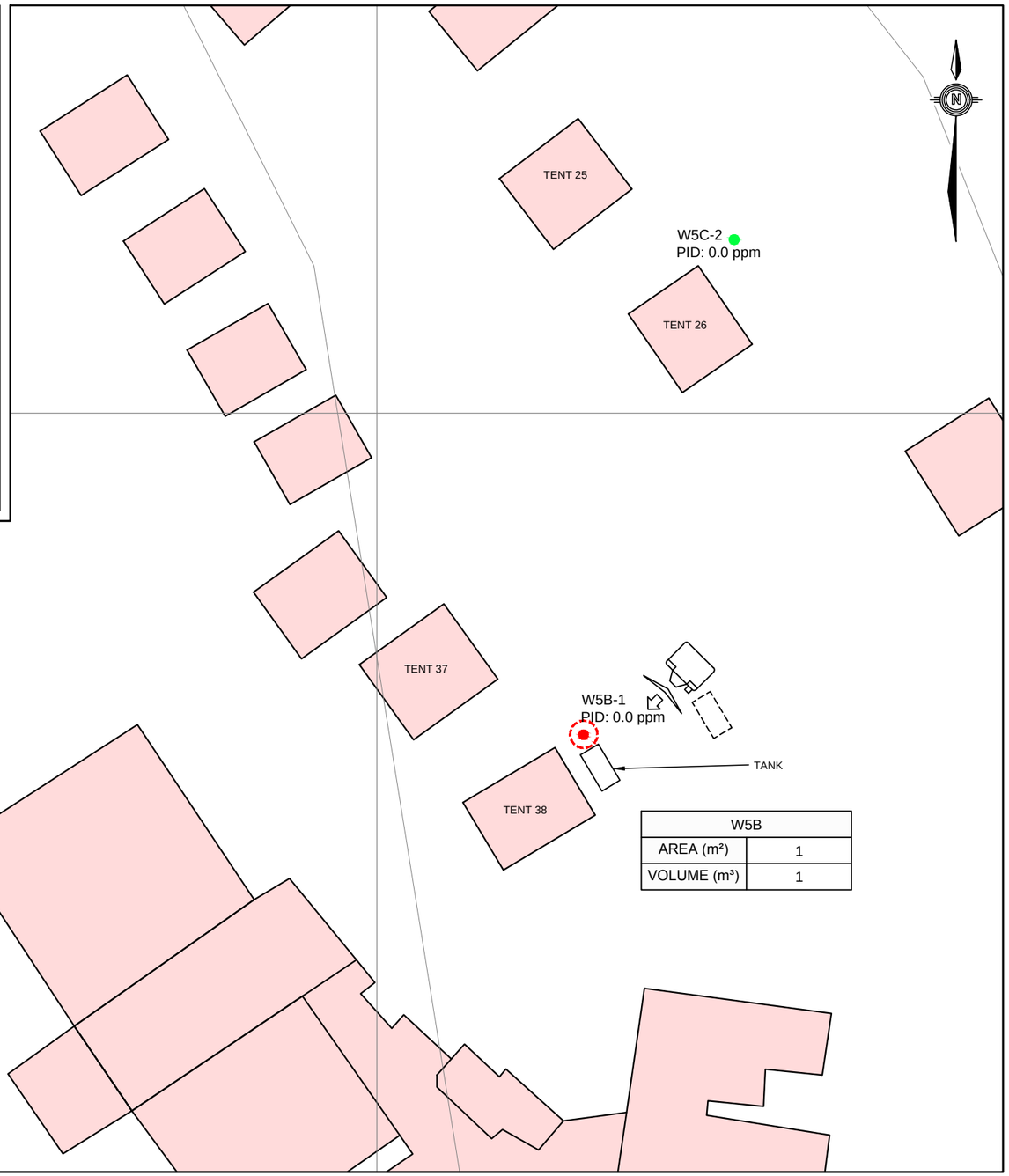
PROJECT NO.	DWN	CKD	REV
Y22101187.001	EL	DF	1
OFFICE: EDM	DATE: June 2012		

Figure 3Ei

Q:\Edmonton\Drafting\PROJECTS\Y2211\Y22101187\001\AutoCAD\Windy\Y22101187.001-Windy_FIG 3E_R0.dwg [FIGURE 3Ei] June 15, 2012 - 8:18:34 am (BY: KIROS, TIGIST)



KEY PLAN
1:4000



0 10 m
Scale: 1: 250

W5B	
AREA (m²)	1
VOLUME (m³)	1

Confirmatory Soil Analytical Results for Hydrocarbons at W5 (Tents W5B and W5C)

Test Parameter	Unit	Tier 1 Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarse-Grained Soil)		Tent 38	Tent 26
		Industrial	Wildland	11W5B_01 0.10	11W5C_01 0.10
Hydrocarbon Fractions F1 to F4					
F1 (C6 - C10)	mg/kg	240	30	<12	<12
F2 (>C10 - C 16)	mg/kg	260	150	**2,900**	<10
F3 (>C16 - C34)	mg/kg	1,700	300	900	60
F4 (>C34 - C50)	mg/kg	3,300	2,800	13	22

LEGEND
- ✕ - SOIL SCREENING POINT
- ● - SAMPLE BELOW TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION
- ● - SAMPLE ABOVE TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION
- ▭ - HEATING FUEL TANK LOCATION
- ▭ - FORMER HEATING FUEL TANK LOCATION
- ▬ - AREA HIGHER THAN INDUSTRIAL GUIDELINE

NOTES
- GPS POINTS WERE COLLECTED IN UTM WITH NAD83 DATUM, ZONE 13, METER; CENTRAL MERIDIAN 105d W.
- EBA's HAND HELD GPS UNIT HAS AN ACCURACY OF ±2-3 m
- **BOLD AND UNDERLINED**: VALUE GREATER THAN THE INDUSTRIAL GUIDELINE
- DEPTH SHOWN IS IN METRES BELOW BELOW GRADE

STATUS
ISSUED FOR USE

CLIENT
NEWMONT

eba A TETRA TECH COMPANY

PHASE III ENVIRONMENTAL SITE ASSESSMENT
OLD WINDY CAMP
HOPE BAY GOLD PROJECT, NUNAVUT

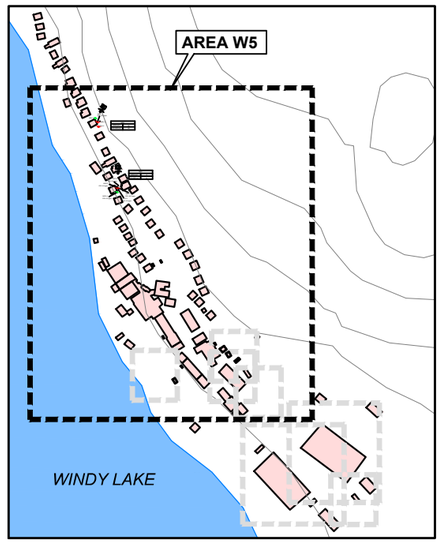
W5 - TENTS (W5A - W5G)

PROJECT NO.	DWN	CKD	REV
Y22101187.001	EL	DF	1

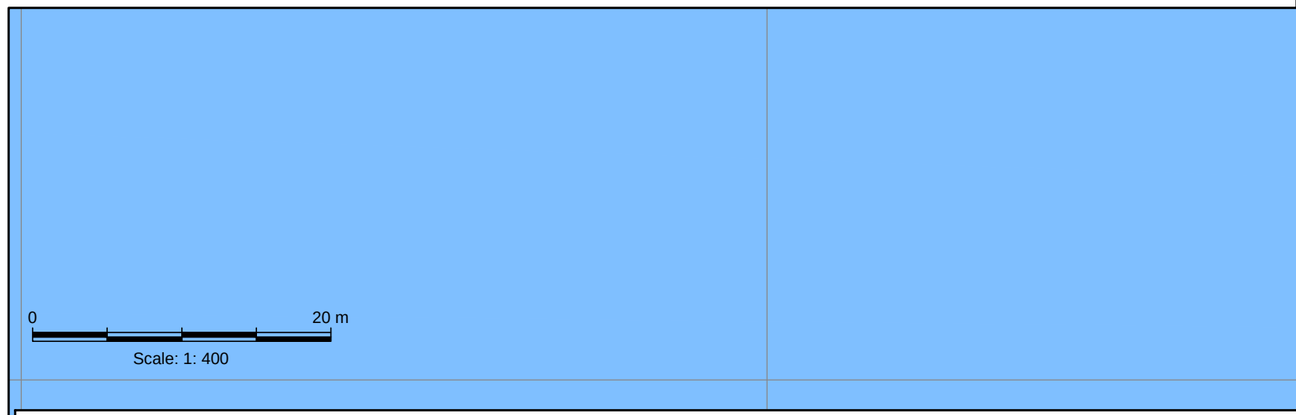
OFFICE	DATE
EDM	June 2012

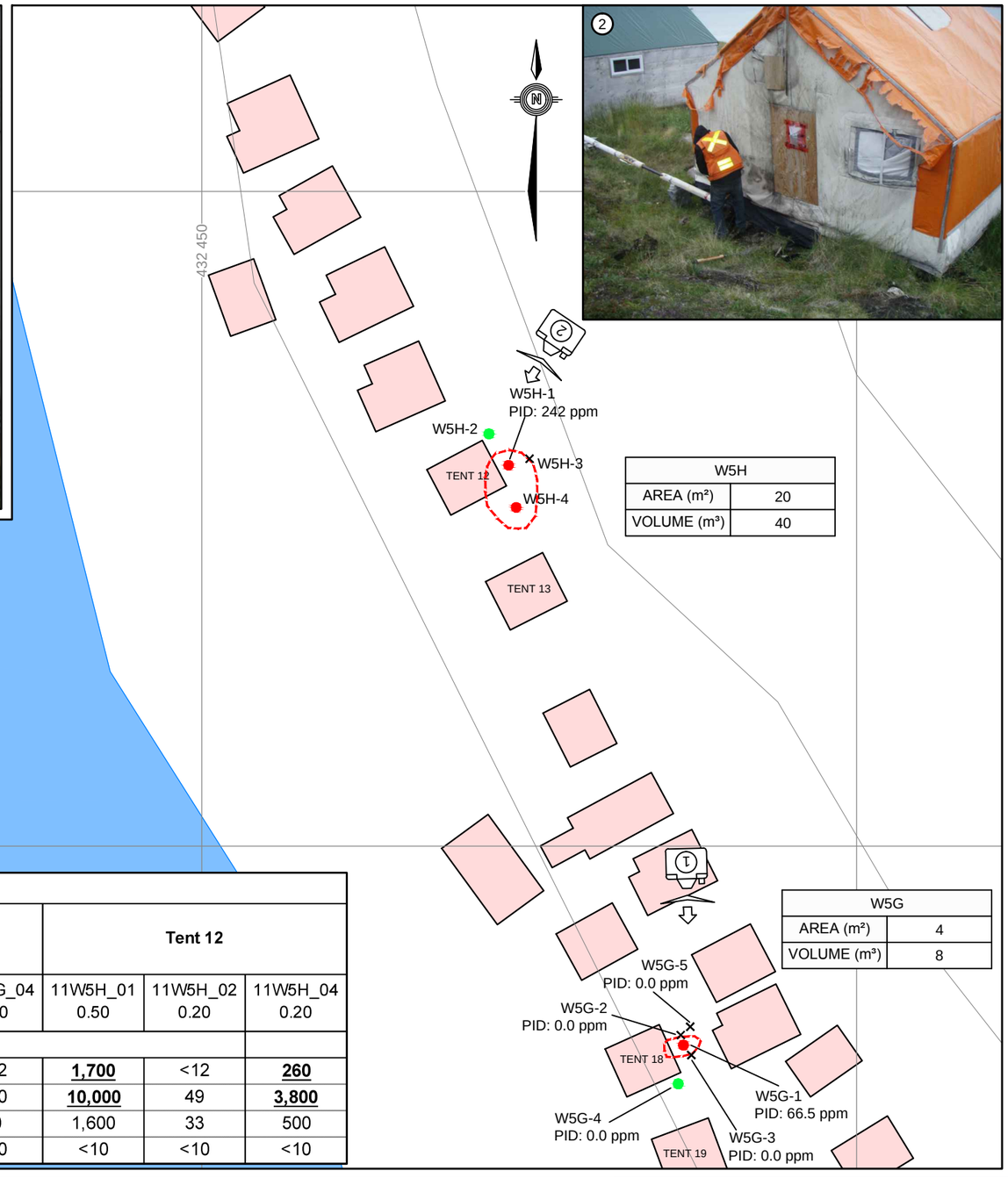
Figure 3Eii

Q:\Edmonton\Drafting\PROJECTS\Y2211\Y22101187\001\AutoCAD\Windy\Y22101187.001-Windy_FIG 3E_R0.dwg [FIGURE 3Eii] June 15, 2012 - 8:17:27 am (BY: KIROS, TIG\STI)



KEY PLAN
1:4000





Confirmatory Soil Analytical Results for Hydrocarbons at W5 (Tents W5G - W5H)

Test Parameter	Unit	Tier 1 Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarse-Grained Soil)		Tent 18			Tent 12		
		Industrial	Wildland	11W5G_01 0.10	11W5G_01 0.30	11W5G_04 0.10	11W5H_01 0.50	11W5H_02 0.20	11W5H_04 0.20
Hydrocarbon Fractions F1 to F4									
F1 (C6 - C10)	mg/kg	240	30	110	73	<12	**1,700**	<12	**260**
F2 (>C10 - C 16)	mg/kg	260	150	**3,300**	**3,500**	<10	**10,000**	49	**3,800**
F3 (>C16 - C34)	mg/kg	1,700	300	420	440	10	1,600	33	500
F4 (>C34 - C50)	mg/kg	3,300	2,800	<10	<10	<10	<10	<10	<10

LEGEND
- ✕ - SOIL SCREENING POINT
- ● - SAMPLE BELOW TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION
- ● - SAMPLE ABOVE TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION
- - - - - AREA HIGHER THAN INDUSTRIAL GUIDELINE

NOTES
- GPS POINTS WERE COLLECTED IN UTM WITH NAD83 DATUM, ZONE 13, METER; CENTRAL MERIDIAN 105d W.
- **BOLD AND UNDERLINED**: VALUE GREATER THAN THE INDUSTRIAL GUIDELINE
- DEPTH SHOWN IS IN METRES BELOW BELOW GRADE

STATUS
ISSUED FOR USE

CLIENT
NEWMONT

A TETRA TECH COMPANY

PHASE III ENVIRONMENTAL SITE ASSESSMENT
OLD WINDY CAMP
HOPE BAY GOLD PROJECT, NUNAVUT

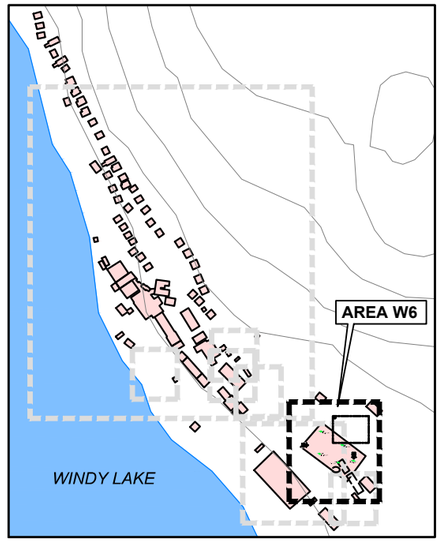
W5 - TENTS (W5G - W5H)

PROJECT NO.	DWN	CKD	REV
Y22101187.001	EL	DF	1

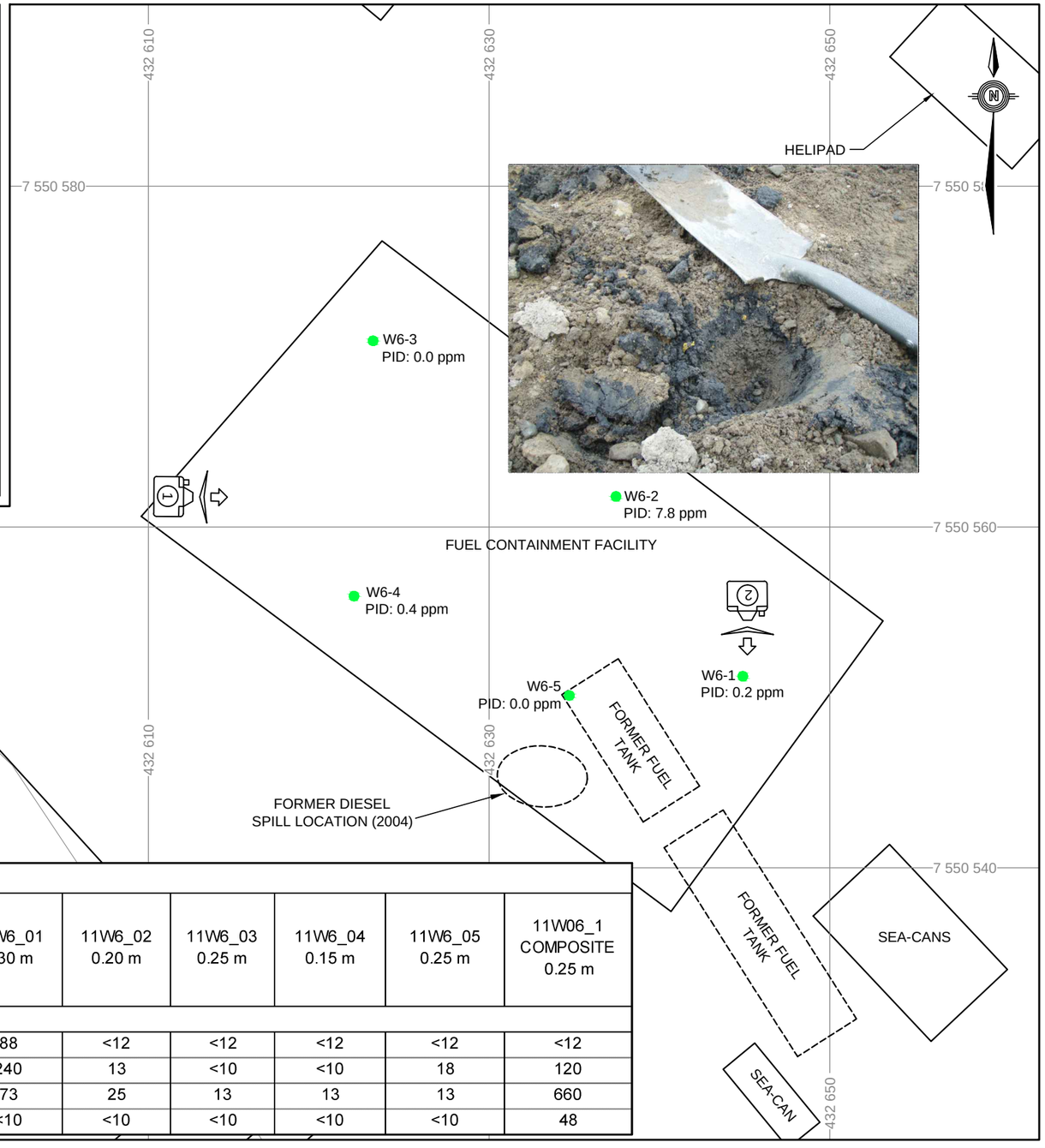
OFFICE: EDM
DATE: June 2012

Figure 3Eiii

Q:\Edmonton\Drafting\PROJECTS\Y2211\Y22101187\001\AutoCAD\Windy\Y22101187.001-Windy_FIG 3E_R0.dwg [FIGURE 3Eiii] June 15, 2012 - 1:12:35 pm (BY: KIROS, TIGISTI)



KEY PLAN
1:4000



Confirmatory Soil Analytical Results For Hydrocarbons at W6 (Tankfarm)

Test Parameter	Unit	Tier 1 Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarse-Grained Soil)		11W6_01 0 - 0.05 m	11W6_01 0.30 m	11W6_02 0.20 m	11W6_03 0.25 m	11W6_04 0.15 m	11W6_05 0.25 m	11W06_1 COMPOSITE 0.25 m
		Industrial	Wildland							
Hydrocarbon Fractions F1 to F4										
F1 (C6 - C10)	mg/kg	240	30	21	88	<12	<12	<12	<12	<12
F2 (>C10 - C 16)	mg/kg	260	150	220	240	13	<10	<10	18	120
F3 (>C16 - C34)	mg/kg	1,700	300	100	73	25	13	13	13	660
F4 (>C34 - C50)	mg/kg	3,300	2,800	<10	<10	<10	<10	<10	<10	48

LEGEND

- SAMPLE BELOW TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION
- - - - FORMER FACILITY LOCATION

NOTES

- GPS POINTS WERE COLLECTED IN UTM WITH NAD83 DATUM, ZONE 13, METER; CENTRAL MERIDIAN 105d W.
- **BOLD AND UNDERLINED**: VALUE GREATER THAN THE INDUSTRIAL GUIDELINE
- DEPTH SHOWN IS IN METRES BELOW BELOW GRADE

STATUS
ISSUED FOR USE

CLIENT
NEWMONT

PHASE III ENVIRONMENTAL SITE ASSESSMENT
OLD WINDY CAMP
HOPE BAY GOLD PROJECT, NUNAVUT

W6 - TANKFARM

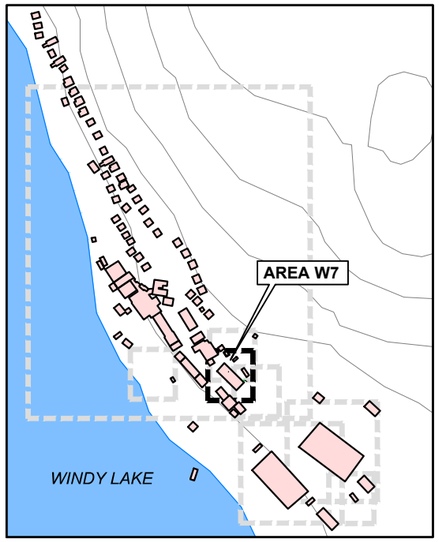
PROJECT NO.	DWN	CKD	REV
Y22101187.001	EL	DF	1

OFFICE: EDM
DATE: June 2012

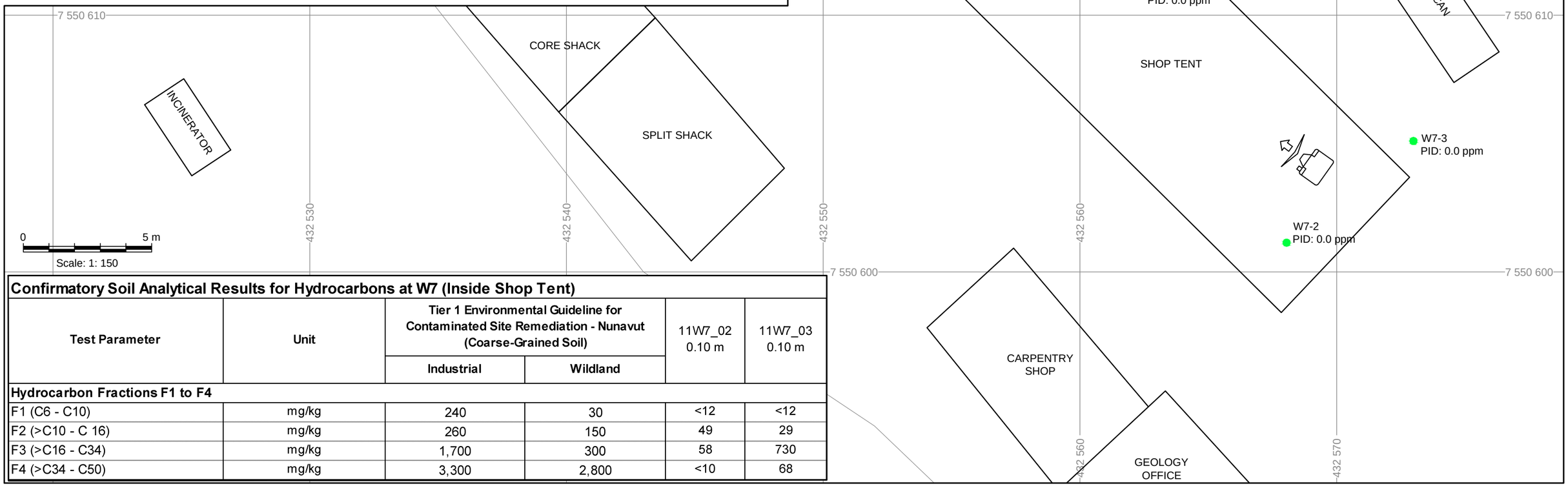
Figure 3F

A TETRA TECH COMPANY

Q:\Edmonton\Drafting\PROJECTS\Y2211\Y22101187001\AutoCAD\Windy\Y22101187.001-Windy_FIG 3F_R0.dwg [FIGURE 3F] June 15, 2012 - 1:09:14 pm (BY: KIROS_TIG\STI)



KEY PLAN
1:4000



Confirmatory Soil Analytical Results for Hydrocarbons at W7 (Inside Shop Tent)

Test Parameter	Unit	Tier 1 Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarse-Grained Soil)		11W7_02 0.10 m	11W7_03 0.10 m
		Industrial	Wildland		
Hydrocarbon Fractions F1 to F4					
F1 (C6 - C10)	mg/kg	240	30	<12	<12
F2 (>C10 - C 16)	mg/kg	260	150	49	29
F3 (>C16 - C34)	mg/kg	1,700	300	58	730
F4 (>C34 - C50)	mg/kg	3,300	2,800	<10	68

LEGEND
- ✕ - SOIL SCREENING POINT
- ● - SAMPLE BELOW TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION
- ● - SAMPLE ABOVE TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION

NOTES
- GPS POINTS WERE COLLECTED IN UTM WITH NAD83 DATUM, ZONE 13, METER; CENTRAL MERIDIAN 105d W.
- **BOLD AND UNDERLINED**: VALUE GREATER THAN THE INDUSTRIAL GUIDELINE
- DEPTH SHOWN IS IN METRES BELOW BELOW GRADE

STATUS
ISSUED FOR USE

CLIENT
NEWMONT

PHASE III ENVIRONMENTAL SITE ASSESSMENT
OLD WINDY CAMP
HOPE BAY GOLD PROJECT, NUNAVUT

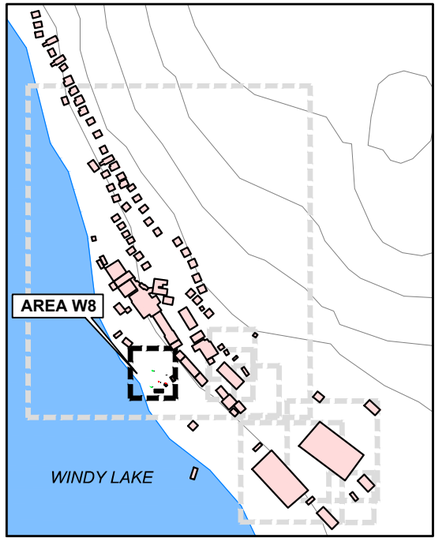
W7 - INSIDE SHOP TENT

eba A TETRA TECH COMPANY

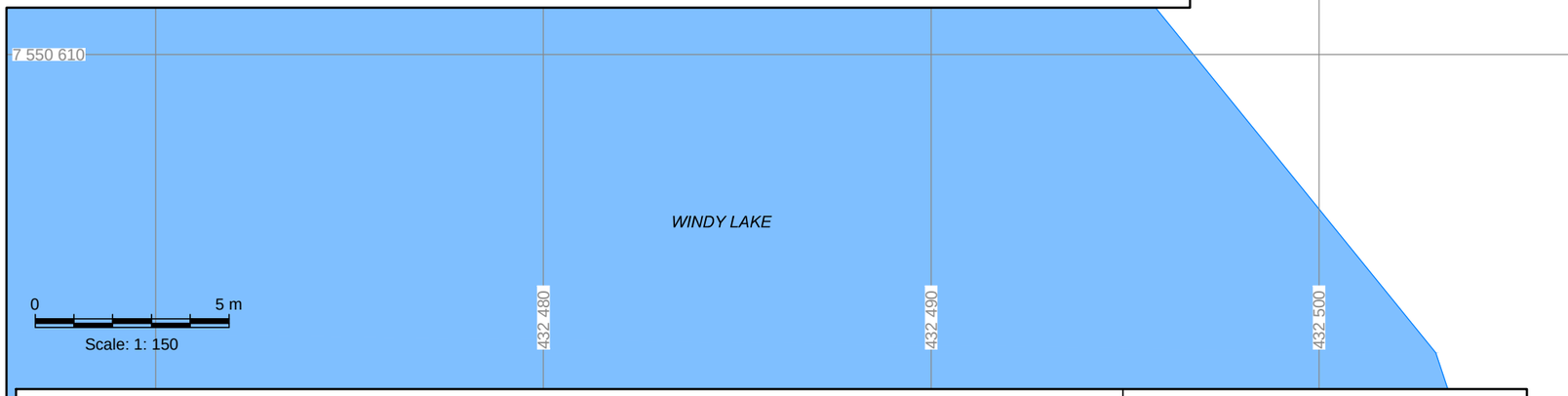
PROJECT NO.	DWN	CKD	REV
Y22101187.001	EL	DF	1
OFFICE: EDM	DATE: June 2012		

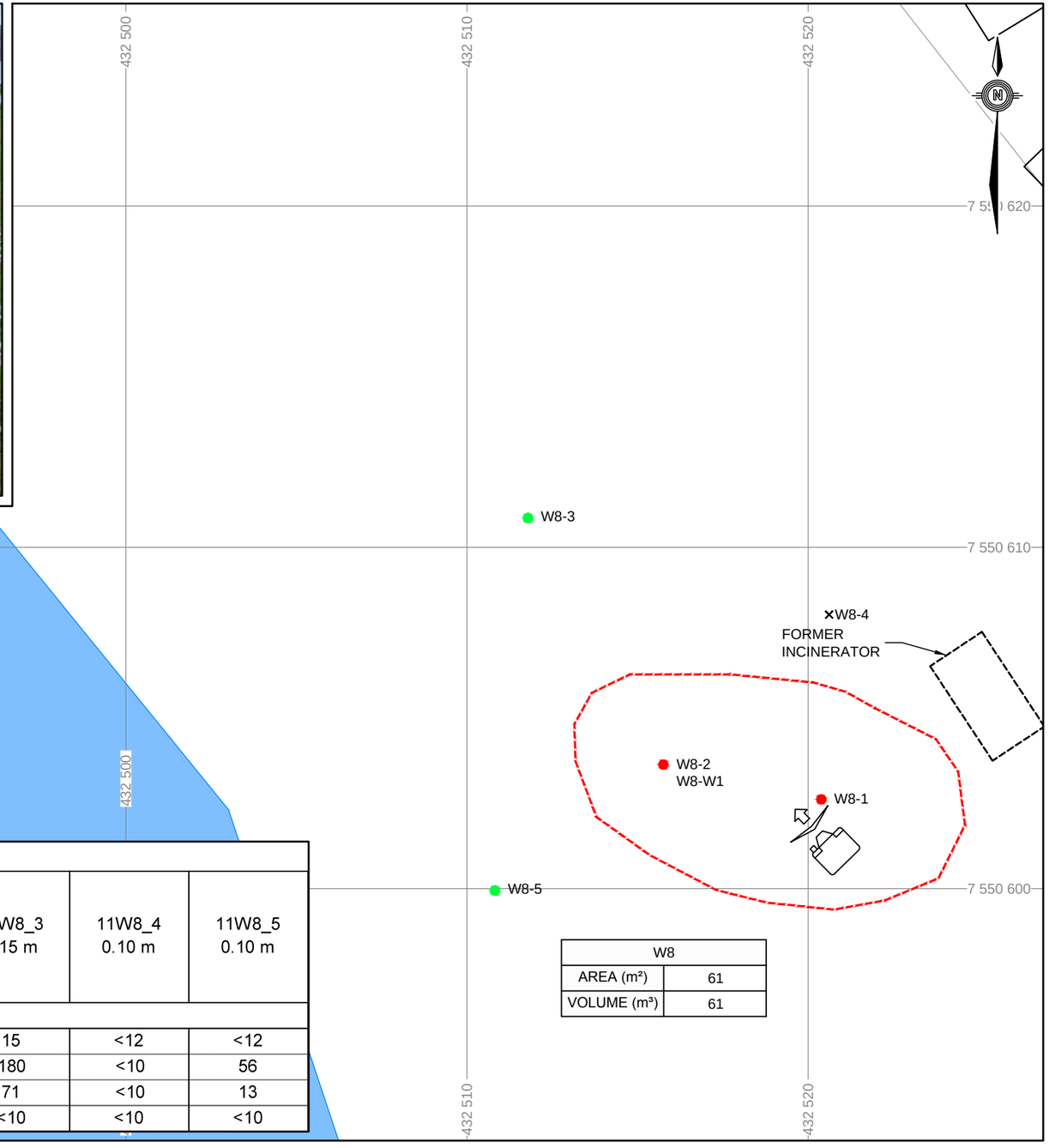
Figure 3G

Q:\Edmonton\Drafting\PROJECTS\Y22\1Y22101187001\AutoCAD\Windy\Y22101187.001-Windy_FIG 3G_R0.dwg [FIGURE 3G] June 15, 2012 - 8:23:04 am (BY: KIROS, TIGIST)



KEY PLAN
1:4000





W8	
AREA (m²)	61
VOLUME (m³)	61

Confirmatory Soil Analytical Results For Hydrocarbons at W8 (Incinerator Near Beach)

Test Parameter	Unit	Tier 1 Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarse-Grained Soil)		11W8_1 0.10 m	11W8_2 0.10 m	11W8_3 0.15 m	11W8_4 0.10 m	11W8_5 0.10 m
		Industrial	Wildland					
Hydrocarbon Fractions F1 to F4								
F1 (C6 - C10)	mg/kg	240	30	<12	<12	15	<12	<12
F2 (>C10 - C 16)	mg/kg	260	150	**290**	**420**	180	<10	56
F3 (>C16 - C34)	mg/kg	1,700	300	1,400	71	71	<10	13
F4 (>C34 - C50)	mg/kg	3,300	2,800	210	<10	<10	<10	<10

LEGEND
- ✕ - SOIL SCREENING POINT
- ● - SAMPLE BELOW TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION (INDUSTRIAL)
- ● - SAMPLE ABOVE TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION (INDUSTRIAL)
- - - - AREA HIGHER THAN INDUSTRIAL GUIDELINE

NOTES
- GPS POINTS WERE COLLECTED IN UTM WITH NAD83 DATUM, ZONE 13, METER; CENTRAL MERIDIAN 105d W.
- **BOLD AND UNDERLINED**: VALUE GREATER THAN THE INDUSTRIAL GUIDELINE
- DEPTH SHOWN IS IN METRES BELOW BELOW GRADE

STATUS
ISSUED FOR USE

CLIENT
NEWMONT

A TETRA TECH COMPANY

PHASE III ENVIRONMENTAL SITE ASSESSMENT
OLD WINDY CAMP
HOPE BAY GOLD PROJECT, NUNAVUT

W8 - INCINERATOR NEAR BEACH

PROJECT NO.	DWN	CKD	REV
Y22101187.001	EL	DF	1
OFFICE: EDM	DATE: June 2012		

Figure 3H

Q:\Edmonton\Drafting\PROJECTS\Y2211\Y22101187\001\AutoCAD\Windy\Y22101187.001-Windy_FIG 3H_R0.dwg [FIGURE 3H] June 15, 2012 - 8:21:43 am (BY: KIROS, TIGIST)

Water Analytical Results for Hydrocarbons, Routine Water and Regulated Metals at Windy Camp

Test Parameter	Unit	CCME[1]	Licence No. 2BE-HOP0712	11W1-1	11W6-1 (HOP-5)	11W8-1	11W8-2
BTEX and Hydrocarbon Fractions F1 to F2							
Benzene	mg/L	0.370	0.370	<0.0004	<0.0004	<0.0004	<0.0004
Toluene	mg/L	0.002	0.002	<0.0004	<0.0004	<0.0004	<0.0004
Ethylbenzene	mg/L	0.090	0.090	<0.0004	<0.0004	<0.0004	<0.0004
Xylenes	mg/L	-	-	<0.0008	<0.0008	<0.0008	<0.0008
F1 (C6 - C10)	mg/L	-	-	<0.1	<0.1	<0.1	<0.1
F2 (>C10 - C16)	mg/L	-	-	<0.1	<0.1	3.3	<0.1
Routine Water and Diss. Regulated Metals Misc. Inorganics							
Conductivity	uS/cm	-	-	410	3,900	570	420
pH	-	6.5 to 9		7.28	7.97	7.1	7.7
Routine Water and Diss. Regulated Metals Calculated Parameters							
Anion Sum	meq/L	-	-	3.9	37	5.7	4.4
Cation Sum	meq/L	-	-	4.3	32	5.9	4.4
Hardness ($CaCO_3$)	mg/L	-	-	170	710	200	170
Ion Balance	-	-	-	1.1	0.87	1	0.99
Dissolved Nitrate (N)	mg/L	13	-	0.2	0.45	<0.003	0.008
Dissolved Nitrate (NO_3)	mg/L	-	-	0.89	2	<0.01	0.04
Nitrate plus Nitrite (N)	mg/L	-	-	0.2	0.45	<0.003	0.008
Dissolved Nitrite (N)	mg/L	0.06	-	<0.003	<0.003	<0.003	<0.003
Dissolved Nitrite (NO_2)	mg/L	-	-	<0.01	<0.01	<0.01	<0.01
Total Dissolved Solids	mg/L	-	-	210	2000	290	230
Routine Water and Diss. Regulated Metals Anions							
Alkalinity (PP as $CaCO_3$)	mg/L	-	-	<0.5	<0.5	<0.5	<0.5
Alkalinity (Total as $CaCO_3$)	mg/L	-	-	110	430	250	170
Bicarbonate (HCO_3)	mg/L	-	-	140	530	310	210
Carbonate (CO_3)	mg/L	-	-	<0.5	<0.5	<0.5	<0.5
Hydroxide (OH)	mg/L	-	-	<0.5	<0.5	<0.5	<0.5
Dissolved Sulphate (SO_4)	mg/L	-	-	7	320	18	19
Dissolved Chloride (Cl)	mg/L	128	-	53	**770**	10	23
Total Regulated Metals Elements							
Total Aluminum (Al)	mg/L	0.1		20	2.4	13	0.072
Total Arsenic (As)	mg/L	0.005		**0.011**	**0.0091**	**0.013**	0.0015
Total Cadmium (Cd)	mg/L	0.06*		0.00021	0.00011	0.00035	0.00001
Total Chromium (Cr), Trivalent	mg/L	0.0089		**0.06**	**0.009**	**0.04**	<0.001
Total Copper (Cu)	mg/L	0.00428*		**0.11**	**0.028**	**0.087**	**0.0021**
Total Iron (Fe)	mg/L	0.3		**47**	**7.9**	**38**	**1.7**
Total Lead (Pb)	mg/L	0.00769*	0.001	**0.011**	**0.0017**	**0.016**	<0.0002
Total Nickel (Ni)	mg/L	0.162*		0.041	0.013	0.029	0.0022
Total Selenium (Se)	mg/L	0.001		<0.002	0.0012	<0.002	<0.0002
Total Silver (Ag)	mg/L	0.0001		<0.001	<0.0001	<0.001	<0.0001
Total Thallium (Tl)	mg/L	0.0008		<0.002	<0.0002	<0.002	<0.0002
Total Uranium (U)	mg/L	0.015		0.002	0.0062	0.002	0.0002
Total Zinc (Zn)	mg/L	0.03		**0.08**	0.012	**0.09**	<0.003

Notes:

[1] Canadian Water Quality Guidelines for Protection of Aquatic Life - freshwater, long-term exposure

* Based on hardness of 200 mg/L

'-' = Not detected/not analyzed/no unit/no guidelines

Bold = Greater than the referenced guideline

LEGEND
- SOIL F2 HYDROCARBONS GREATER THAN REMEDIAL OBJECTIVES
- MONITORING WELL LOCATION (DRY) (INSTALLED IN 2009 BY WESA)
- SURFACE WATER SAMPLING LOCATION

0 100 m

Scale: 1: 2 000

NOTES
- GPS POINTS WERE COLLECTED IN UTM WITH NAD83 DATUM, ZONE 13, METER; CENTRAL MERIDIAN 105d W.

STATUS
ISSUED FOR USE

CLIENT
NEWMONT

PHASE III ENVIRONMENTAL SITE ASSESSMENT
OLD WINDY CAMP
HOPE BAY GOLD PROJECT, NUNAVUT

SURFACE SAMPLING WATER LOCATIONS

eba A TETRA TECH COMPANY

PROJECT NO.	DWN	CKD	REV
Y22101187.001	EL	DF	1

OFFICE: EDM
DATE: June 2012

Figure 4

Q:\Edmonton\Drafting\PROJECTS\Y2211\Y22101187001\AutoCAD\Windy\Y22101187.001-Windy_FIG 4_R0.dwg [FIGURE 4] June 15, 2012 - 8:24:02 am (BY: KIROS, TIGIST)

APPENDIX A
LABORATORY ANALYTICAL RESULTS

Maxxam

Your P.O. #: Y22101187.001
Your C.O.C. #: A050092, A050093, A050094, A050095, A050096, A050097

Attention: DANIELA FELSKE
EBA ENGINEERING CONSULTANTS LTD.
EDMONTON - Rebate
14940-123 AVENUE
EDMONTON, AB
CANADA T5V 1B4

Report Date: 2011/08/30

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B177775
Received: 2011/08/22, 11:57

Sample Matrix: Soil
Samples Received: 63

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Boron (Hot Water Soluble)	5	2011/08/27	2011/08/27	AB SOP-00042	EPA 200.7
BTEX/F1 by HS GC/MS (MeOH extract)	1	2011/08/23	2011/08/26	EENVSOP-00012 EENVSOP-00002 EENVSOP-00005	CCME CWS, EPA 8260C
BTEX/F1 by HS GC/MS (MeOH extract)	25	2011/08/23	2011/08/27	EENVSOP-00012 EENVSOP-00002 EENVSOP-00005	CCME CWS, EPA 8260C
BTEX/F1 by HS GC/MS (MeOH extract)	20	2011/08/23	2011/08/28	EENVSOP-00012 EENVSOP-00002 EENVSOP-00005	CCME CWS, EPA 8260C
BTEX/F1 by HS GC/MS (MeOH extract)	15	2011/08/23	2011/08/29	EENVSOP-00012 EENVSOP-00002 EENVSOP-00005	CCME CWS, EPA 8260C
Cation/EC Ratio	4	N/A	2011/08/29		CALCULATION
Chloride (Soluble)	1	2011/08/25	2011/08/27	AB SOP-00026	SM 4110-B
Chloride (Soluble)	3	2011/08/25	2011/08/28	AB SOP-00026	SM 4110-B
Hexavalent Chromium	1	2011/08/23	2011/08/24	EENVSOP-00131	SM 3500-Cr B
Hexavalent Chromium	2	2011/08/24	2011/08/29	EENVSOP-00131	SM 3500-Cr B
Hexavalent Chromium	2	2011/08/25	2011/08/24	EENVSOP-00131	SM 3500-Cr B
Conductivity @25C (Soluble)	4	2011/08/25	2011/08/26	AB SOP-00004	SSMA 15.3
CCME Hydrocarbons (F2-F4 in soil)	40	2011/08/23	2011/08/26	AB SOP-00040 AB SOP-00036	CCME PHC-CWS
CCME Hydrocarbons (F2-F4 in soil)	20	2011/08/23	2011/08/27	AB SOP-00040 AB SOP-00036	CCME PHC-CWS
CCME Hydrocarbons (F2-F4 in soil)	1	2011/08/24	2011/08/28	AB SOP-00040 AB SOP-00036	CCME PHC-CWS
Elements by ICPMS - Soils	5	2011/08/26	2011/08/26	AB SOP-00043	EPA 200.8
Ion Balance	4	N/A	2011/08/29	AB WI-00065	SM 1030E
Sum of Cations, Anions	4	N/A	2011/08/29	AB WI-00065	SM 1030E
Moisture	62	N/A	2011/08/24	EENVSOP-00139	Carter SSMA 51.2
NO2 + NO3 Available (10:1 Wet)	1	2011/08/23	2011/08/29	EENVSOP-00063 EENVSOP-00055	MMCAWW 2359/ 4110 B
Nitrite Available (10:1 Wet)	1	2011/08/24	2011/08/27	AB SOP-00023	SM 4110 B
Nitrogen - Nitrate (as N)	1	N/A	2011/08/29	EENVSOP-00055	SM 4110 B
Nitrate Available (10:1 Wet)	1	2011/08/24	2011/08/27	AB SOP-00023	MMCW 2359
pH @25C (1:2 Calcium Chloride Extract)	2	2011/08/25	2011/08/25	AB SOP-00006	SSMA 16.3
pH @25C (1:2 Calcium Chloride Extract)	2	2011/08/26	2011/08/26	AB SOP-00006	SSMA 16.3
Phosphorous, Potassium - Available	1	2011/08/26	2011/08/26	AB SOP-00042	EPA 200.7

../2

Maxxam

Your P.O. #: Y22101187.001
Your C.O.C. #: A050092, A050093, A050094, A050095, A050096, A050097

Attention: DANIELA FELSKE
EBA ENGINEERING CONSULTANTS LTD.
EDMONTON - Rebate
14940-123 AVENUE
EDMONTON, AB
CANADA T5V 1B4

Report Date: 2011/08/30

CERTIFICATE OF ANALYSIS

Sample Matrix: Soil
Samples Received: 63

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Particle Size by Sieve (75 micron)	11	N/A	2011/08/24	AB SOP-00022	SSMA 55.4
Particle Size by Sieve (75 micron)	2	N/A	2011/08/25	AB SOP-00022	SSMA 55.4
Sodium Adsorption Ratio	4	N/A	2011/08/29	AB WI-00065	SSMA 15.4.4
Ca,Mg,Na,K,SO4 (Soluble)	4	2011/08/27	2011/08/29	AB SOP-00042	EPA 200.7
Sulphur (Available)	1	2011/08/26	2011/08/26	AB SOP-00042	EPA 200.7
Soluble Paste	4	2011/08/25	2011/08/25	AB SOP-00033	SSMA 15.2
Soluble Ions Calculation	4	N/A	2011/08/25		CALCULATION
Theoretical Gypsum Requirement (1)	4	N/A	2011/08/29	CAL WI-00087	CJSS 79:449-455

(1) Units for TGR have changed from tons/acre to tonnes/ha

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Jeremy Wakaruk, B.Sc., Senior Project Manager
Email: JWakaruk@maxxam.ca
Phone# (780) 577-7105 Ext:7105

==========

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.

Total cover pages: 2

Maxxam

Maxxam Job #: B177775
Report Date: 2011/08/30

EBA ENGINEERING CONSULTANTS LTD.

Your P.O. #: Y22101187.001

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		BI0038	BI0039	BI0040	BI0041	BI0042		
Sampling Date		2011/08/09	2011/08/09	2011/08/09	2011/08/09	2011/08/09		
COC Number		A050092	A050092	A050092	A050092	A050092		
	Units	**11W5G-01 (30CM)**	**11W5H-01 (50CM)**	**11W5G-04 (10CM)**	**11W5H-02 (20CM)**	**11W5G-01 (10CM)**	**RDL**	**QC Batch**
Physical Properties								
Moisture	%	6.4	22	11	23	8.7	0.3	5118200
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	3500	10000	<10	49	3300	10	5117241
F3 (C16-C34 Hydrocarbons)	mg/kg	440	1600	10	33	420	10	5117241
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	<10	<10	<10	<10	10	5117241
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	N/A	5117241
Volatiles								
Benzene	mg/kg	<0.0050	0.14	<0.0050	<0.0050	<0.0050	0.0050	5117716
Toluene	mg/kg	<0.020	4.6	<0.020	<0.020	<0.020	0.020	5117716
Ethylbenzene	mg/kg	<0.010	4.4	<0.010	<0.010	<0.010	0.010	5117716
Xylenes (Total)	mg/kg	<0.040	68	<0.040	<0.040	<0.040	0.040	5117716
m & p-Xylene	mg/kg	<0.040	43	<0.040	<0.040	<0.040	0.040	5117716
o-Xylene	mg/kg	<0.020	25	<0.020	<0.020	<0.020	0.020	5117716
F1 (C6-C10) - BTEX	mg/kg	73	1700	<12	<12	110	12	5117716
(C6-C10)	mg/kg	73	1800	<12	<12	110	12	5117716
Surrogate Recovery (%)								
4-BROMOFLUOROBENZENE (sur.)	%	98	109	97	99	99	N/A	5117716
D10-ETHYLBENZENE (sur.)	%	107	106	115	110	109	N/A	5117716
D4-1,2-DICHLOROETHANE (sur.)	%	99	104	94	101	97	N/A	5117716
D8-TOLUENE (sur.)	%	102	106	106	103	102	N/A	5117716
O-TERPHENYL (sur.)	%	113	101	97	100	109	N/A	5117241

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: B177775
Report Date: 2011/08/30

EBA ENGINEERING CONSULTANTS LTD.

Your P.O. #: Y22101187.001

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		BI0043	BI0044	BI0045	BI0046	BI0047		
Sampling Date		2011/08/09	2011/08/09	2011/08/09	2011/08/09	2011/08/09		
COC Number		A050092	A050092	A050092	A050092	A050092		
	Units	**11W8-05 (10CM)**	**11W8-03 (15CM)**	**11W8-04 (10CM)**	**11W8-02 (10CM)**	**11W8-01 (10CM)**	**RDL**	**QC Batch**
Physical Properties								
Moisture	%	23	26	19	20	41	0.3	5118200
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	56	180	<10	420	290	10	5117241
F3 (C16-C34 Hydrocarbons)	mg/kg	13	71	<10	71	1400	10	5117241
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	<10	<10	<10	210	10	5117241
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	N/A	5117241
Volatiles								
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5117716
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.47	0.020	5117716
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5117716
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	5117716
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	5117716
o-Xylene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	5117716
F1 (C6-C10) - BTEX	mg/kg	<12	15	<12	<12	<12	12	5117716
(C6-C10)	mg/kg	<12	15	<12	<12	<12	12	5117716
Surrogate Recovery (%)								
4-BROMOFLUOROBENZENE (sur.)	%	97	98	97	99	97	N/A	5117716
D10-ETHYLBENZENE (sur.)	%	110	110	112	110	119	N/A	5117716
D4-1,2-DICHLOROETHANE (sur.)	%	98	98	100	95	96	N/A	5117716
D8-TOLUENE (sur.)	%	104	103	106	104	107	N/A	5117716
O-TERPHENYL (sur.)	%	97	99	92	97	109	N/A	5117241

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: B177775
Report Date: 2011/08/30

EBA ENGINEERING CONSULTANTS LTD.

Your P.O. #: Y22101187.001

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		BI0048	BI0049	BI0050	BI0056	BI0057		
Sampling Date		2011/08/09	2011/08/09	2011/08/10	2011/08/10	2011/08/10		
COC Number		A050092	A050092	A050093	A050093	A050093		
	Units	**11W7-03 (10CM)**	**11W5E-01 (85CM)**	**11W6-03 (25CM)**	**11W6-04 (15CM)**	**11W6-05 (25CM)**	**RDL**	**QC Batch**
Physical Properties								
Moisture	%	16	8.3	9.8	14	13	0.3	5118200
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	29	5900	<10	<10	18	10	5117241
F3 (C16-C34 Hydrocarbons)	mg/kg	730	920	13	15	13	10	5117241
F4 (C34-C50 Hydrocarbons)	mg/kg	68	<10	<10	<10	<10	10	5117241
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	N/A	5117241
Volatiles								
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5117716
Toluene	mg/kg	<0.020	0.035	<0.020	<0.020	<0.020	0.020	5117716
Ethylbenzene	mg/kg	<0.010	0.027	<0.010	<0.010	<0.010	0.010	5117716
Xylenes (Total)	mg/kg	<0.040	24	<0.040	<0.040	<0.040	0.040	5117716
m & p-Xylene	mg/kg	<0.040	11	<0.040	<0.040	<0.040	0.040	5117716
o-Xylene	mg/kg	<0.020	13	<0.020	<0.020	<0.020	0.020	5117716
F1 (C6-C10) - BTEX	mg/kg	<12	960	<12	<12	<12	12	5117716
(C6-C10)	mg/kg	<12	990	<12	<12	<12	12	5117716
Surrogate Recovery (%)								
4-BROMOFLUOROBENZENE (sur.)	%	94	119	96	97	95	N/A	5117716
D10-ETHYLBENZENE (sur.)	%	114	113	111	107	112	N/A	5117716
D4-1,2-DICHLOROETHANE (sur.)	%	97	100	96	102	94	N/A	5117716
D8-TOLUENE (sur.)	%	105	108	102	102	106	N/A	5117716
O-TERPHENYL (sur.)	%	97	129	100	102	101	N/A	5117241

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: B177775
Report Date: 2011/08/30

EBA ENGINEERING CONSULTANTS LTD.

Your P.O. #: Y22101187.001

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		BI0058	BI0059	BI0060	BI0061	BI0062		
Sampling Date		2011/08/10	2011/08/10	2011/08/10	2011/08/10	2011/08/10		
COC Number		A050093	A050093	A050093	A050093	A050093		
	Units	**11W6-02 (20CM)**	**11W6-01 (30CM)**	**11W6-01 (0-5CM)**	**11W1-01 (0-5CM)**	**11W2-23 (30CM)**	**RDL**	**QC Batch**
Physical Properties								
Moisture	%	10	13	17	29	22	0.3	5118200
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	13	240	220	340	33	10	5117241
F3 (C16-C34 Hydrocarbons)	mg/kg	25	73	100	320	55	10	5117241
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	<10	<10	<10	<10	10	5117241
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	N/A	5117241
Volatiles								
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5117716
Toluene	mg/kg	<0.020	<0.020	<0.020	0.033	<0.020	0.020	5117716
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5117716
Xylenes (Total)	mg/kg	<0.040	0.75	<0.040	0.26	<0.040	0.040	5117716
m & p-Xylene	mg/kg	<0.040	0.23	<0.040	0.18	<0.040	0.040	5117716
o-Xylene	mg/kg	<0.020	0.52	0.036	0.084	<0.020	0.020	5117716
F1 (C6-C10) - BTEX	mg/kg	<12	88	21	29	<12	12	5117716
(C6-C10)	mg/kg	<12	89	21	29	<12	12	5117716
Surrogate Recovery (%)								
4-BROMOFLUOROBENZENE (sur.)	%	95	93	100	94	100	N/A	5117716
D10-ETHYLBENZENE (sur.)	%	112	108	112	113	112	N/A	5117716
D4-1,2-DICHLOROETHANE (sur.)	%	97	99	99	101	99	N/A	5117716
D8-TOLUENE (sur.)	%	105	105	108	104	103	N/A	5117716
O-TERPHENYL (sur.)	%	108	105	107	109	99	N/A	5117241

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam

Maxxam Job #: B177775
Report Date: 2011/08/30

EBA ENGINEERING CONSULTANTS LTD.

Your P.O. #: Y22101187.001

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		BI0063	BI0064	BI0065	BI0066	BI0067		
Sampling Date		2011/08/10	2011/08/10	2011/08/10	2011/08/10	2011/08/10		
COC Number		A050093	A050093	A050093	A050093	A050094		
	Units	**11W1-01 (15CM)**	**11W1-05 (25CM)**	**11W1-09 (20CM)**	**11W1-24 (20CM)**	**11W2-21 (25CM)**	**RDL**	**QC Batch**
Physical Properties								
Moisture	%	12	21	13	12	19	0.3	5118254
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	380	<10	14	93	10	5117233
F3 (C16-C34 Hydrocarbons)	mg/kg	11	290	19	19	220	10	5117233
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	24	12	<10	39	10	5117233
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	N/A	5117233
Volatiles								
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5117793
Toluene	mg/kg	<0.020	0.033	<0.020	<0.020	0.028	0.020	5117793
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5117793
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	5117793
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	5117793
o-Xylene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	5117793
F1 (C6-C10) - BTEX	mg/kg	<12	<12	<12	<12	<12	12	5117793
(C6-C10)	mg/kg	<12	<12	<12	<12	<12	12	5117793
Surrogate Recovery (%)								
4-BROMOFLUOROBENZENE (sur.)	%	98	95	96	96	97	N/A	5117793
D10-ETHYLBENZENE (sur.)	%	105	106	113	103	113	N/A	5117793
D4-1,2-DICHLOROETHANE (sur.)	%	104	99	97	98	95	N/A	5117793
D8-TOLUENE (sur.)	%	101	103	101	104	107	N/A	5117793
O-TERPHENYL (sur.)	%	94	101	99	99	104	N/A	5117233

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam

Maxxam Job #: B177775
Report Date: 2011/08/30

EBA ENGINEERING CONSULTANTS LTD.

Your P.O. #: Y22101187.001

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		BI0080	BI0081	BI0082	BI0083	BI0084		
Sampling Date		2011/08/10	2011/08/10	2011/08/10	2011/08/10	2011/08/10		
COC Number		A050094	A050094	A050094	A050094	A050094		
	Units	**11W2-18 (25CM)**	**11W2-18 (50CM)**	**11W2-19 (20CM)**	**11W2-8 (20CM)**	**11W2-20 (25CM)**	**RDL**	**QC Batch**
Physical Properties								
Moisture	%	7.3	9.9	3.0	11	9.3	0.3	5118254
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	1600	110	<10	170	550	10	5117233
F3 (C16-C34 Hydrocarbons)	mg/kg	320	45	23	140	570	10	5117233
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	<10	<10	20	51	10	5117233
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	N/A	5117233
Volatiles								
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5117793
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	5117793
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5117793
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	5117793
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	5117793
o-Xylene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	5117793
F1 (C6-C10) - BTEX	mg/kg	32	<12	<12	14	<12	12	5117793
(C6-C10)	mg/kg	32	<12	<12	14	<12	12	5117793
Surrogate Recovery (%)								
4-BROMOFLUOROBENZENE (sur.)	%	95	98	100	98	97	N/A	5117793
D10-ETHYLBENZENE (sur.)	%	125	111	105	112	107	N/A	5117793
D4-1,2-DICHLOROETHANE (sur.)	%	100	98	106	97	99	N/A	5117793
D8-TOLUENE (sur.)	%	102	104	98	104	104	N/A	5117793
O-TERPHENYL (sur.)	%	100	101	102	101	100	N/A	5117233

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam

Maxxam Job #: B177775
Report Date: 2011/08/30

EBA ENGINEERING CONSULTANTS LTD.

Your P.O. #: Y22101187.001

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		BI0085	BI0086	BI0087	BI0088	BI0089		
Sampling Date		2011/08/10	2011/08/10	2011/08/10	2011/08/10	2011/08/10		
COC Number		A050094	A050094	A050094	A050094	A050094		
	Units	**11W2-7 (20CM)**	**11W2-4 (25CM)**	**11W2-10 (25CM)**	**11W2-13 (25CM)**	**11W2-2 (20CM)**	**RDL**	**QC Batch**
Physical Properties								
Moisture	%	9.8	17	15	11	15	0.3	5118254
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	95	<10	13	32	10	5117233
F3 (C16-C34 Hydrocarbons)	mg/kg	39	160	130	44	100	10	5117233
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	20	18	<10	17	10	5117233
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	N/A	5117233
Volatiles								
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5117793
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	5117793
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5117793
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	5117793
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	5117793
o-Xylene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	5117793
F1 (C6-C10) - BTEX	mg/kg	<12	<12	<12	<12	<12	12	5117793
(C6-C10)	mg/kg	<12	<12	<12	<12	<12	12	5117793
Surrogate Recovery (%)								
4-BROMOFLUOROBENZENE (sur.)	%	95	96	96	106	94	N/A	5117793
D10-ETHYLBENZENE (sur.)	%	110	111	110	104	107	N/A	5117793
D4-1,2-DICHLOROETHANE (sur.)	%	94	96	97	118	92	N/A	5117793
D8-TOLUENE (sur.)	%	103	106	106	92	104	N/A	5117793
O-TERPHENYL (sur.)	%	103	103	103	99	113	N/A	5117233

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: B177775
Report Date: 2011/08/30

EBA ENGINEERING CONSULTANTS LTD.

Your P.O. #: Y22101187.001

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		BI0090	BI0091	BI0162	BI0163	BI0164		
Sampling Date		2011/08/10	2011/08/09	2011/08/09	2011/08/09	2011/08/09		
COC Number		A050094	A050095	A050095	A050095	A050095		
	Units	**11W2-17 (20CM)**	**11W4-01 (25CM)**	**11W3-02 (10CM)**	**11W4-10 (50CM)**	**11W3-01 (20CM)**	**RDL**	**QC Batch**
Physical Properties								
Moisture	%	13	17	15	18	13	0.3	5118254
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	6400	460	13000	1700	10	5117233
F3 (C16-C34 Hydrocarbons)	mg/kg	74	940	61	1500	290	10	5117233
F4 (C34-C50 Hydrocarbons)	mg/kg	11	<10	<10	13	16	10	5117233
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	N/A	5117233
Volatiles								
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5117793
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	5117793
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5117793
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	5117793
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	5117793
o-Xylene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	5117793
F1 (C6-C10) - BTEX	mg/kg	<12	220	20	820	13	12	5117793
(C6-C10)	mg/kg	<12	220	20	820	13	12	5117793
Surrogate Recovery (%)								
4-BROMOFLUOROBENZENE (sur.)	%	96	106	91	113	99	N/A	5117793
D10-ETHYLBENZENE (sur.)	%	106	95	113	107	109	N/A	5117793
D4-1,2-DICHLOROETHANE (sur.)	%	99	120	93	108	94	N/A	5117793
D8-TOLUENE (sur.)	%	103	92	106	101	104	N/A	5117793
O-TERPHENYL (sur.)	%	100	104	104	104	104	N/A	5117233

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: B177775
Report Date: 2011/08/30

EBA ENGINEERING CONSULTANTS LTD.

Your P.O. #: Y22101187.001

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		BI0165	BI0166	BI0167	BI0168	BI0169		
Sampling Date		2011/08/09	2011/08/09	2011/08/09	2011/08/09	2011/08/09		
COC Number		A050095	A050095	A050095	A050095	A050095		
	Units	**11W7-02 (10CM)**	**11W3-10 (20CM)**	**11W4-01 (75CM)**	**11W3-04 (25CM)**	**11W4-08 (20CM)**	**RDL**	**QC Batch**
Physical Properties								
Moisture	%	5.8	13	4.3	9.5	29	0.3	5119601
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	49	210	7000	91	15	10	5117229
F3 (C16-C34 Hydrocarbons)	mg/kg	58	110	770	120	41	10	5117229
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	36	<10	<10	<10	10	5117229
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	N/A	5117229
Volatiles								
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5117417
Toluene	mg/kg	<0.020	<0.020	<0.020	0.028	<0.020	0.020	5117417
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	0.018	<0.010	0.010	5117417
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	5117417
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	5117417
o-Xylene	mg/kg	<0.020	<0.020	<0.020	0.033	<0.020	0.020	5117417
F1 (C6-C10) - BTEX	mg/kg	<12	<12	200	<12	<12	12	5117417
(C6-C10)	mg/kg	<12	<12	200	<12	<12	12	5117417
Surrogate Recovery (%)								
4-BROMOFLUOROBENZENE (sur.)	%	104	102	86	103	102	N/A	5117417
D10-ETHYLBENZENE (sur.)	%	114	121	112	107	119	N/A	5117417
D4-1,2-DICHLOROETHANE (sur.)	%	101	104	118	109	98	N/A	5117417
D8-TOLUENE (sur.)	%	103	104	114	99	103	N/A	5117417
O-TERPHENYL (sur.)	%	99	104	108	103	102	N/A	5117229

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: B177775
Report Date: 2011/08/30

EBA ENGINEERING CONSULTANTS LTD.

Your P.O. #: Y22101187.001

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		BI0170	BI0171	BI0175	BI0176		BI0182		
Sampling Date		2011/08/09	2011/08/09	2011/08/09	2011/08/09		2011/08/09		
COC Number		A050095	A050095	A050095	A050096		A050096		
	Units	**11W4-02 (30CM)**	**11W4-09 (25CM)**	**11W4-07 (25CM)**	**11W06-1 (CS) (25CM)**	**RDL**	**11W5E-01 (50CM)**	**RDL**	**QC Batch**
Physical Properties									
Moisture	%	18	5.3	12	13	0.3	7.8	0.3	5119601
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/kg	1000	11	16	120	10	6400	10	5117229
F3 (C16-C34 Hydrocarbons)	mg/kg	380	<10	67	660	10	1200	10	5117229
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	<10	<10	48	10	<10	10	5117229
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	N/A	Yes	N/A	5117229
Volatiles									
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	<0.0050	0.0050	5117417
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	0.032	0.020	5117417
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	<3.7 (1)	3.7	5117417
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	14	0.040	5117417
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	4.6	0.040	5117417
o-Xylene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	9.8	0.020	5117417
F1 (C6-C10) - BTEX	mg/kg	<12	<12	<12	<12	12	460	12	5117417
(C6-C10)	mg/kg	<12	<12	<12	<12	12	470	12	5117417
Surrogate Recovery (%)									
4-BROMOFLUOROBENZENE (sur.)	%	96	102	103	101	N/A	83	N/A	5117417
D10-ETHYLBENZENE (sur.)	%	108	111	115	112	N/A	105	N/A	5117417
D4-1,2-DICHLOROETHANE (sur.)	%	98	100	105	97	N/A	119	N/A	5117417
D8-TOLUENE (sur.)	%	105	104	100	103	N/A	116	N/A	5117417
O-TERPHENYL (sur.)	%	103	108	103	104	N/A	106	N/A	5117229

N/A = Not Applicable
RDL = Reportable Detection Limit
(1) Detection limit raised due to qualifying ion outside of acceptance criteria. Results are potentially biased high due to possible interferent.

Maxxam Job #: B177775
Report Date: 2011/08/30

EBA ENGINEERING CONSULTANTS LTD.

Your P.O. #: Y22101187.001

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		BI0183	BI0184	BI0185	BI0186	BI0187		
Sampling Date		2011/08/09	2011/08/09	2011/08/09	2011/08/09	2011/08/09		
COC Number		A050096	A050096	A050096	A050096	A050096		
	Units	**BULK FUEL STORAGE (10CM)**	**11W5E-04 (20CM)**	**11W5F-02 (10CM)**	**11W5E-01 (15CM)**	**11W5D-01 (15CM)**	**RDL**	**QC Batch**
Physical Properties								
Moisture	%	25	9.2	10	15	6.5	0.3	5119601
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	14	<10	10	10000	2100	10	5117229
F3 (C16-C34 Hydrocarbons)	mg/kg	57	11	<10	1800	83	10	5117229
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	<10	<10	<10	<10	10	5117229
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	N/A	5117229
Volatiles								
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5117417
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.037	0.020	5117417
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	0.054	<0.010	0.010	5117417
Xylenes (Total)	mg/kg	0.39	<0.040	<0.040	6.9	0.056	0.040	5117417
m & p-Xylene	mg/kg	0.19	<0.040	<0.040	1.2	0.056	0.040	5117417
o-Xylene	mg/kg	0.20	<0.020	<0.020	5.7	<0.020	0.020	5117417
F1 (C6-C10) - BTEX	mg/kg	<12	<12	<12	430	<12	12	5117417
(C6-C10)	mg/kg	<12	<12	<12	440	<12	12	5117417
Surrogate Recovery (%)								
4-BROMOFLUOROBENZENE (sur.)	%	92	96	97	89	93	N/A	5117417
D10-ETHYLBENZENE (sur.)	%	111	127	112	114	113	N/A	5117417
D4-1,2-DICHLOROETHANE (sur.)	%	115	111	103	118	101	N/A	5117417
D8-TOLUENE (sur.)	%	106	102	104	118	110	N/A	5117417
O-TERPHENYL (sur.)	%	104	97	104	108	112	N/A	5117229

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: B177775
Report Date: 2011/08/30

EBA ENGINEERING CONSULTANTS LTD.

Your P.O. #: Y22101187.001

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		BI0188	BI0189	BI0190	BI0191	BI0192		
Sampling Date		2011/08/09	2011/08/09	2011/08/09	2011/08/09	2011/08/09		
COC Number		A050096	A050096	A050096	A050096	A050096		
	Units	**11W5B-01 (10CM)**	**11W5E-02 (20CM)**	**11W5C-01 (10CM)**	**11W5D-01 (30CM)**	**11W5A-01 (20CM)**	**RDL**	**QC Batch**
Physical Properties								
Moisture	%	5.7	14	15	4.0	23	0.3	5119601
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	2900	11	<10	180	<10	10	5117229
F3 (C16-C34 Hydrocarbons)	mg/kg	900	69	60	23	49	10	5117229
F4 (C34-C50 Hydrocarbons)	mg/kg	13	16	22	<10	14	10	5117229
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	N/A	5117229
Volatiles								
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5117417
Toluene	mg/kg	0.024	0.029	<0.020	<0.020	0.035	0.020	5117417
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5117417
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	5117417
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	5117417
o-Xylene	mg/kg	0.032	<0.020	<0.020	<0.020	<0.020	0.020	5117417
F1 (C6-C10) - BTEX	mg/kg	<12	<12	<12	<12	<12	12	5117417
(C6-C10)	mg/kg	<12	<12	<12	<12	<12	12	5117417
Surrogate Recovery (%)								
4-BROMOFLUOROBENZENE (sur.)	%	94	102	102	94	102	N/A	5117417
D10-ETHYLBENZENE (sur.)	%	111	114	114	130	112	N/A	5117417
D4-1,2-DICHLOROETHANE (sur.)	%	99	95	96	118	96	N/A	5117417
D8-TOLUENE (sur.)	%	108	104	105	99	104	N/A	5117417
O-TERPHENYL (sur.)	%	113	114	116	109	108	N/A	5117229

N/A = Not Applicable
RDL = Reportable Detection Limit

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		BI0196		
Sampling Date		2011/08/10		
COC Number		A050097		
	Units	**11W5H-04 (20CM)**	**RDL**	**QC Batch**
Physical Properties				
Moisture	%	20	0.3	5117834
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/kg	3800	10	5130099
F3 (C16-C34 Hydrocarbons)	mg/kg	500	10	5130099
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	10	5130099
Reached Baseline at C50	mg/kg	Yes	N/A	5130099
Volatiles				
Benzene	mg/kg	<0.0050	0.0050	5118195
Toluene	mg/kg	0.18	0.020	5118195
Ethylbenzene	mg/kg	0.085	0.010	5118195
Xylenes (Total)	mg/kg	4.9	0.040	5118195
m & p-Xylene	mg/kg	2.3	0.040	5118195
o-Xylene	mg/kg	2.6	0.020	5118195
F1 (C6-C10) - BTEX	mg/kg	260	12	5118195
(C6-C10)	mg/kg	260	12	5118195
Surrogate Recovery (%)				
4-BROMOFLUOROBENZENE (sur.)	%	101	N/A	5118195
D10-ETHYLBENZENE (sur.)	%	114	N/A	5118195
D4-1,2-DICHLOROETHANE (sur.)	%	111	N/A	5118195
D8-TOLUENE (sur.)	%	113	N/A	5118195
O-TERPHENYL (sur.)	%	101	N/A	5130099

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: B177775
Report Date: 2011/08/30

EBA ENGINEERING CONSULTANTS LTD.

Your P.O. #: Y22101187.001

NUTRIENT PACKAGE 2 (SOIL)

Maxxam ID		BI0195		
Sampling Date		2011/08/10		
COC Number		A050097		
	Units	**11W02-18 COMPOSITE**	**RDL**	**QC Batch**
Calculated Parameters				
Available (KCl) Nitrate (N)	mg/kg	<1	1	5114965
Nutrients				
Available (KCl) Nitrate plus Nitrite (N)	mg/kg	<1	1	5114964
Available (KCl) Nitrite (N)	mg/kg	<0.5	0.5	5129767
Available (Mod Kel) Phosphorus (P)	mg/kg	<4	4	5128879
Available (Mod Kel) Potassium (K)	mg/kg	26	4	5128879
Available (CaCl2) Sulphur (S)	mg/kg	122	2	5128759
Physical Properties				
Moisture	%	11	0.3	5122169

RDL = Reportable Detection Limit

REGULATED METALS (CCME/AT1) - SOILS

Maxxam ID		BI0056	BI0060	BI0162		BI0193	BI0195		
Sampling Date		2011/08/10	2011/08/10	2011/08/09		2011/08/07	2011/08/10		
COC Number		A050093	A050093	A050095		A050097	A050097		
	Units	**11W6-04 (15CM)**	**11W6-01 (0-5CM)**	**11W3-02 (10CM)**	**QC Batch**	**11W01-01 (0-15CM)**	**11W02-18 COMPOSITE**	**RDL**	**QC Batch**
Elements									
Soluble (Hot water) Boron (B)	mg/kg	0.6	1.4	0.4	5129816	0.3	1.0	0.1	5129816
Hex. Chromium (Cr 6+)	mg/kg	<0.15	<0.15	<0.15	5118797	<0.15	<0.15	0.15	5132476
Total Antimony (Sb)	mg/kg	<1	<1	<1	5129196	<1	<1	1	5129196
Total Arsenic (As)	mg/kg	2	2	4	5129196	1	2	1	5129196
Total Barium (Ba)	mg/kg	26	19	74	5129196	24	31	10	5129196
Total Beryllium (Be)	mg/kg	<0.4	<0.4	0.4	5129196	<0.4	<0.4	0.4	5129196
Total Cadmium (Cd)	mg/kg	<0.1	<0.1	<0.1	5129196	<0.1	<0.1	0.1	5129196
Total Chromium (Cr)	mg/kg	25	20	45	5129196	22	27	1	5129196
Total Cobalt (Co)	mg/kg	8	5	9	5129196	5	7	1	5129196
Total Copper (Cu)	mg/kg	21	12	21	5129196	18	14	5	5129196
Total Lead (Pb)	mg/kg	2	2	6	5129196	2	3	1	5129196
Total Mercury (Hg)	mg/kg	<0.05	<0.05	<0.05	5129196	<0.05	<0.05	0.05	5129196
Total Molybdenum (Mo)	mg/kg	<0.4	<0.4	0.6	5129196	<0.4	1.0	0.4	5129196
Total Nickel (Ni)	mg/kg	19	12	24	5129196	14	17	1	5129196
Total Selenium (Se)	mg/kg	<0.5	<0.5	<0.5	5129196	<0.5	<0.5	0.5	5129196
Total Silver (Ag)	mg/kg	<1	<1	<1	5129196	<1	<1	1	5129196
Total Thallium (Tl)	mg/kg	<0.3	<0.3	<0.3	5129196	<0.3	<0.3	0.3	5129196
Total Tin (Sn)	mg/kg	<1	<1	<1	5129196	<1	<1	1	5129196
Total Uranium (U)	mg/kg	<1	<1	1	5129196	<1	<1	1	5129196
Total Vanadium (V)	mg/kg	54	24	47	5129196	32	34	1	5129196
Total Zinc (Zn)	mg/kg	34	23	41	5129196	26	29	10	5129196

RDL = Reportable Detection Limit

Maxxam Job #: B177775
Report Date: 2011/08/30

EBA ENGINEERING CONSULTANTS LTD.

Your P.O. #: Y22101187.001

SOIL SALINITY 4 (SOIL)

Maxxam ID		BI0059		BI0183			BI0193		
Sampling Date		2011/08/10		2011/08/09			2011/08/07		
COC Number		A050093		A050096			A050097		
	Units	**11W6-01 (30CM)**	**RDL**	**BULK FUEL STORAGE (10CM)**	**RDL**	**QC Batch**	**11W01-01 (0-15CM)**	**RDL**	**QC Batch**
Calculated Parameters									
Anion Sum	meq/L	140	N/A	110	N/A	5114409	7.1	N/A	5114409
Calculated Boron (B)	mg/kg	0.05	0.03	0.36	0.07	5114411	0.08	0.03	5114411
Cation Sum	meq/L	130	N/A	110	N/A	5114409	7.2	N/A	5114409
Cation/EC Ratio	N/A	11	0.1	10	0.1	5114124	11	0.1	5114124
Ion Balance	N/A	0.95	0.01	1.0	0.01	5114408	1.0	0.01	5114408
Calculated Calcium (Ca)	mg/kg	250	0.5	1300	1	5114411	17	0.5	5114411
Calculated Magnesium (Mg)	mg/kg	130	0.3	96	0.7	5114411	9.7	0.3	5114411
Calculated Sodium (Na)	mg/kg	470	0.8	97	2	5114411	18	0.9	5114411
Calculated Potassium (K)	mg/kg	4.7	0.4	8.1	0.9	5114411	1.7	0.4	5114411
Calculated Chloride (Cl)	mg/kg	1200	8	2700	20	5114411	26	2	5114411
Calculated Sulphate (SO4)	mg/kg	580	2	6	3	5114411	81	2	5114411
Soluble Parameters									
Soluble Chloride (Cl)	mg/L	3600 (1)	30	3900 (1)	30	5129753	76	5	5129753
Soluble Conductivity	dS/m	12	0.02	11	0.02	5124263	0.63	0.02	5124263
Soluble (CaCl2) pH	N/A	6.47	N/A	5.06	N/A	5121860	5.38	N/A	5125327
Sodium Adsorption Ratio	N/A	11	0.1	0.9	0.1	5114410	1.5	0.1	5114410
Soluble Calcium (Ca)	mg/L	740	1.5	1900	1.5	5127239	48	1.5	5127239
Soluble Magnesium (Mg)	mg/L	390	1.0	140	1.0	5127239	28	1.0	5127239
Soluble Sodium (Na)	mg/L	1400	2.5	140	2.5	5127239	53	2.5	5127239
Soluble Potassium (K)	mg/L	14	1.3	12	1.3	5127239	4.9	1.3	5127239
Saturation %	%	33	N/A	69	N/A	5124190	34	N/A	5124190
Soluble Sulphate (SO4)	mg/L	1800	5.0	9.2	5.0	5127239	240	5.0	5127239
Theoretical Gypsum Requirement	tonnes/ha	<0.1	0.1	<0.1	0.1	5114413	<0.1	0.1	5114413

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

SOIL SALINITY 4 (SOIL)

Maxxam ID		BI0195		
Sampling Date		2011/08/10		
COC Number		A050097		
	Units	**11W02-18 COMPOSITE**	**RDL**	**QC Batch**
Calculated Parameters				
Anion Sum	meq/L	47	N/A	5114409
Calculated Boron (B)	mg/kg	0.31	0.03	5114411
Cation Sum	meq/L	48	N/A	5114409
Cation/EC Ratio	N/A	12	0.1	5114124
Ion Balance	N/A	1.0	0.01	5114408
Calculated Calcium (Ca)	mg/kg	120	0.5	5114411
Calculated Magnesium (Mg)	mg/kg	56	0.4	5114411
Calculated Sodium (Na)	mg/kg	140	0.9	5114411
Calculated Potassium (K)	mg/kg	3.3	0.4	5114411
Calculated Chloride (Cl)	mg/kg	200	2	5114411
Calculated Sulphate (SO4)	mg/kg	520	2	5114411
Soluble Parameters				
Soluble Chloride (Cl)	mg/L	580	5	5129753
Soluble Conductivity	dS/m	3.8	0.02	5124263
Soluble (CaCl2) pH	N/A	6.09	N/A	5125327
Sodium Adsorption Ratio	N/A	4.6	0.1	5114410
Soluble Calcium (Ca)	mg/L	340	1.5	5127239
Soluble Magnesium (Mg)	mg/L	160	1.0	5127239
Soluble Sodium (Na)	mg/L	410	2.5	5127239
Soluble Potassium (K)	mg/L	9.3	1.3	5127239
Saturation %	%	35	N/A	5124190
Soluble Sulphate (SO4)	mg/L	1500	5.0	5127239
Theoretical Gypsum Requirement	tonnes/ha	<0.1	0.1	5114413

RDL = Reportable Detection Limit

Maxxam Job #: B177775
Report Date: 2011/08/30

EBA ENGINEERING CONSULTANTS LTD.

Your P.O. #: Y22101187.001

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		BI0044	BI0049	BI0050	BI0065	BI0084	BI0085		
Sampling Date		2011/08/09	2011/08/09	2011/08/10	2011/08/10	2011/08/10	2011/08/10		
COC Number		A050092	A050092	A050093	A050093	A050094	A050094		
	Units	**11W8-03 (15CM)**	**11W5E-01 (85CM)**	**11W6-03 (25CM)**	**11W1-09 (20CM)**	**11W2-20 (25CM)**	**11W2-7 (20CM)**	**RDL**	**QC Batch**
Physical Properties									
Sieve - Pan	%	15	11	8.8	6.8	18	29	0.2	5117333
Sieve - #200 (>0.075mm)	%	85	89	91	93	82	71	0.2	5117333
Grain Size	%	COARSE	COARSE	COARSE	COARSE	COARSE	COARSE	0.2	5117333

RDL = Reportable Detection Limit

Maxxam ID		BI0089	BI0091	BI0168	BI0184	BI0188		
Sampling Date		2011/08/10	2011/08/09	2011/08/09	2011/08/09	2011/08/09		
COC Number		A050094	A050095	A050095	A050096	A050096		
	Units	**11W2-2 (20CM)**	**11W4-01 (25CM)**	**11W3-04 (25CM)**	**11W5E-04 (20CM)**	**11W5B-01 (10CM)**	**RDL**	**QC Batch**
Physical Properties								
Sieve - Pan	%	40	11	16	33	3.9	0.2	5117333
Sieve - #200 (>0.075mm)	%	60	89	84	67	96	0.2	5117333
Grain Size	%	COARSE	COARSE	COARSE	COARSE	COARSE	0.2	5117333

RDL = Reportable Detection Limit

Maxxam ID		BI0193	BI0195		
Sampling Date		2011/08/07	2011/08/10		
COC Number		A050097	A050097		
	Units	**11W01-01 (0-15CM)**	**11W02-18 COMPOSITE**	**RDL**	**QC Batch**
Nutrients					
Available (KCl) Nitrate (N)	mg/kg	N/A	<0.5	0.5	5129768
Physical Properties					
Sieve - Pan	%	19	61	0.2	5122024
Sieve - #200 (>0.075mm)	%	81	39	0.2	5122024
Grain Size	%	COARSE	FINE	0.2	5122024

N/A = Not Applicable
RDL = Reportable Detection Limit

General Comments

Results relate only to the items tested.

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: Y22101187.001
Site Location:

Quality Assurance Report

Maxxam Job Number: EB177775

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5117229	PK4	Matrix Spike						
		[BI0166-01]	O-TERPHENYL (sur.)	2011/08/27		102	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/27		100	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2011/08/27		92	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2011/08/27		93	%	50 - 130
		Spiked Blank	O-TERPHENYL (sur.)	2011/08/27		100	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/27		106	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2011/08/27		104	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2011/08/27		99	%	70 - 130
		Method Blank	O-TERPHENYL (sur.)	2011/08/27		104	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/27	<10		mg/kg	
			F3 (C16-C34 Hydrocarbons)	2011/08/27	<10		mg/kg	
			F4 (C34-C50 Hydrocarbons)	2011/08/27	<10		mg/kg	
		RPD [BI0165-01]	F2 (C10-C16 Hydrocarbons)	2011/08/27	NC		%	50
			F3 (C16-C34 Hydrocarbons)	2011/08/27	15.3		%	50
			F4 (C34-C50 Hydrocarbons)	2011/08/27	NC		%	50
5117233	PK4	Matrix Spike						
		[BI0064-01]	O-TERPHENYL (sur.)	2011/08/26		95	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/26		NC	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2011/08/26		88	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2011/08/26		92	%	50 - 130
		Spiked Blank	O-TERPHENYL (sur.)	2011/08/26		97	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/26		101	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2011/08/26		101	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2011/08/26		99	%	70 - 130
		Method Blank	O-TERPHENYL (sur.)	2011/08/26		114	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/26	<10		mg/kg	
			F3 (C16-C34 Hydrocarbons)	2011/08/26	<10		mg/kg	
			F4 (C34-C50 Hydrocarbons)	2011/08/26	<10		mg/kg	
		RPD [BI0063-01]	F2 (C10-C16 Hydrocarbons)	2011/08/26	NC		%	50
			F3 (C16-C34 Hydrocarbons)	2011/08/26	NC		%	50
			F4 (C34-C50 Hydrocarbons)	2011/08/26	NC		%	50
5117241	AN4	Matrix Spike						
		[BI0039-01]	O-TERPHENYL (sur.)	2011/08/26		115	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/26		NC	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2011/08/26		NC	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2011/08/26		103	%	50 - 130
		Spiked Blank	O-TERPHENYL (sur.)	2011/08/26		101	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/26		96	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2011/08/26		96	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2011/08/26		93	%	70 - 130
		Method Blank	O-TERPHENYL (sur.)	2011/08/26		106	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/26	<10		mg/kg	
			F3 (C16-C34 Hydrocarbons)	2011/08/26	<10		mg/kg	
			F4 (C34-C50 Hydrocarbons)	2011/08/26	<10		mg/kg	
		RPD [BI0038-01]	F2 (C10-C16 Hydrocarbons)	2011/08/26	1.4		%	50
			F3 (C16-C34 Hydrocarbons)	2011/08/26	13.1		%	50
			F4 (C34-C50 Hydrocarbons)	2011/08/26	NC		%	50
5117333	JB9	Method Blank	Sieve - Pan	2011/08/24	<0.2		%	
			Sieve - #200 (>0.075mm)	2011/08/24	<0.2		%	
		RPD	Sieve - Pan	2011/08/24	10.4		%	35
			Sieve - #200 (>0.075mm)	2011/08/24	21.6		%	35
5117417	YT	Matrix Spike						
		[BI0166-01]	4-BROMOFLUOROBENZENE (sur.)	2011/08/27		103	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2011/08/27		106	%	60 - 130

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: Y22101187.001
Site Location:

Quality Assurance Report (Continued)

Maxxam Job Number: EB177775

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5117417	YT	Matrix Spike						
		[BI0166-01]	D4-1,2-DICHLOROETHANE (sur.)	2011/08/27		109	%	60 - 140
			D8-TOLUENE (sur.)	2011/08/27		102	%	60 - 140
			Benzene	2011/08/27		108	%	60 - 140
			Toluene	2011/08/27		102	%	60 - 140
			Ethylbenzene	2011/08/27		111	%	60 - 140
			m & p-Xylene	2011/08/27		108	%	60 - 140
			o-Xylene	2011/08/27		109	%	60 - 140
			(C6-C10)	2011/08/27		80	%	60 - 140
		Spiked Blank	4-BROMOFLUOROBENZENE (sur.)	2011/08/27		104	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2011/08/27		128	%	60 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2011/08/27		104	%	60 - 140
			D8-TOLUENE (sur.)	2011/08/27		103	%	60 - 140
			Benzene	2011/08/27		116	%	60 - 140
			Toluene	2011/08/27		113	%	60 - 140
			Ethylbenzene	2011/08/27		123	%	60 - 140
			m & p-Xylene	2011/08/27		122	%	60 - 140
			o-Xylene	2011/08/27		122	%	60 - 140
			(C6-C10)	2011/08/27		81	%	60 - 140
		Method Blank	4-BROMOFLUOROBENZENE (sur.)	2011/08/27		103	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2011/08/27		110	%	60 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2011/08/27		99	%	60 - 140
			D8-TOLUENE (sur.)	2011/08/27		106	%	60 - 140
			Benzene	2011/08/27	<0.0050		mg/kg	
			Toluene	2011/08/27	<0.020		mg/kg	
			Ethylbenzene	2011/08/27	<0.010		mg/kg	
			Xylenes (Total)	2011/08/27	<0.040		mg/kg	
			m & p-Xylene	2011/08/27	<0.040		mg/kg	
			o-Xylene	2011/08/27	<0.020		mg/kg	
			F1 (C6-C10) - BTEX	2011/08/27	<12		mg/kg	
			(C6-C10)	2011/08/27	<12		mg/kg	
		RPD [BI0165-01]	Benzene	2011/08/27	NC		%	50
			Toluene	2011/08/27	NC		%	50
			Ethylbenzene	2011/08/27	NC		%	50
			Xylenes (Total)	2011/08/27	NC		%	50
			m & p-Xylene	2011/08/27	NC		%	50
			o-Xylene	2011/08/27	NC		%	50
			F1 (C6-C10) - BTEX	2011/08/27	NC		%	50
			(C6-C10)	2011/08/27	NC		%	50
5117716	PS7	Matrix Spike						
		[BI0039-01]	4-BROMOFLUOROBENZENE (sur.)	2011/08/28		117	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2011/08/28		102	%	60 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2011/08/28		116	%	60 - 140
			D8-TOLUENE (sur.)	2011/08/28		99	%	60 - 140
			Benzene	2011/08/28		111	%	60 - 140
			Toluene	2011/08/28		NC	%	60 - 140
			Ethylbenzene	2011/08/28		NC	%	60 - 140
			m & p-Xylene	2011/08/28		NC	%	60 - 140
			o-Xylene	2011/08/28		NC	%	60 - 140
			(C6-C10)	2011/08/28		NC	%	60 - 140
		Spiked Blank	4-BROMOFLUOROBENZENE (sur.)	2011/08/28		106	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2011/08/28		110	%	60 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2011/08/28		104	%	60 - 140
			D8-TOLUENE (sur.)	2011/08/28		102	%	60 - 140
			Benzene	2011/08/28		103	%	60 - 140

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: Y22101187.001
Site Location:

Quality Assurance Report (Continued)

Maxxam Job Number: EB177775

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5117716	PS7	Spiked Blank	Toluene	2011/08/28		94	%	60 - 140
			Ethylbenzene	2011/08/28		99	%	60 - 140
			m & p-Xylene	2011/08/28		100	%	60 - 140
			o-Xylene	2011/08/28		100	%	60 - 140
			(C6-C10)	2011/08/28		102	%	60 - 140
		Method Blank	4-BROMOFLUOROBENZENE (sur.)	2011/08/28		96	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2011/08/28		108	%	60 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2011/08/28		96	%	60 - 140
			D8-TOLUENE (sur.)	2011/08/28		105	%	60 - 140
			Benzene	2011/08/28	<0.0050		mg/kg	
			Toluene	2011/08/28	<0.020		mg/kg	
			Ethylbenzene	2011/08/28	<0.010		mg/kg	
			Xylenes (Total)	2011/08/28	<0.040		mg/kg	
			m & p-Xylene	2011/08/28	<0.040		mg/kg	
			o-Xylene	2011/08/28	<0.020		mg/kg	
			F1 (C6-C10) - BTEX	2011/08/28	<12		mg/kg	
			(C6-C10)	2011/08/28	<12		mg/kg	
		RPD [BI0038-01]	Benzene	2011/08/29	NC		%	50
			Toluene	2011/08/29	NC		%	50
			Ethylbenzene	2011/08/29	NC		%	50
			Xylenes (Total)	2011/08/29	NC		%	50
			m & p-Xylene	2011/08/29	NC		%	50
			o-Xylene	2011/08/29	NC		%	50
			F1 (C6-C10) - BTEX	2011/08/29	20.4		%	50
			(C6-C10)	2011/08/29	20.4		%	50
5117793	PS7	Matrix Spike [BI0064-01]	4-BROMOFLUOROBENZENE (sur.)	2011/08/27		96	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2011/08/27		104	%	60 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2011/08/27		97	%	60 - 140
			D8-TOLUENE (sur.)	2011/08/27		105	%	60 - 140
			Benzene	2011/08/27		101	%	60 - 140
			Toluene	2011/08/27		90	%	60 - 140
			Ethylbenzene	2011/08/27		98	%	60 - 140
			m & p-Xylene	2011/08/27		95	%	60 - 140
			o-Xylene	2011/08/27		92	%	60 - 140
			(C6-C10)	2011/08/27		89	%	60 - 140
		Spiked Blank	4-BROMOFLUOROBENZENE (sur.)	2011/08/27		109	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2011/08/27		112	%	60 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2011/08/27		100	%	60 - 140
			D8-TOLUENE (sur.)	2011/08/27		108	%	60 - 140
			Benzene	2011/08/27		100	%	60 - 140
			Toluene	2011/08/27		90	%	60 - 140
			Ethylbenzene	2011/08/27		95	%	60 - 140
			m & p-Xylene	2011/08/27		95	%	60 - 140
			o-Xylene	2011/08/27		93	%	60 - 140
			(C6-C10)	2011/08/27		99	%	60 - 140
		Method Blank	4-BROMOFLUOROBENZENE (sur.)	2011/08/27		97	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2011/08/27		102	%	60 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2011/08/27		109	%	60 - 140
			D8-TOLUENE (sur.)	2011/08/27		100	%	60 - 140
			Benzene	2011/08/27	<0.0050		mg/kg	
			Toluene	2011/08/27	<0.020		mg/kg	
			Ethylbenzene	2011/08/27	<0.010		mg/kg	
			Xylenes (Total)	2011/08/27	<0.040		mg/kg	
			m & p-Xylene	2011/08/27	<0.040		mg/kg	

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: Y22101187.001
Site Location:

Quality Assurance Report (Continued)

Maxxam Job Number: EB177775

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5117793	PS7	Method Blank	o-Xylene	2011/08/27	<0.020		mg/kg	
			F1 (C6-C10) - BTEX	2011/08/27	<12		mg/kg	
			(C6-C10)	2011/08/27	<12		mg/kg	
		RPD [BI0063-01]	Benzene	2011/08/27	NC		%	50
			Toluene	2011/08/27	NC		%	50
			Ethylbenzene	2011/08/27	NC		%	50
			Xylenes (Total)	2011/08/27	NC		%	50
			m & p-Xylene	2011/08/27	NC		%	50
			o-Xylene	2011/08/27	NC		%	50
			F1 (C6-C10) - BTEX	2011/08/27	NC		%	50
			(C6-C10)	2011/08/27	NC		%	50
5117834	APA	Method Blank	Moisture	2011/08/24	<0.3		%	
		RPD	Moisture	2011/08/24	7.1		%	20
5118195	PS7	Matrix Spike	4-BROMOFLUOROBENZENE (sur.)	2011/08/26		103	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2011/08/26		107	%	60 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2011/08/26		101	%	60 - 140
			D8-TOLUENE (sur.)	2011/08/26		105	%	60 - 140
			Benzene	2011/08/26		122	%	60 - 140
			Toluene	2011/08/26		116	%	60 - 140
			Ethylbenzene	2011/08/26		131	%	60 - 140
			m & p-Xylene	2011/08/26		129	%	60 - 140
			o-Xylene	2011/08/26		129	%	60 - 140
			(C6-C10)	2011/08/26		119	%	60 - 140
		Spiked Blank	4-BROMOFLUOROBENZENE (sur.)	2011/08/26		102	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2011/08/26		93	%	60 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2011/08/26		103	%	60 - 140
			D8-TOLUENE (sur.)	2011/08/26		106	%	60 - 140
			Benzene	2011/08/26		115	%	60 - 140
			Toluene	2011/08/26		110	%	60 - 140
			Ethylbenzene	2011/08/26		122	%	60 - 140
			m & p-Xylene	2011/08/26		121	%	60 - 140
			o-Xylene	2011/08/26		119	%	60 - 140
			(C6-C10)	2011/08/26		99	%	60 - 140
		Method Blank	4-BROMOFLUOROBENZENE (sur.)	2011/08/26		103	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2011/08/26		114	%	60 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2011/08/26		98	%	60 - 140
			D8-TOLUENE (sur.)	2011/08/26		105	%	60 - 140
			Benzene	2011/08/26	<0.0050		mg/kg	
			Toluene	2011/08/26	<0.020		mg/kg	
			Ethylbenzene	2011/08/26	<0.010		mg/kg	
			Xylenes (Total)	2011/08/26	<0.040		mg/kg	
			m & p-Xylene	2011/08/26	<0.040		mg/kg	
			o-Xylene	2011/08/26	<0.020		mg/kg	
			F1 (C6-C10) - BTEX	2011/08/26	<12		mg/kg	
			(C6-C10)	2011/08/26	<12		mg/kg	
		RPD	Benzene	2011/08/26	NC		%	50
			Toluene	2011/08/26	NC		%	50
			Ethylbenzene	2011/08/26	NC		%	50
			Xylenes (Total)	2011/08/26	NC		%	50
			m & p-Xylene	2011/08/26	NC		%	50
			o-Xylene	2011/08/26	NC		%	50
			F1 (C6-C10) - BTEX	2011/08/26	NC		%	50
			(C6-C10)	2011/08/26	NC		%	50
5118200	APA	Method Blank	Moisture	2011/08/24	<0.3		%	
		RPD [BI0040-01]	Moisture	2011/08/24	10.6		%	20

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: Y22101187.001
Site Location:

Quality Assurance Report (Continued)

Maxxam Job Number: EB177775

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5118254	APA	Method Blank	Moisture	2011/08/24	<0.3		%	
		RPD [BI0091-01]	Moisture	2011/08/24	3.7		%	20
5118797	BA3	Spiked Blank	Hex. Chromium (Cr 6+)	2011/08/24		109	%	90 - 110
		Method Blank	Hex. Chromium (Cr 6+)	2011/08/24	<0.15		mg/kg	
		RPD	Hex. Chromium (Cr 6+)	2011/08/24	NC		%	35
5119601	APA	Method Blank	Moisture	2011/08/24	<0.3		%	
		RPD [BI0167-01]	Moisture	2011/08/24	13.0		%	20
5121860	LCA	QC Standard	Soluble (CaCl2) pH	2011/08/25		99	%	97 - 103
		Spiked Blank	Soluble (CaCl2) pH	2011/08/25		100	%	97 - 103
		RPD	Soluble (CaCl2) pH	2011/08/25	0.3		%	5
5122024	JB9	Method Blank	Sieve - Pan	2011/08/25	<0.2		%	
			Sieve - #200 (>0.075mm)	2011/08/25	<0.2		%	
		RPD	Sieve - Pan	2011/08/25	9.9		%	35
			Sieve - #200 (>0.075mm)	2011/08/25	2.3		%	35
5122169	APA	Method Blank	Moisture	2011/08/25	<0.3		%	
		RPD	Moisture	2011/08/25	12.1		%	20
5124190	CCI	QC Standard	Saturation %	2011/08/25		103	%	88 - 112
		RPD	Saturation %	2011/08/25	0.06		%	12
5124263	SY5	QC Standard	Soluble Conductivity	2011/08/26		105	%	75 - 125
		Spiked Blank	Soluble Conductivity	2011/08/26		97	%	90 - 110
		Method Blank	Soluble Conductivity	2011/08/26	<0.02		dS/m	
		RPD	Soluble Conductivity	2011/08/26	7.3		%	35
5125327	LCA	QC Standard	Soluble (CaCl2) pH	2011/08/26		99	%	97 - 103
		Spiked Blank	Soluble (CaCl2) pH	2011/08/26		100	%	97 - 103
		RPD	Soluble (CaCl2) pH	2011/08/26	0		%	5
5127239	AD3	Matrix Spike	Soluble Calcium (Ca)	2011/08/27		108	%	80 - 120
			Soluble Magnesium (Mg)	2011/08/27		107	%	80 - 120
			Soluble Sodium (Na)	2011/08/27		108	%	80 - 120
			Soluble Potassium (K)	2011/08/27		108	%	80 - 120
		QC Standard	Soluble Calcium (Ca)	2011/08/29		121	%	75 - 125
			Soluble Magnesium (Mg)	2011/08/29		116	%	75 - 125
			Soluble Sodium (Na)	2011/08/29		107	%	75 - 125
			Soluble Potassium (K)	2011/08/29		89	%	75 - 125
			Soluble Sulphate (SO4)	2011/08/29		121	%	75 - 125
		Spiked Blank	Soluble Calcium (Ca)	2011/08/27		106	%	80 - 120
			Soluble Magnesium (Mg)	2011/08/27		108	%	80 - 120
			Soluble Sodium (Na)	2011/08/27		103	%	80 - 120
			Soluble Potassium (K)	2011/08/27		109	%	80 - 120
		Method Blank	Soluble Calcium (Ca)	2011/08/27	<1.5		mg/L	
			Soluble Magnesium (Mg)	2011/08/27	<1.0		mg/L	
			Soluble Sodium (Na)	2011/08/27	<2.5		mg/L	
			Soluble Potassium (K)	2011/08/27	<1.3		mg/L	
			Soluble Sulphate (SO4)	2011/08/27	<5.0		mg/L	
		RPD	Soluble Calcium (Ca)	2011/08/29	10.3		%	35
			Soluble Magnesium (Mg)	2011/08/29	9.6		%	35
			Soluble Sodium (Na)	2011/08/29	10.4		%	35
			Soluble Potassium (K)	2011/08/29	NC		%	35
			Soluble Sulphate (SO4)	2011/08/29	14.1		%	35
5128759	NC3	Spiked Blank	Available (CaCl2) Sulphur (S)	2011/08/26		99	%	80 - 120
		Method Blank	Available (CaCl2) Sulphur (S)	2011/08/26	<2		mg/kg	
		RPD	Available (CaCl2) Sulphur (S)	2011/08/26	NC		%	35
5128879	NC3	Spiked Blank	Available (Mod Kel) Phosphorus (P)	2011/08/26		99	%	75 - 125
			Available (Mod Kel) Potassium (K)	2011/08/26		94	%	75 - 125
		Method Blank	Available (Mod Kel) Phosphorus (P)	2011/08/26	<4		mg/kg	
			Available (Mod Kel) Potassium (K)	2011/08/26	<4		mg/kg	

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: Y22101187.001
Site Location:

Quality Assurance Report (Continued)

Maxxam Job Number: EB177775

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5128879	NC3	RPD	Available (Mod Kel) Phosphorus (P)	2011/08/26	NC		%	35
			Available (Mod Kel) Potassium (K)	2011/08/26	NC		%	35
5129196	RG4	Matrix Spike						
		[BI0056-01]	Total Antimony (Sb)	2011/08/26		98	%	75 - 125
			Total Arsenic (As)	2011/08/26		97	%	75 - 125
			Total Barium (Ba)	2011/08/26		NC	%	75 - 125
			Total Beryllium (Be)	2011/08/26		106	%	75 - 125
			Total Cadmium (Cd)	2011/08/26		100	%	75 - 125
			Total Chromium (Cr)	2011/08/26		NC	%	75 - 125
			Total Cobalt (Co)	2011/08/26		93	%	75 - 125
			Total Copper (Cu)	2011/08/26		94	%	75 - 125
			Total Lead (Pb)	2011/08/26		97	%	75 - 125
			Total Mercury (Hg)	2011/08/26		99	%	75 - 125
			Total Molybdenum (Mo)	2011/08/26		108	%	75 - 125
			Total Nickel (Ni)	2011/08/26		94	%	75 - 125
			Total Selenium (Se)	2011/08/26		100	%	75 - 125
			Total Silver (Ag)	2011/08/26		104	%	75 - 125
			Total Thallium (Tl)	2011/08/26		80	%	75 - 125
			Total Tin (Sn)	2011/08/26		118	%	75 - 125
			Total Uranium (U)	2011/08/26		96	%	75 - 125
			Total Vanadium (V)	2011/08/26		NC	%	75 - 125
			Total Zinc (Zn)	2011/08/26		NC	%	75 - 125
		QC Standard	Total Arsenic (As)	2011/08/26		106	%	50 - 150
			Total Barium (Ba)	2011/08/26		112	%	69 - 131
			Total Chromium (Cr)	2011/08/26		98	%	41 - 159
			Total Cobalt (Co)	2011/08/26		98	%	75 - 125
			Total Copper (Cu)	2011/08/26		94	%	72 - 127
			Total Lead (Pb)	2011/08/26		96	%	54 - 146
			Total Nickel (Ni)	2011/08/26		104	%	61 - 139
			Total Vanadium (V)	2011/08/26		115	%	50 - 150
			Total Zinc (Zn)	2011/08/26		95	%	72 - 128
		Spiked Blank	Total Antimony (Sb)	2011/08/26		98	%	75 - 125
			Total Arsenic (As)	2011/08/26		97	%	75 - 125
			Total Barium (Ba)	2011/08/26		111	%	75 - 125
			Total Beryllium (Be)	2011/08/26		100	%	75 - 125
			Total Cadmium (Cd)	2011/08/26		99	%	75 - 125
			Total Chromium (Cr)	2011/08/26		100	%	75 - 125
			Total Cobalt (Co)	2011/08/26		95	%	75 - 125
			Total Copper (Cu)	2011/08/26		102	%	75 - 125
			Total Lead (Pb)	2011/08/26		98	%	75 - 125
			Total Mercury (Hg)	2011/08/26		92	%	75 - 125
			Total Molybdenum (Mo)	2011/08/26		103	%	75 - 125
			Total Nickel (Ni)	2011/08/26		102	%	75 - 125
			Total Selenium (Se)	2011/08/26		99	%	75 - 125
			Total Silver (Ag)	2011/08/26		102	%	75 - 125
			Total Thallium (Tl)	2011/08/26		80	%	75 - 125
			Total Tin (Sn)	2011/08/26		114	%	75 - 125
			Total Uranium (U)	2011/08/26		101	%	75 - 125
			Total Vanadium (V)	2011/08/26		99	%	75 - 125
			Total Zinc (Zn)	2011/08/26		103	%	75 - 125
		Method Blank	Total Antimony (Sb)	2011/08/26	<1		mg/kg	
			Total Arsenic (As)	2011/08/26	<1		mg/kg	
			Total Barium (Ba)	2011/08/26	<10		mg/kg	
			Total Beryllium (Be)	2011/08/26	<0.4		mg/kg	
			Total Cadmium (Cd)	2011/08/26	<0.1		mg/kg	

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: Y22101187.001
Site Location:

Quality Assurance Report (Continued)

Maxxam Job Number: EB177775

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5129196	RG4	Method Blank	Total Chromium (Cr)	2011/08/26	<1		mg/kg	
			Total Cobalt (Co)	2011/08/26	<1		mg/kg	
			Total Copper (Cu)	2011/08/26	<5		mg/kg	
			Total Lead (Pb)	2011/08/26	<1		mg/kg	
			Total Mercury (Hg)	2011/08/26	<0.05		mg/kg	
			Total Molybdenum (Mo)	2011/08/26	<0.4		mg/kg	
			Total Nickel (Ni)	2011/08/26	<1		mg/kg	
			Total Selenium (Se)	2011/08/26	<0.5		mg/kg	
			Total Silver (Ag)	2011/08/26	<1		mg/kg	
			Total Thallium (Tl)	2011/08/26	<0.3		mg/kg	
			Total Tin (Sn)	2011/08/26	<1		mg/kg	
			Total Uranium (U)	2011/08/26	<1		mg/kg	
			Total Vanadium (V)	2011/08/26	<1		mg/kg	
			Total Zinc (Zn)	2011/08/26	<10		mg/kg	
		RPD [BI0056-01]	Total Antimony (Sb)	2011/08/26	NC		%	35
			Total Arsenic (As)	2011/08/26	NC		%	35
			Total Barium (Ba)	2011/08/26	NC		%	35
			Total Beryllium (Be)	2011/08/26	NC		%	35
			Total Cadmium (Cd)	2011/08/26	NC		%	35
			Total Chromium (Cr)	2011/08/26	20.8		%	35
			Total Cobalt (Co)	2011/08/26	21.8		%	35
			Total Copper (Cu)	2011/08/26	NC		%	35
			Total Lead (Pb)	2011/08/26	NC		%	35
			Total Mercury (Hg)	2011/08/26	NC		%	35
			Total Molybdenum (Mo)	2011/08/26	NC		%	35
			Total Nickel (Ni)	2011/08/26	24.8		%	35
			Total Selenium (Se)	2011/08/26	NC		%	35
			Total Silver (Ag)	2011/08/26	NC		%	35
			Total Thallium (Tl)	2011/08/26	NC		%	35
			Total Tin (Sn)	2011/08/26	NC		%	35
			Total Uranium (U)	2011/08/26	NC		%	35
			Total Vanadium (V)	2011/08/26	17.9		%	35
			Total Zinc (Zn)	2011/08/26	NC		%	35
5129753	KN3	Matrix Spike	Soluble Chloride (Cl)	2011/08/27		106	%	75 - 125
		QC Standard	Soluble Chloride (Cl)	2011/08/27		109	%	75 - 125
		Spiked Blank	Soluble Chloride (Cl)	2011/08/27		105	%	80 - 120
		Method Blank	Soluble Chloride (Cl)	2011/08/27	<5		mg/L	
		RPD	Soluble Chloride (Cl)	2011/08/27	NC		%	35
5129767	KN3	Matrix Spike	Available (KCl) Nitrite (N)	2011/08/29		108	%	75 - 125
		Spiked Blank	Available (KCl) Nitrite (N)	2011/08/27		111	%	75 - 125
		Method Blank	Available (KCl) Nitrite (N)	2011/08/27	0.6, RDL=0.5		mg/kg	
		RPD	Available (KCl) Nitrite (N)	2011/08/27	NC		%	35
5129768	KN3	Matrix Spike	Available (KCl) Nitrate (N)	2011/08/29		97	%	75 - 125
		Spiked Blank	Available (KCl) Nitrate (N)	2011/08/27		93	%	75 - 125
		Method Blank	Available (KCl) Nitrate (N)	2011/08/27	0.8, RDL=0.5		mg/kg	
		RPD	Available (KCl) Nitrate (N)	2011/08/27	NC		%	25
5129816	SV1	Matrix Spike	Soluble (Hot water) Boron (B)	2011/08/27		101	%	75 - 125
		Spiked Blank	Soluble (Hot water) Boron (B)	2011/08/27		103	%	80 - 120
		Method Blank	Soluble (Hot water) Boron (B)	2011/08/27	<0.1		mg/kg	
		RPD	Soluble (Hot water) Boron (B)	2011/08/27	4.0		%	35
5130099	PK4	Matrix Spike	O-TERPHENYL (sur.)	2011/08/28		105	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/28		130	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2011/08/28		130	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2011/08/28		129	%	50 - 130
		Spiked Blank	O-TERPHENYL (sur.)	2011/08/28		97	%	50 - 130

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: Y22101187.001
Site Location:

Quality Assurance Report (Continued)

Maxxam Job Number: EB177775

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5130099	PK4	Spiked Blank	F2 (C10-C16 Hydrocarbons)	2011/08/28		87	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2011/08/28		88	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2011/08/28		92	%	70 - 130
		Method Blank	O-TERPHENYL (sur.)	2011/08/28		101	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/28	<10		mg/kg	
			F3 (C16-C34 Hydrocarbons)	2011/08/28	<10		mg/kg	
			F4 (C34-C50 Hydrocarbons)	2011/08/28	<10		mg/kg	
		RPD	F2 (C10-C16 Hydrocarbons)	2011/08/28	49.9		%	50
			F3 (C16-C34 Hydrocarbons)	2011/08/28	49.9		%	50
			F4 (C34-C50 Hydrocarbons)	2011/08/28	46.8		%	50
5132476	BA3	Matrix Spike	Hex. Chromium (Cr 6+)	2011/08/29		103	%	N/A
		Spiked Blank	Hex. Chromium (Cr 6+)	2011/08/29		103	%	75 - 125
		Method Blank	Hex. Chromium (Cr 6+)	2011/08/29	<0.15		mg/kg	
		RPD	Hex. Chromium (Cr 6+)	2011/08/29	NC		%	35

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.
QC Standard: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
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 spiked amount was not sufficiently significant to permit a reliable recovery calculation.
NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

Maxxam

Calgary: 4000 19st St. NE, T2E 6P8, Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4, Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-8889
www.maxxamanalytics.com

08/963(3) **Chain of Custody** A050092

Page: 1 of 6

	Invoice To:	C/O Report Address ☐
Company:	EBA ENGINEERING	
Contact:	DANIELA FELSKE	
Address:	14940-123 AVE	
	Prov: EDM, AB	PC:
Contact #s:	Ph: 780-451-2121	Cell:

Report To: *	Same as Invoice ☒
☒	
Prov:	PC:
Ph:	Cell:

Report Distribution (E-Mail):
dfelske@eba.ca
mhebert@eba.ca
bhorne@eba.ca

REGULATORY GUIDELINES:
☐ AT1
☒ CCME
☐ Regulated Drinking Water
☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #:	Y22101187.001
Project # / Name:	
Site Location:	
Quote #:	
Sampled By:	

SERVICE REQUESTED: ☐ RUSH (Contact lab to reserve) Date Required: ____ ☒ REGULAR (5 to 7 Days)

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	SOIL: Sieve (75 micron)	SOIL: Regulated Metals (CCME / AT1)	SOIL: Salinity 4	SOIL: Assessment ICP Metals	SOIL: Basic Class II Landfill	WATER: ☐VOCs ☐BTEX F1	WATER: ☐BTEX F1-F2 ☐BTEX F1-F4	WATER: ☐ Routine Water ☐ Turb ☐ F	WATER: ☐ TOC ☐ DOC	WATER: Regulated Metals (CCME / AT1) Total	WATER: Regulated Metals (CCME / AT1) Dissolved	WATER: Mercury ☐ Total ☐ Dissolved	Other Analysis	HOLD - Do not Analyze	# of Containers Submitted
1	11W5G-01	30cm	S	Aug 9/11	X															
2	11W5H-01	50cm	S		X															
3	11W5G-04	10cm			X															
4	11W5H-02	20cm			X															
5	11W5G-01	10cm			X															
6	11W8-05	10cm			X															
7	11W8-03	15cm			X	X														
8	11W8-04	10cm			X															
9	11W8-02	10cm			X															
10	11W8-01	10cm			X															
11	~~11W8-02~~ 11W7-03	10cm			X															
12	11W5E-01	85cm			X															

Please indicate Filtered, Preserved or Both (F, P, F/P)

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
D. FELSKE	AUG 22, 2011	9:00
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions:

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:
VERONICA AKADLISA	2011/08/22	11:57

Lab Comments:

Maxxam Job #: B177775

Custody Seal	Temperature	Ice
ABSENT	5, 6, 5	PRESENT
ABSENT	6, 5, 5	PRESENT
ABSENT	22, 22, 22	ABSENT

LAST COOLER FOR DISPOSAL

Maxxam

Calgary: 4000 19st St. NE, T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 485-8889
www.maxxamanalytics.com

Chain of Custody

A050093

Page: 2 of 6

	Invoice To:	C/O Report Address ☐	Report To:	Same as Invoice ☐
Company:				
Contact:				
Address:				
	Prov:	PC:	Prov:	PC:
Contact #s:	Ph:	Cell:	Ph:	Cell:

Report Distribution (E-Mail):

REGULATORY GUIDELINES:
- ☐ AT1
- ☐ CCME
- ☐ Regulated Drinking Water
- ☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #:	
Project # / Name:	
Site Location:	
Quote #:	
Sampled By:	

SERVICE REQUESTED: ☐ **RUSH** (Contact lab to reserve) **Date Required:** ☐ REGULAR (5 to 7 Days)

Same

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	SOIL: Sieve (75 micron)	SOIL: Regulated Metals (CCME / AT1)	SOIL: Salinity 4	SOIL: Assessment ICP Metals	SOIL: Basic Class II Landfill	WATER: ☐BTEX F1 ☐VOCs	WATER: ☐BTEX F1-F2 ☐BTEX F1-F4	WATER: ☐ Routine Water ☐ Turb ☐ F	WATER: ☐ TOC ☐ DOC	WATER: Regulated Metals (CCME / AT1) Total	WATER: Regulated Metals (CCME / AT1) Dissolved	WATER: Mercury ☐ Total ☐ Dissolved	Other Analysis	HOLD - Do not Analyze	# of Containers Submitted
1	11W6-03	25cm	S	Aug 10	X	X														
2	11W6-04	15cm			X		X													
3	11W6-05	25cm			X															
4	11W6-02	20cm			X															
5	11W6-07	30cm			X		X													
6	11W6-01	0-5cm			X		X													
7	11W1-01	0-5cm			X															
8	11W2-23	30			X															
9	11W1-01	15			X															
10	11W1-05	25			X															
11	11W1-09	20			X	X														
12	11W1-24	20			X															

Please indicate Filtered, Preserved or Both (F, P, F/P)

VM / MH B

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
D FESKE	Aug 22, 2011	9:00 am
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions:

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:
VERONICA AKAOHSA	2011/08/22	11:57

Lab Comments:

Maxxam Job #: B177775

Custody Seal	Temperature	Ice
ABSENT	5, 6, 5	PRESENT
ABSENT	6, 6, 5	PRESENT
ABSENT	22, 22, 22	ABSENT

Maxxam

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Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-8889
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Chain of Custody

A050094

Page: 3 of 6

	Invoice To:	C/O Report Address ☐	Report To:	Same as Invoice ☐	Report Distribution (E-Mail):
Company:					
Contact:					
Address:					
	Prov:	PC:	Prov:	PC:	
Contact #s:	Ph:	Cell:	Ph:	Cell:	

REGULATORY GUIDELINES:
- ☐ AT1
- ☐ CCME
- ☐ Regulated Drinking Water
- ☐ Other:

All samples are held for 60 calendar days after sample receipt unless specified otherwise.

PO #:	
Project # / Name:	
Site Location:	
Quote #:	
Sampled By:	

SERVICE REQUESTED:
- ☐ **RUSH** (Contact lab to reserve) Date Required:
- ☒ REGULAR (5 to 7 Days)

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	SOIL: Sieve (75 micron)	SOIL: Regulated Metals (CCME / AT1)	SOIL: Salinity 4	SOIL: Assessment ICP Metals	SOIL: Basic Class II Landfill	WATER: ☐BTEX F1 ☐VOCs	WATER: ☐BTEX F1-F2 ☐BTEX F1-F4	WATER: ☐ Routine Water ☐ Turb ☐ F	WATER: ☐ TOC ☐ DOC	WATER: Regulated Metals (CCME / AT1) Total	WATER: Regulated Metals (CCME / AT1) Dissolved	WATER: Mercury ☐ Total ☐ Dissolved	Other Analysis	HOLD - Do not Analyze	# of Containers Submitted
1	11W2-21	25cm	S	Aug 10	X															
2	11W2-18	25cm			X															
3	11W2-18	50cm			X															
4	11W2-19	20cm			X															
5	11W2-8	20cm			X															
6	11W2-~~8~~20	25			X	X														
7	11W2-7	20			X	X														
8	11W24	25			X															
9	11W2-10	25			X															
10	11W2-13	25			X															
11	11W2-2	20			X	X														
12	11W2-17	20			X															

MPH AHS F/P

Please indicate Filtered, Preserved or Both (F, P, F/P)

Relinquished By (Signature/Print): D FELSKE	Date (YY/MM/DD): AUG 22, 2011	Time (24:00): 9 am
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions:

# of Jars Used & Not Submitted

LAB USE ONLY

Received By: VERONICA AKAOHSA	Date: 2011/08/22	Time: 11:57	Maxxam Job #: B177775

Custody Seal	Temperature	Ice
ABSENT	5, 6, 5	PRESENT
	6, 5, 5	PRESENT
	22, 22, 22	ABSENT

Lab Comments:

Maxxam

Calgary: 4000 19st St. NE, T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-8889
www.maxxamanalytics.com

Chain of Custody

A050095

	Invoice To:	C/O Report Address ☐
Company:		
Contact:		
Address:		
	Prov:	PC:
Contact #s:	Ph:	Cell:

same

	Report To: *	Same as Invoice ☐
	Prov:	PC:
	Ph:	Cell:

see pg 1

Report Distribution (E-Mail):

REGULATORY GUIDELINES:
- ☐ AT1
- ☒ CCME
- ☐ Regulated Drinking Water
- ☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #:	
Project # / Name:	
Site Location:	
Quote #:	
Sampled By:	

SERVICE REQUESTED: ☐ **RUSH** (Contact lab to reserve) **Date Required:** ☒ REGULAR (5 to 7 Days)

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	SOIL: Sieve (75 micron)	SOIL: Regulated Metals (CCME / AT1)	SOIL: Salinity 4	SOIL: Assessment ICP Metals	SOIL: Basic Class II Landfill	WATER: ☐BTEX F1 ☐VOCs	WATER: ☐BTEX F1-F2 ☐BTEX F1-F4	WATER: ☐ Routine Water ☐ Turb ☐ F	WATER: ☐ TOC ☐ DOC	WATER: Regulated Metals (CCME / AT1) Total	WATER: Regulated Metals (CCME / AT1) Dissolved	WATER: Mercury ☐ Total ☐ Dissolved	Other Analysis	HOLD - Do not Analyze	# of Containers Submitted
1	11W4-01	25cm	S	AUG 9	X	X														
2	11W3-02	10cm			X		X													
3	11W4-10	50cm			X															
4	11W3-01	20cm			X															
5	11W7-02	10cm			X															
6	11W3-10	20cm			X															
7	11W4-01	35cm			X															
8	11W3-04	25cm			XX															
9	11W4-08	20cm			X															
10	11W4-02	30cm			X															
11	11W4-09	25cm			X															
12	11W4-07	25cm			X															

Please indicate Filtered, Preserved or Both (F, P, F/P)

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
D. FELSKE	AUG 22, 2011	9:00 am
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions:

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:
VERONICA AKAOLISA	2011/08/22	11:57

Lab Comments:

Maxxam Job #: B177775

Custody Seal	Temperature	Ice
ABSENT	5,6,5 6,5,5 22,22,22	

Maxxam

Calgary: 4000 19st St. NE, T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 485-8889
www.maxxamanalytics.com

Chain of Custody

A050096

	Invoice To:	C/O Report Address ☐	Report To:	Same as Invoice ☐
Company:				
Contact:				
Address:				
	Prov:	PC:	Prov:	PC:
Contact #s:	Ph:	Cell:	Ph:	Cell:

Report Distribution (E-Mail):

REGULATORY GUIDELINES:
- ☐ AT1
- ☐ CCME
- ☐ Regulated Drinking Water
- ☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #:	
Project # / Name:	
Site Location:	
Quote #:	
Sampled By:	

SERVICE REQUESTED:
- ☐ **RUSH** (Contact lab to reserve) Date Required:
- ☒ REGULAR (5 to 7 Days)

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	SOIL: Sieve (75 micron)	SOIL: Regulated Metals (CCME / AT1)	SOIL: Salinity 4	SOIL: Assessment ICP Metals	SOIL: Basic Class II Landfill	WATER: ☐BTEX F1 ☐VOCs	WATER: ☐BTEX F1-F2 ☐BTEX F1-F4	WATER: ☐ Routine Water ☐ Turb ☐ F	WATER: ☐ TOC ☐ DOC	WATER: Regulated Metals (CCME / AT1) Total	WATER: Regulated Metals (CCME / AT1) Dissolved	WATER: Mercury ☐ Total ☐ Dissolved	Other Analysis	HOLD - Do not Analyze	# of Containers Submitted
1	11W06_1(CS)	~~Bag~~ 25cm	S	Aug 9,201	X															
2	11W5E-01	50cm			X															
3	BULK FUEL STORAGE	10cm			X			X												
4	11W5E-04	20cm			X	X														
5	11W5F-02	10cm			X															
6	11W5E-01	15cm			X															
7	11W5D-01	15cm			X															
8	11W5B-01	10cm			X	X														
9	11W5E-02	20cm			X															
10	11W5C-01	10cm			X															
11	11W5D-01	30cm			X															
12	11W5A-01	20cm			X															

Please indicate Filtered, Preserved or Both (F, P, F/P)

MATH AHS F/P

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
D. FELSKE	AUG 22 2011	9:00am
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions:

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #: B177775
VERONICA AKAOLISA	2011/08/22	11:57	

Lab Comments:	Custody Seal	Temperature	Ice
	ABSENT	5, 6, 5 PRESENT 6, 5, 5 PRESENT 22, 22, 22 ABSENT	

Maxxam

Calgary: 4000 19st St. NE. T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-8889
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Chain of Custody

A050097

	Invoice To:	C/O Report Address ☐
Company:		
Contact:		
Address:		
	Prov:	PC:
Contact #s:	Ph:	Cell:

	Report To:	Same as Invoice ☐
	Prov:	PC:
	Ph:	Cell:

Report Distribution (E-Mail):

REGULATORY GUIDELINES:
- ☐ AT1
- ☐ CCME
- ☐ Regulated Drinking Water
- ☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #:	
Project # / Name:	
Site Location:	
Quote #:	
Sampled By:	

SERVICE REQUESTED:
- ☐ **RUSH** (Contact lab to reserve) Date Required:
- ☒ REGULAR (5 to 7 Days)

See pg 1

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	Sieve (75micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	NUTRIENTS	PH	WATER: ☐BTEX F1 ☐VOCs	☐BTEX F1-F2 ☐BTEX F1-F4	☐ Routine Water ☐ Turb ☐ F	☐ TOC ☐ DOC	Regulated Metals (CCME / AT1) Total	Dissolved	Mercury ☐ Total ☐ Dissolved	Other Analysis	HOLD - Do not Analyze	# of Containers Submitted
1	11W01-01	0-15 ~~25~~	S	AUG 22		X	X	X														
2	11W02-18 composite		S	AUG 10		X	X	X			X	X										
3	11W5H-04	20cm	S		X																	
4																						
5																						
6																						
7																						
8																						
9																						
10																						
11																						
12																						

Please indicate Filtered, Preserved or Both (F, P, F/P) → F P

VM / AHB

Relinquished By (Signature/Print): D. FELSKE	Date (YY/MM/DD): AUG 22 2011	Time (24:00): 9:00am
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions:

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #:
VERONICA AKAOLISA	2011/08/22	11:57	B177775

Lab Comments:

Custody Seal	Temperature	Ice
ABSENT	5, 6, 5 PRESENT 6, 5, 5 PRESENT 22, 22, 22 ABSENT	

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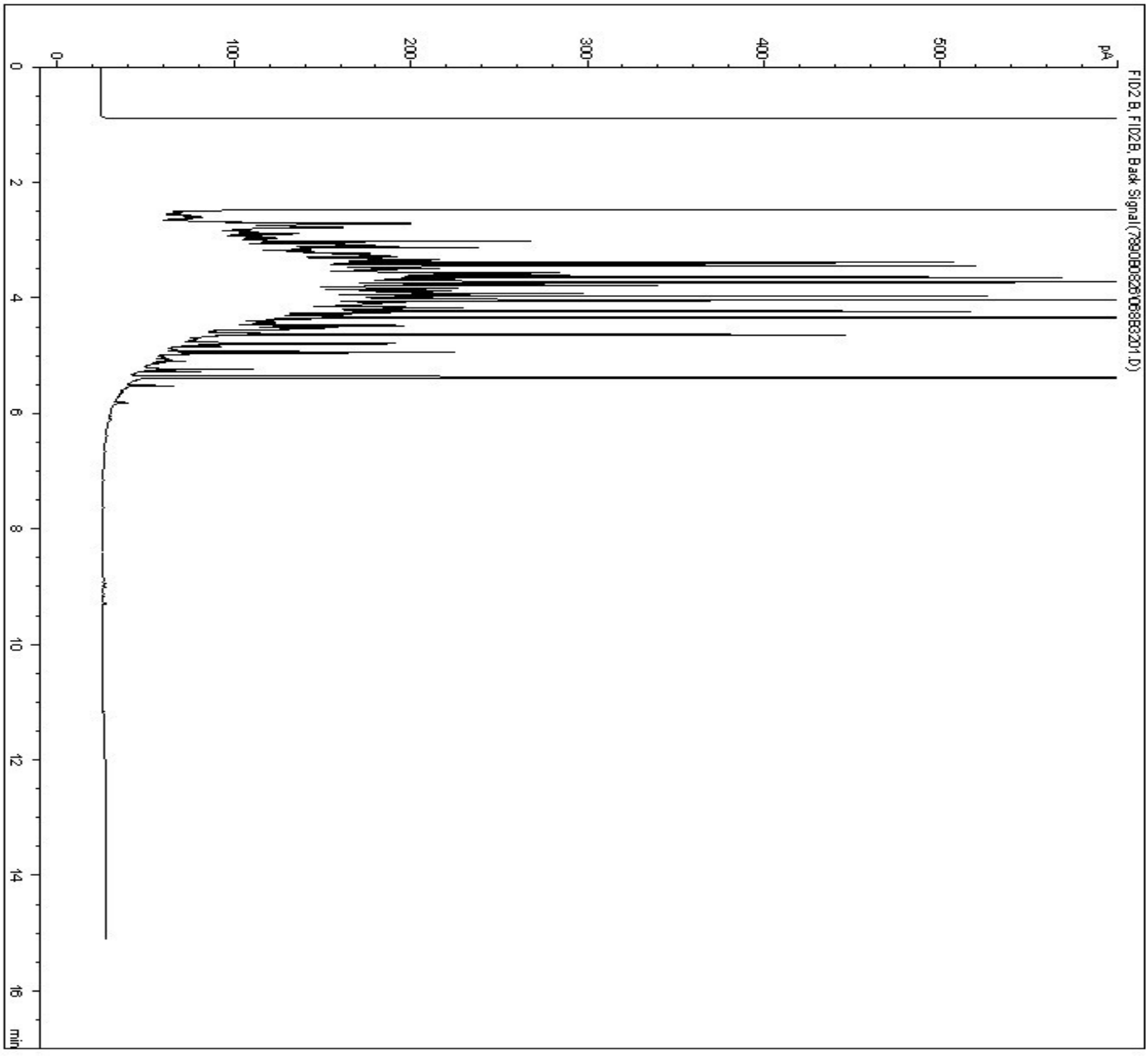
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0038

Client ID: 11W5G-01 (30CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0826\068B3201.D
Sample Name: BI0038



*** End of Report ***

Instrument 1 2011/08/29 10:03:25 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Success Through Science®

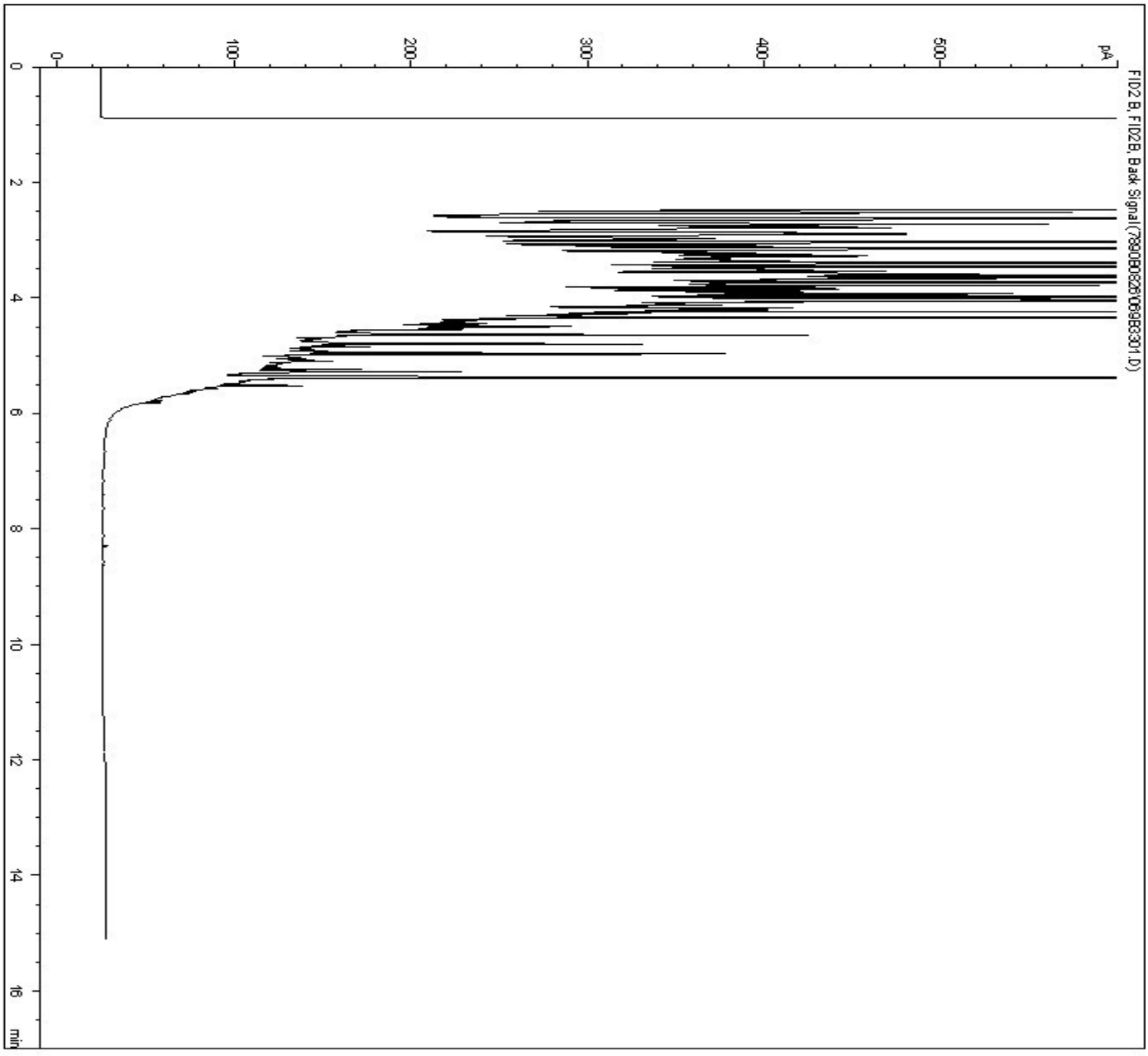
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0039

Client ID: 11W5H-01 (50CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0826\069B3301.D
Sample Name: BI0039



*** End of Report ***

Instrument 1 2011/08/29 10:03:28 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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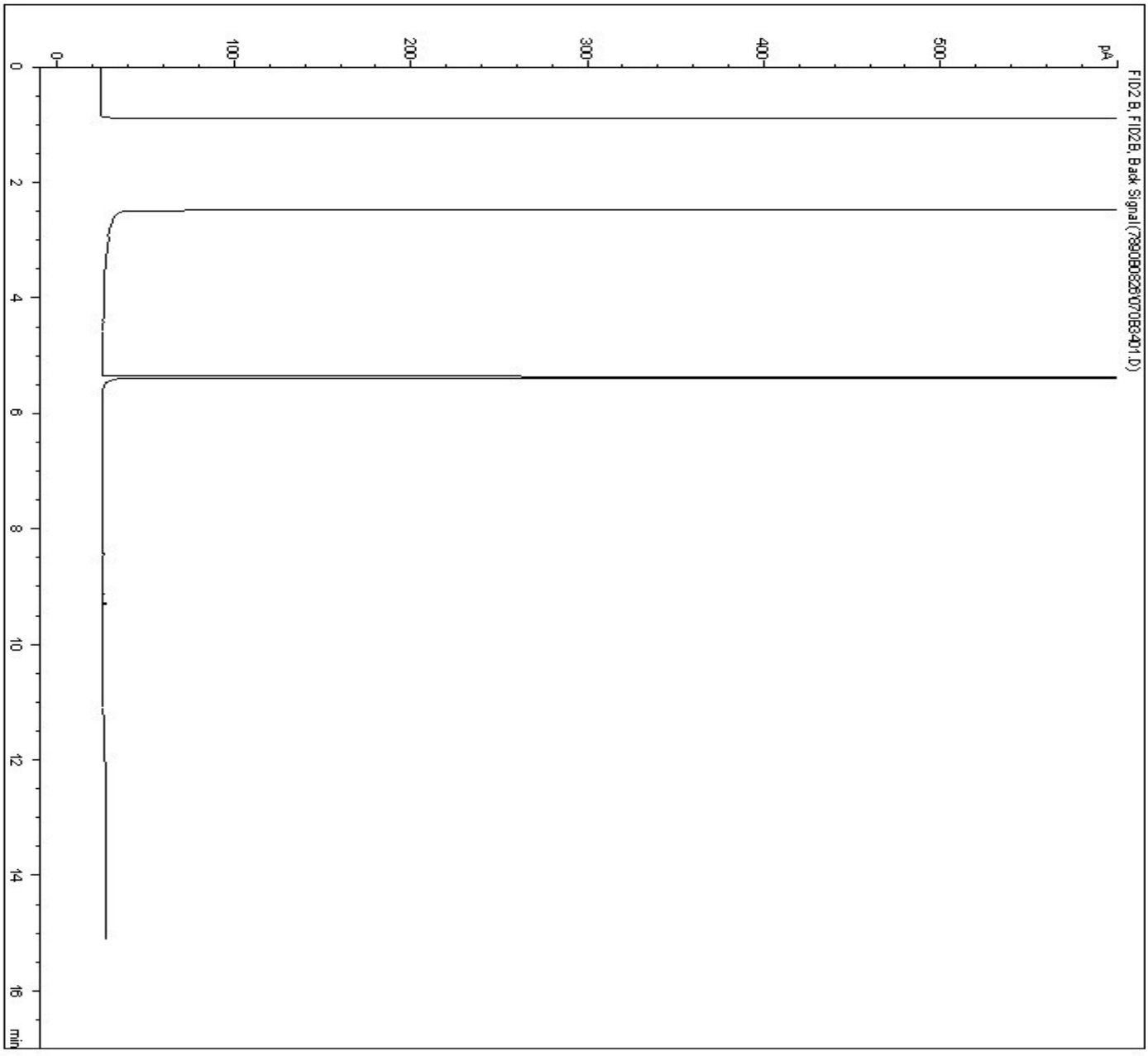
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0040

Client ID: 11W5G-04 (10CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0826\070B3401.D
Sample Name: BI0040



*** End of Report ***

Instrument 1 2011/08/29 10:03:31 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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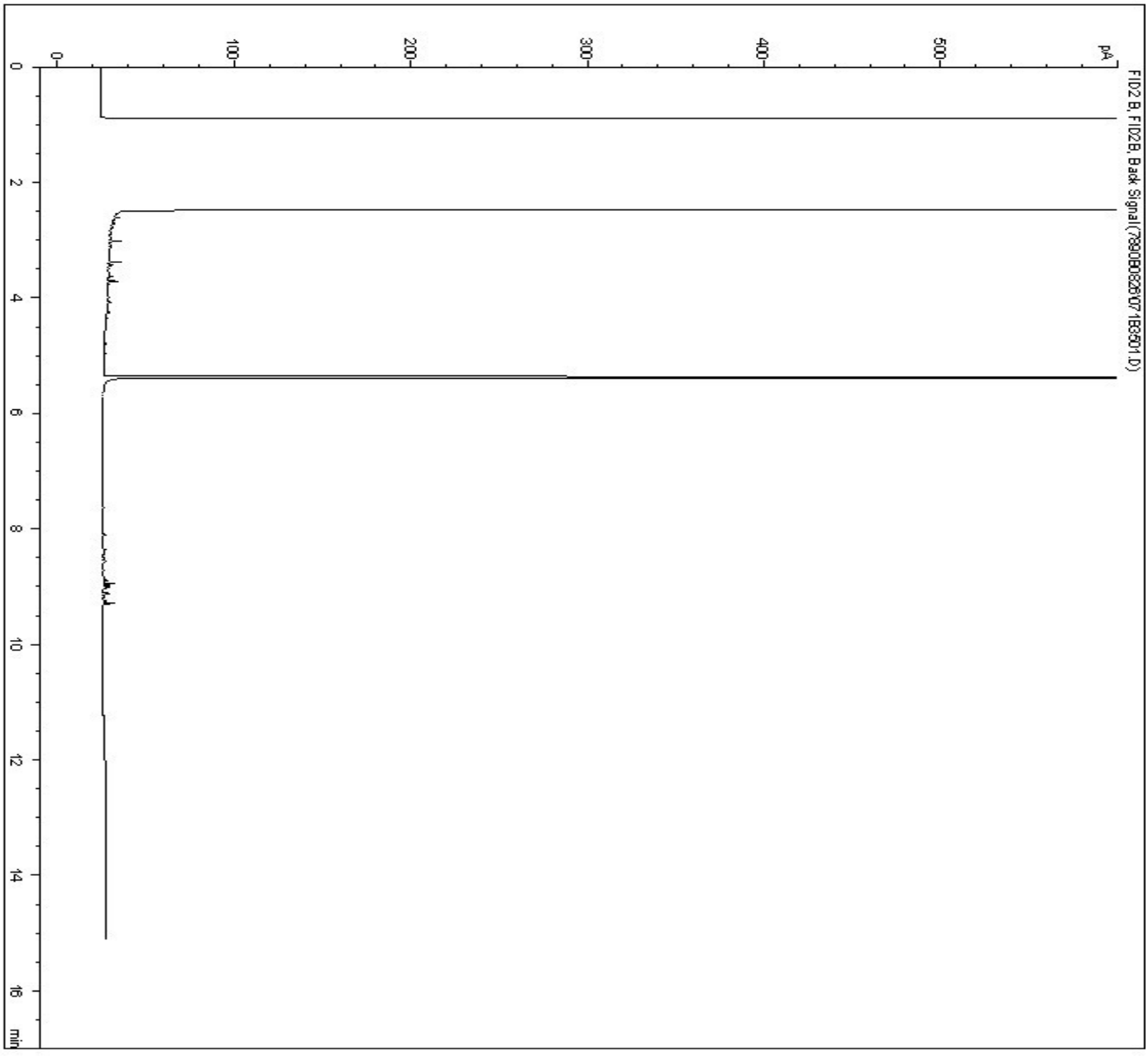
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0041

Client ID: 11W5H-02 (20CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0826\071B3501.D
Sample Name: BI0041



*** End of Report ***

Instrument 1 2011/08/29 10:03:34 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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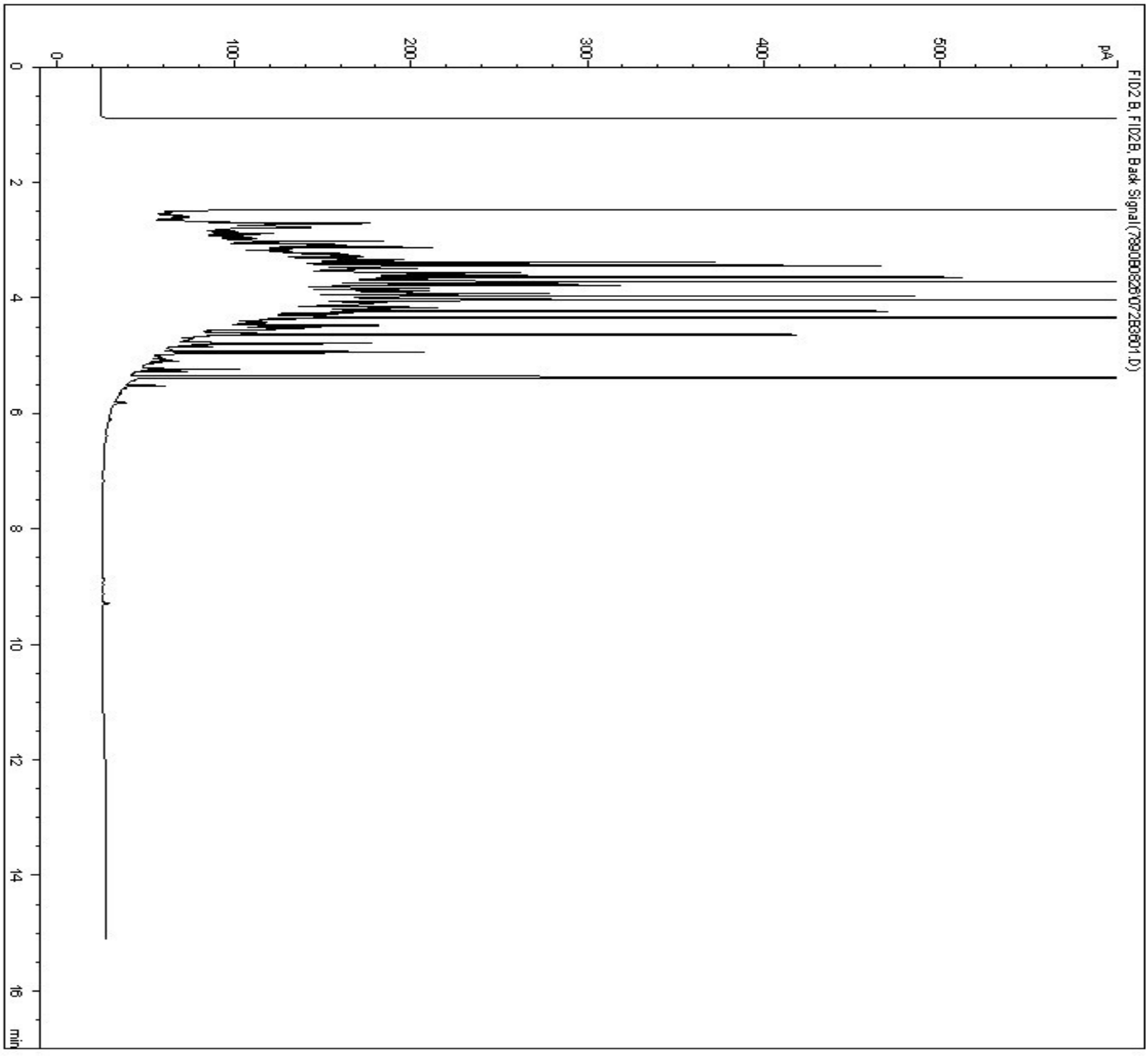
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0042

Client ID: 11W5G-01 (10CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0826\072B3601.D
Sample Name: BI0042



*** End of Report ***

Instrument 1 2011/08/29 10:03:36 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Success Through Science®

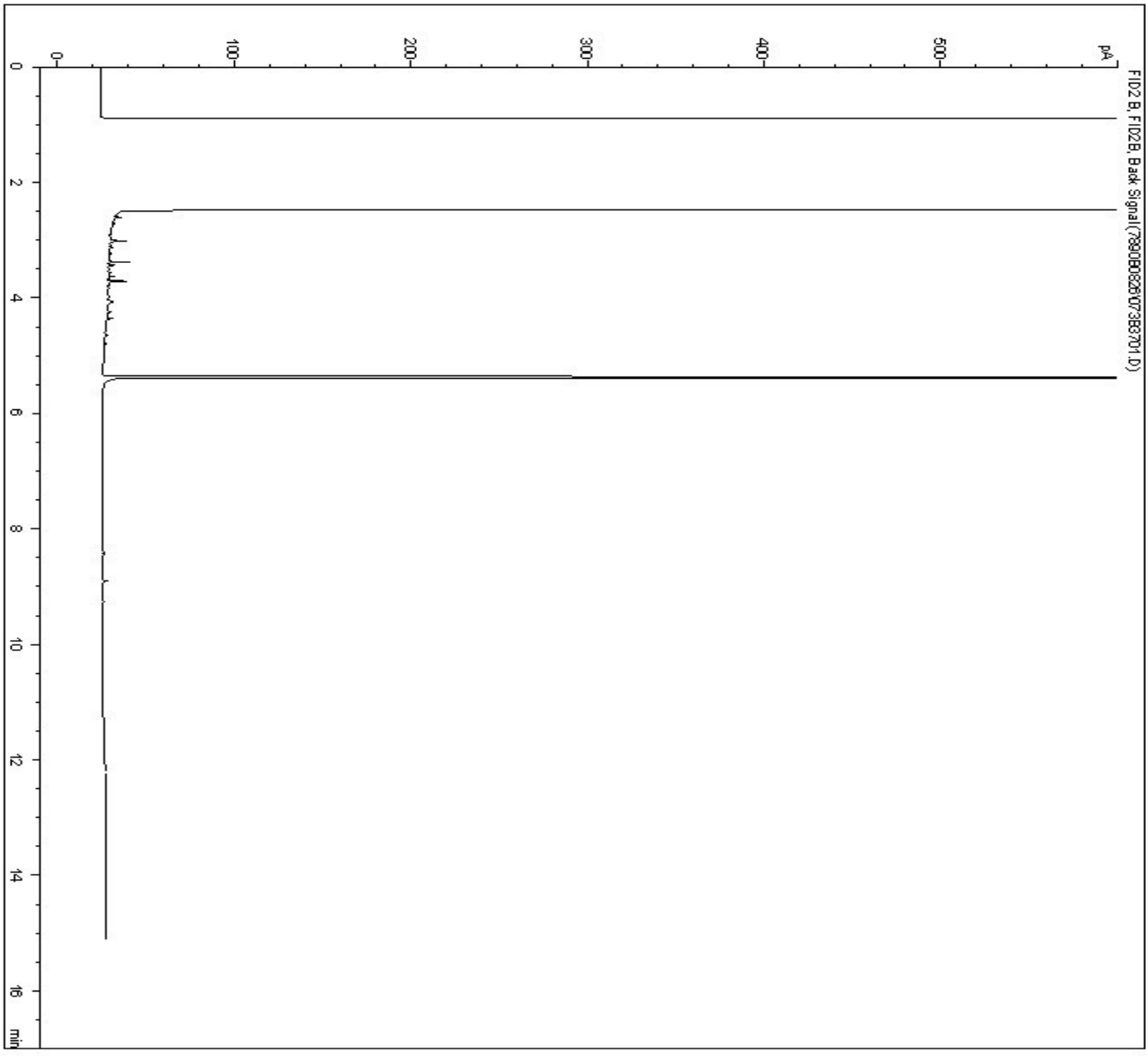
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0043

Client ID: 11W8-05 (10CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0826\073B3701.D
Sample Name: BI0043



*** End of Report ***

Instrument 1 2011/08/29 10:03:39 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Success Through Science®

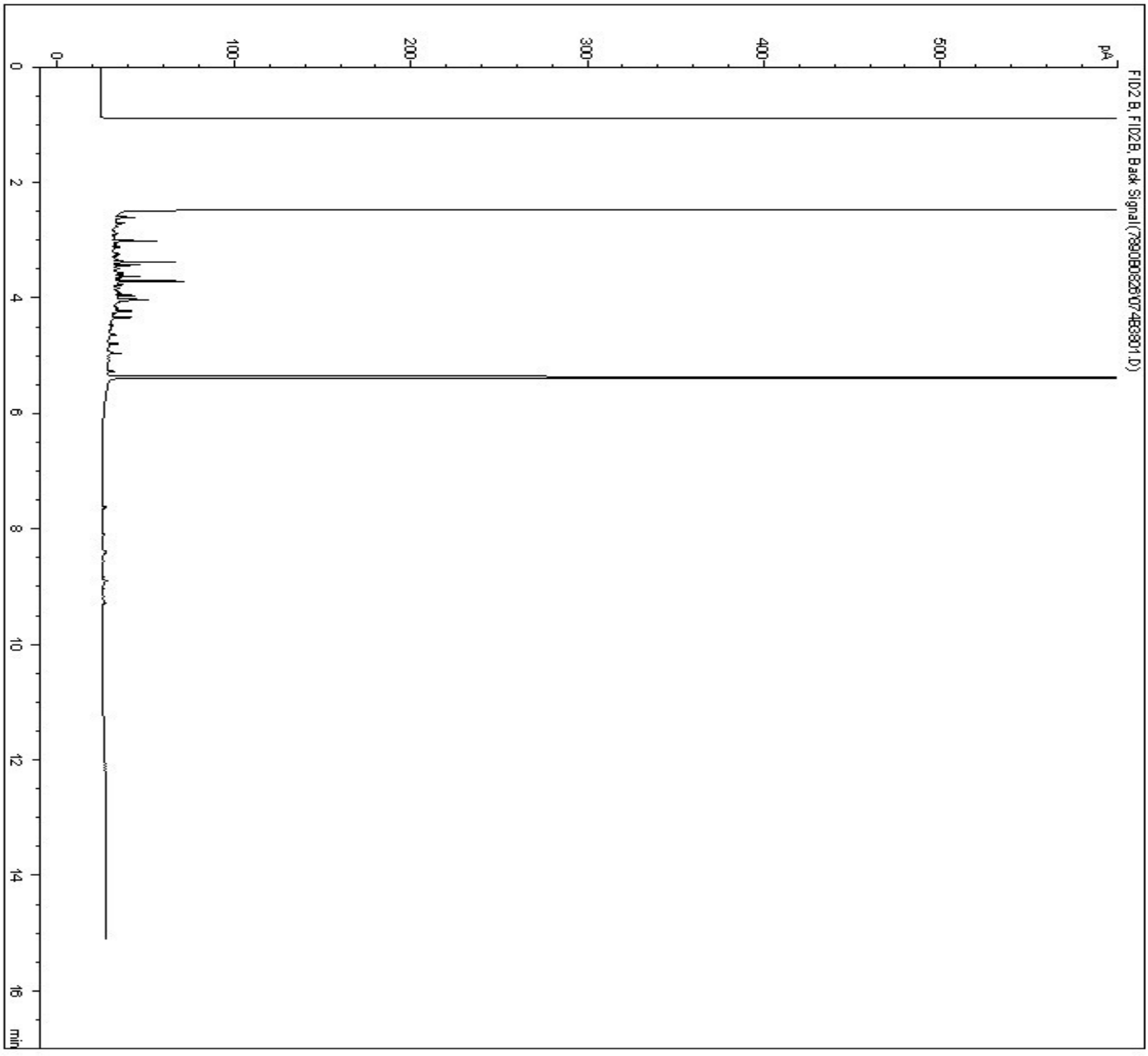
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0044

Client ID: 11W8-03 (15CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0826\074B3801.D
Sample Name: BI0044



*** End of Report ***

Instrument 1 2011/08/29 10:03:42 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Success Through Science®

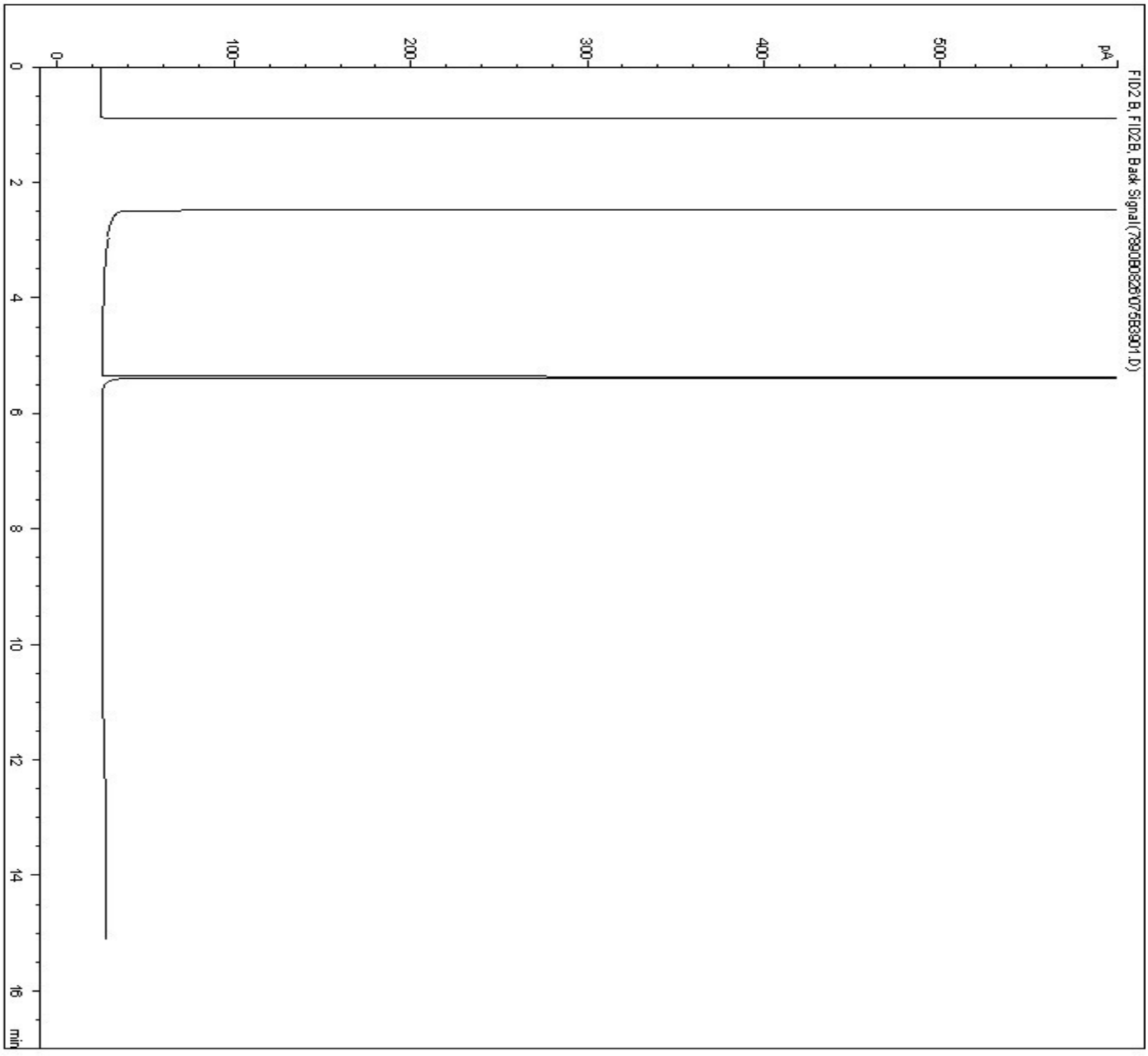
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0045

Client ID: 11W8-04 (10CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0826\075B3901.D
Sample Name: BI0045



*** End of Report ***

Instrument 1 2011/08/29 10:03:45 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Success Through Science®

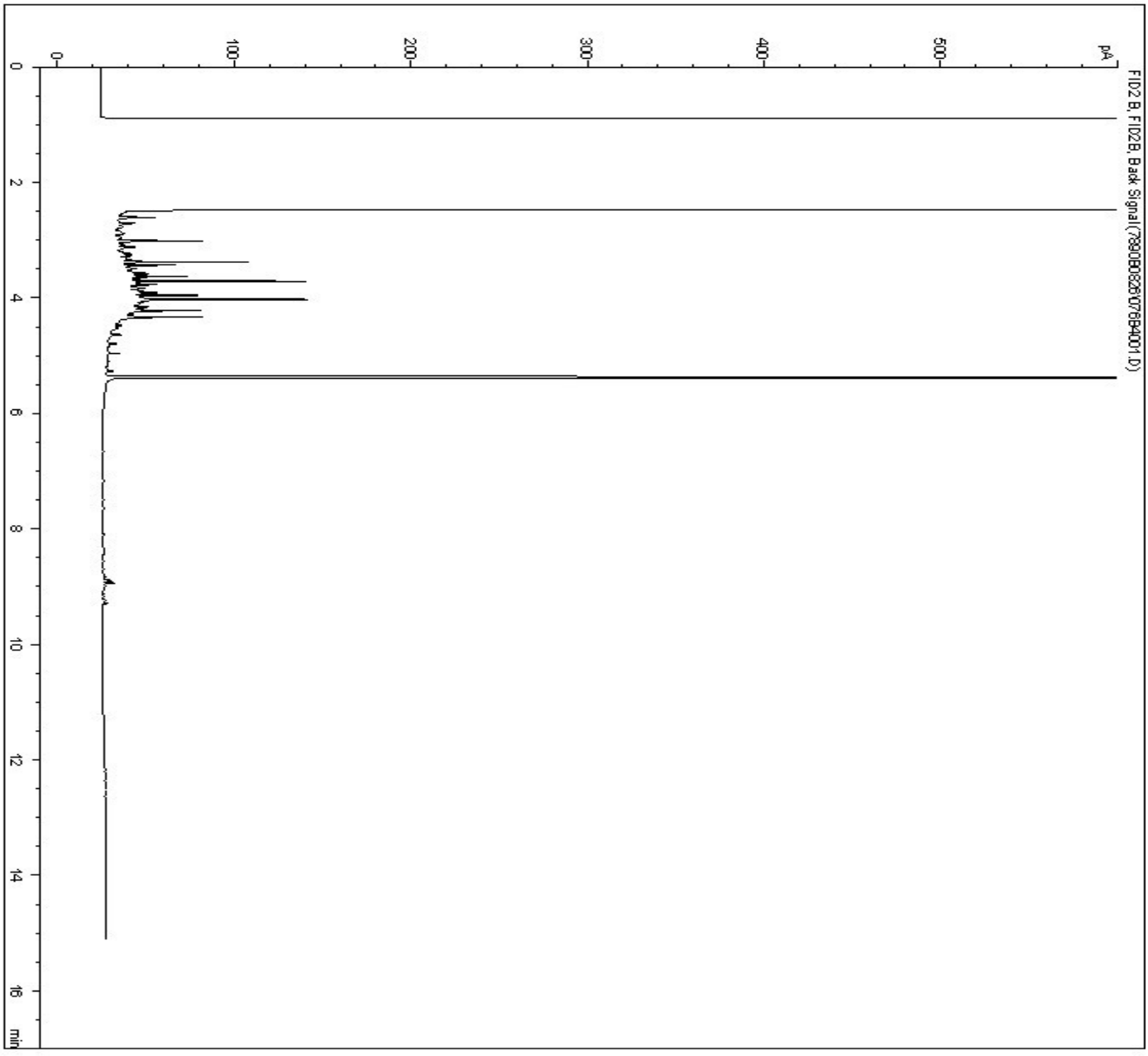
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0046

Client ID: 11W8-02 (10CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0826\076B4001.D
Sample Name: BI0046



*** End of Report ***

Instrument 1 2011/08/29 10:03:48 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Success Through Science®

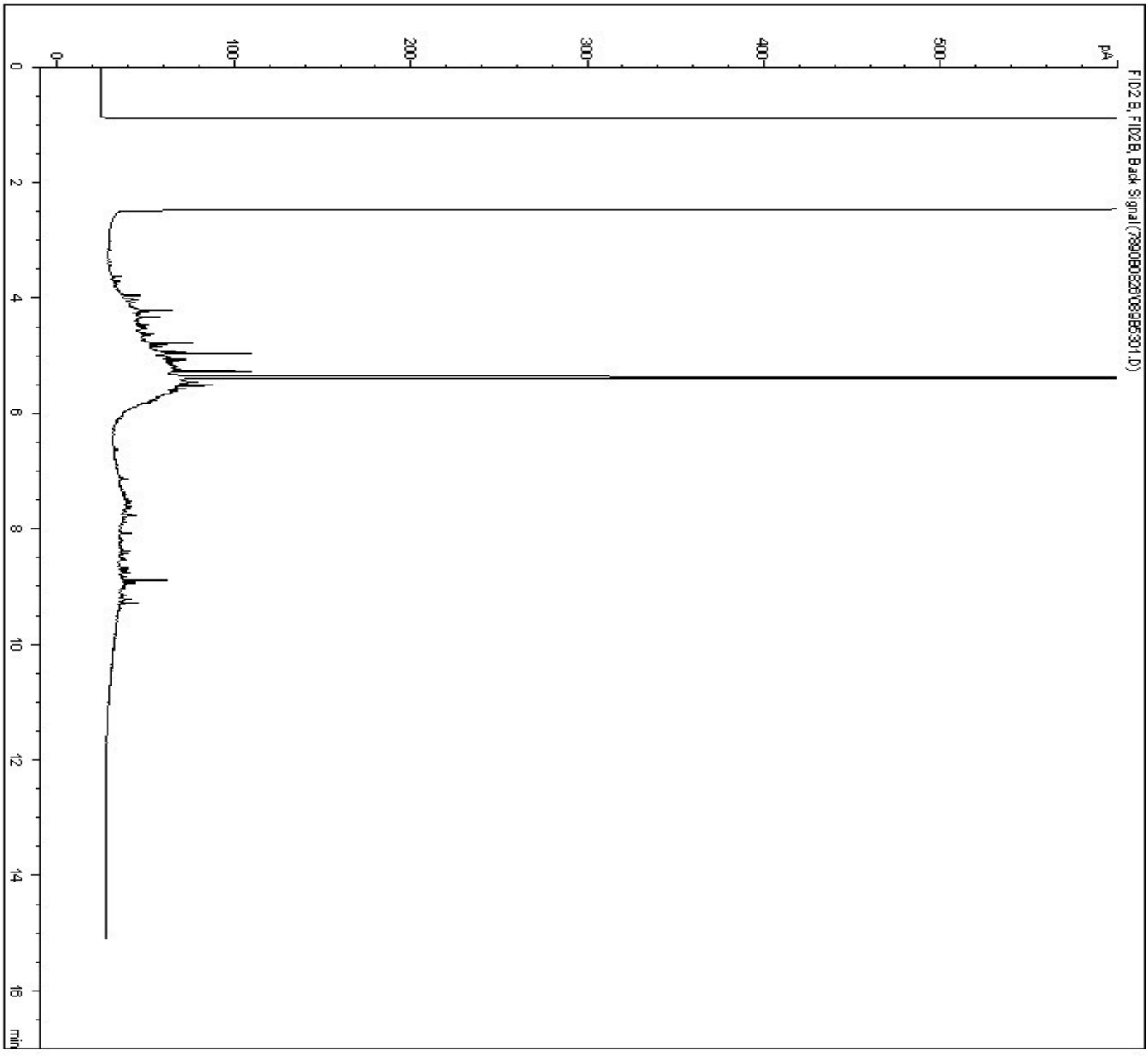
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0047

Client ID: 11W8-01 (10CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0826\089B5301.D
Sample Name: BI0047



*** End of Report ***

Instrument 1 2011/08/29 10:04:27 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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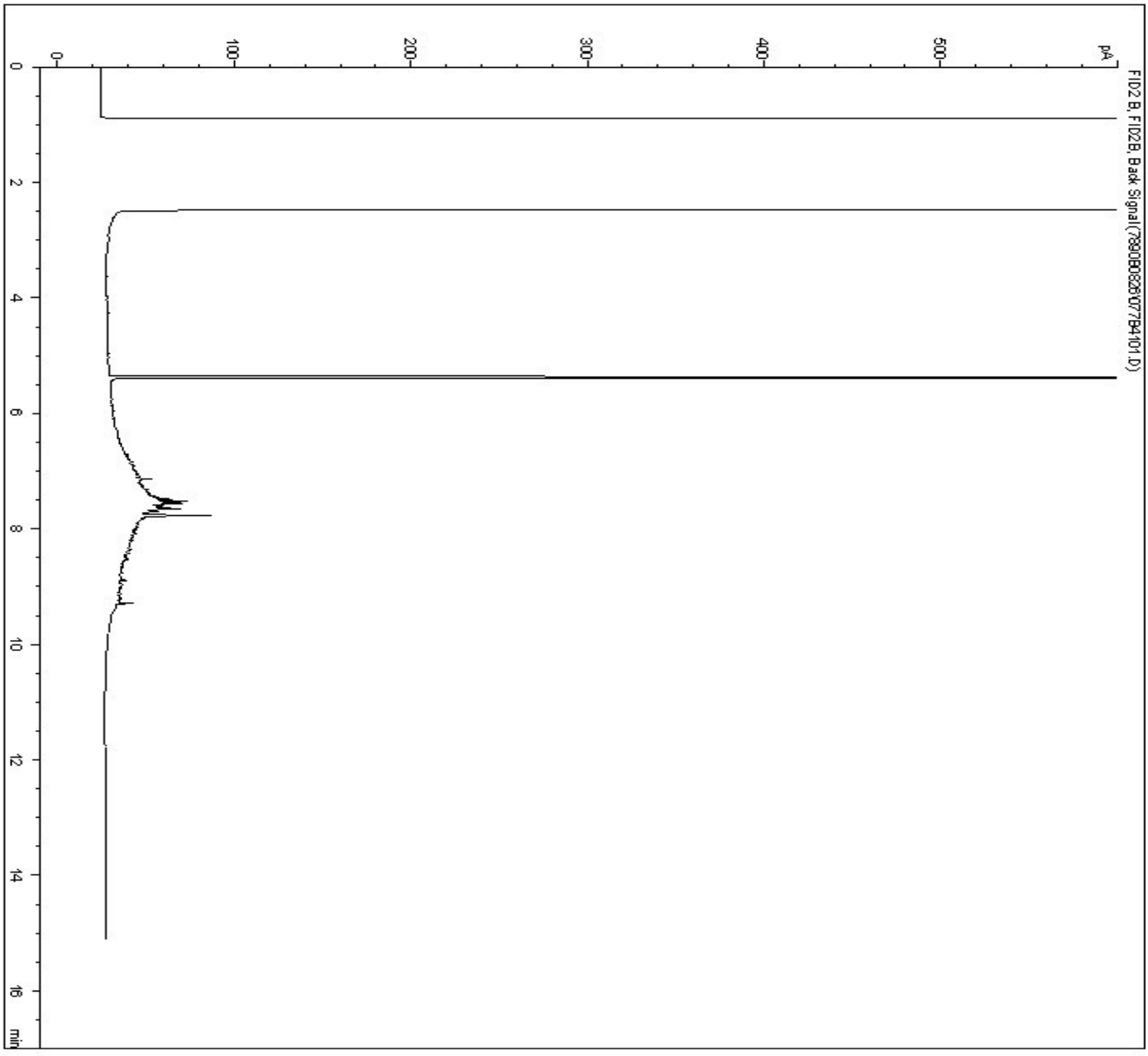
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0048

Client ID: 11W7-03 (10CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0826\077B4101.D
Sample Name: BI0048



*** End of Report ***

Instrument 1 2011/08/29 10:03:51 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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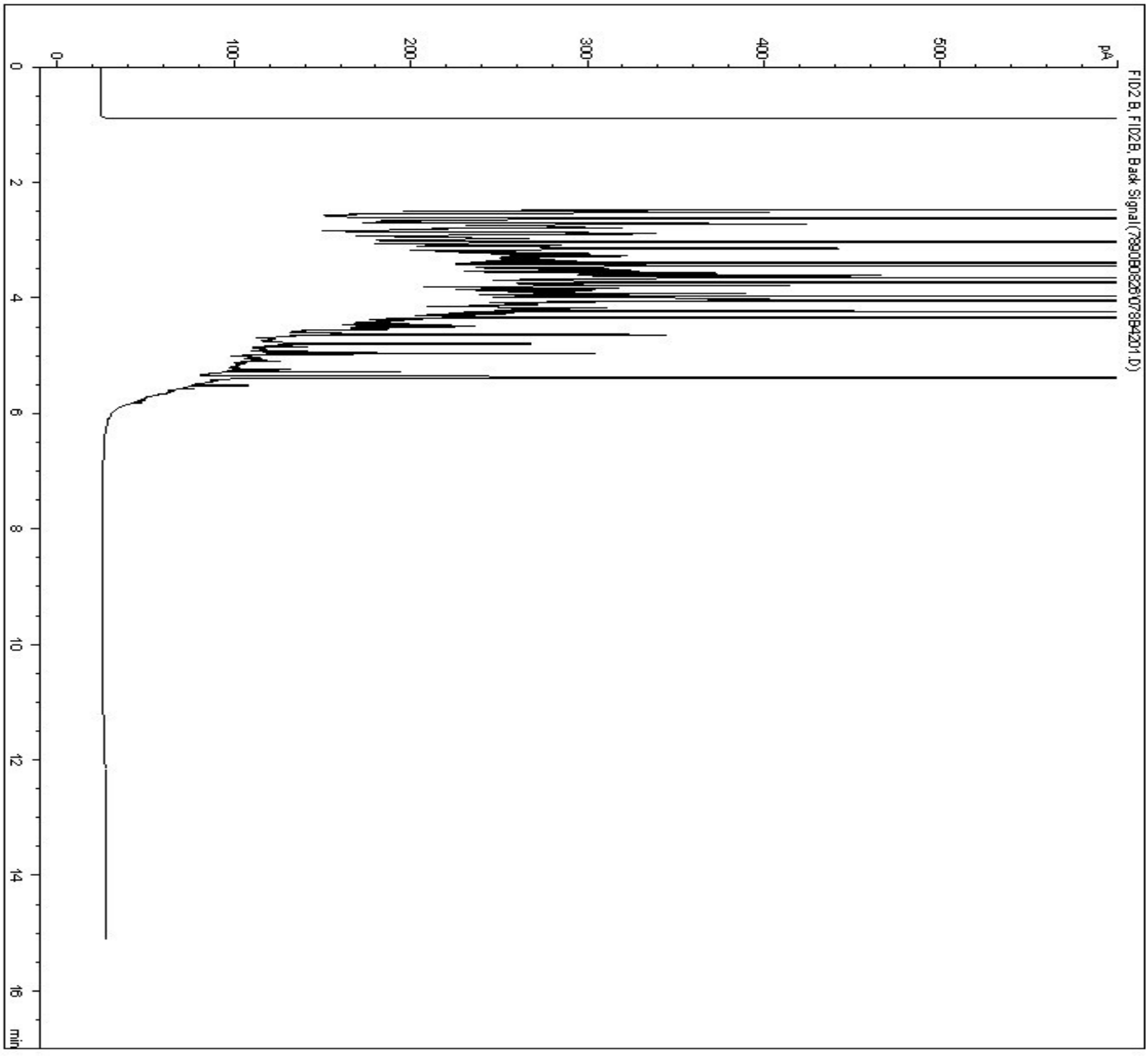
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0049

Client ID: 11W5E-01 (85CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0826\078B4201.D
Sample Name: BI0049



*** End of Report ***

Instrument 1 2011/08/29 10:03:54 AM RC6

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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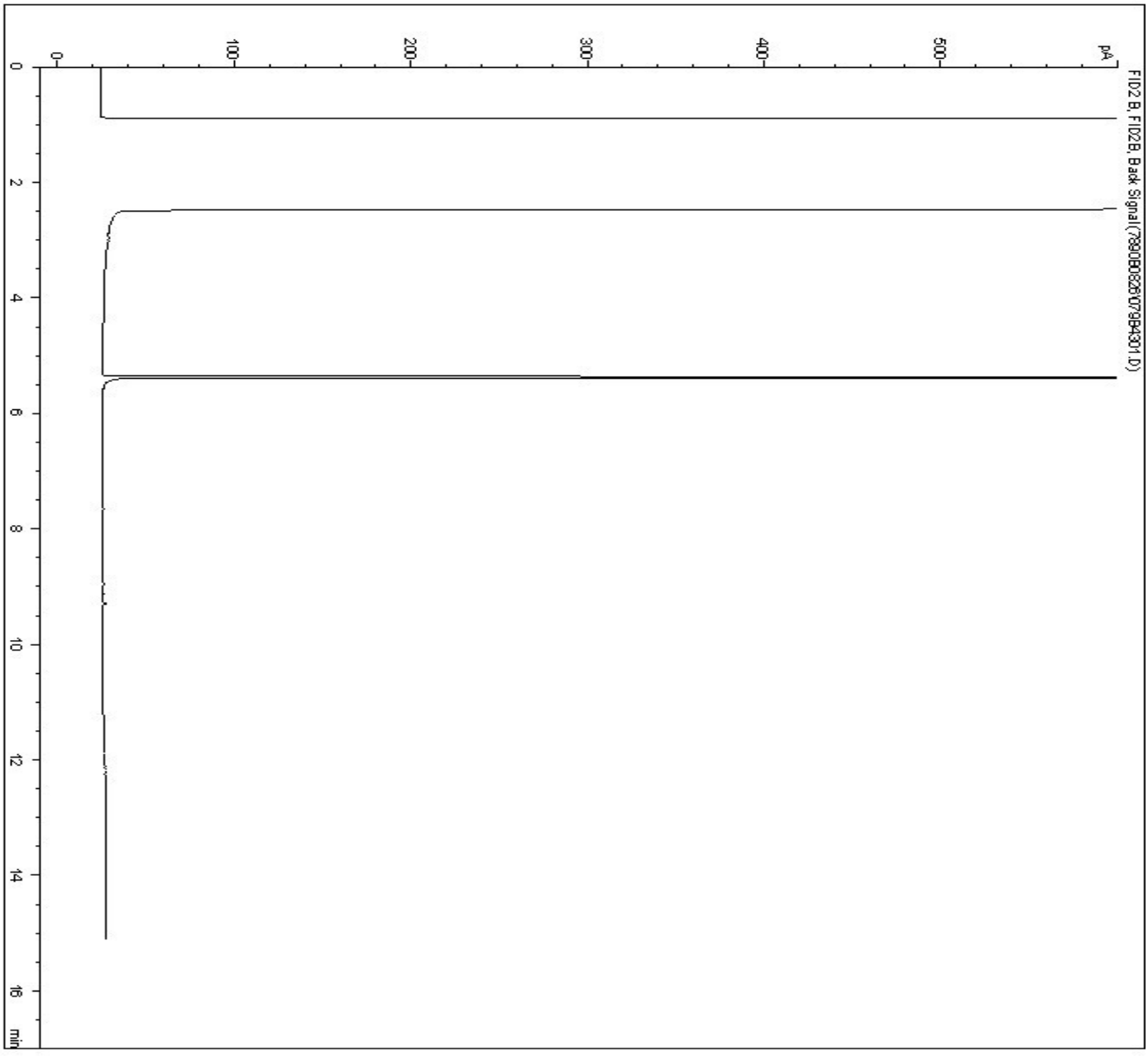
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0050

Client ID: 11W6-03 (25CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0826\079B4301.D
Sample Name: BI0050



*** End of Report ***

Instrument 1 2011/08/29 10:03:57 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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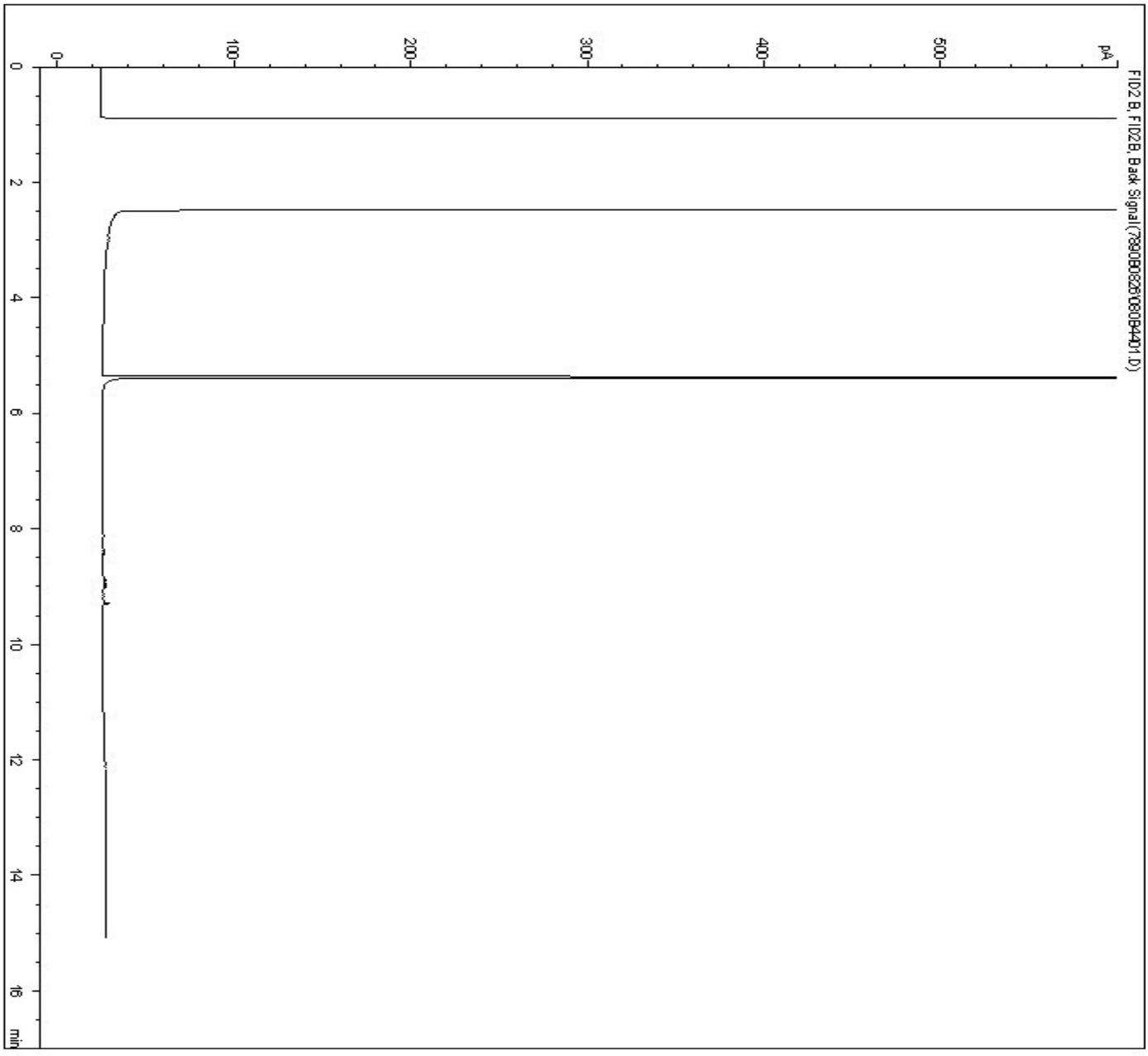
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0056

Client ID: 11W6-04 (15CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0826\080B4401.D
Sample Name: BI0056



*** End of Report ***

Instrument 1 2011/08/29 10:04:00 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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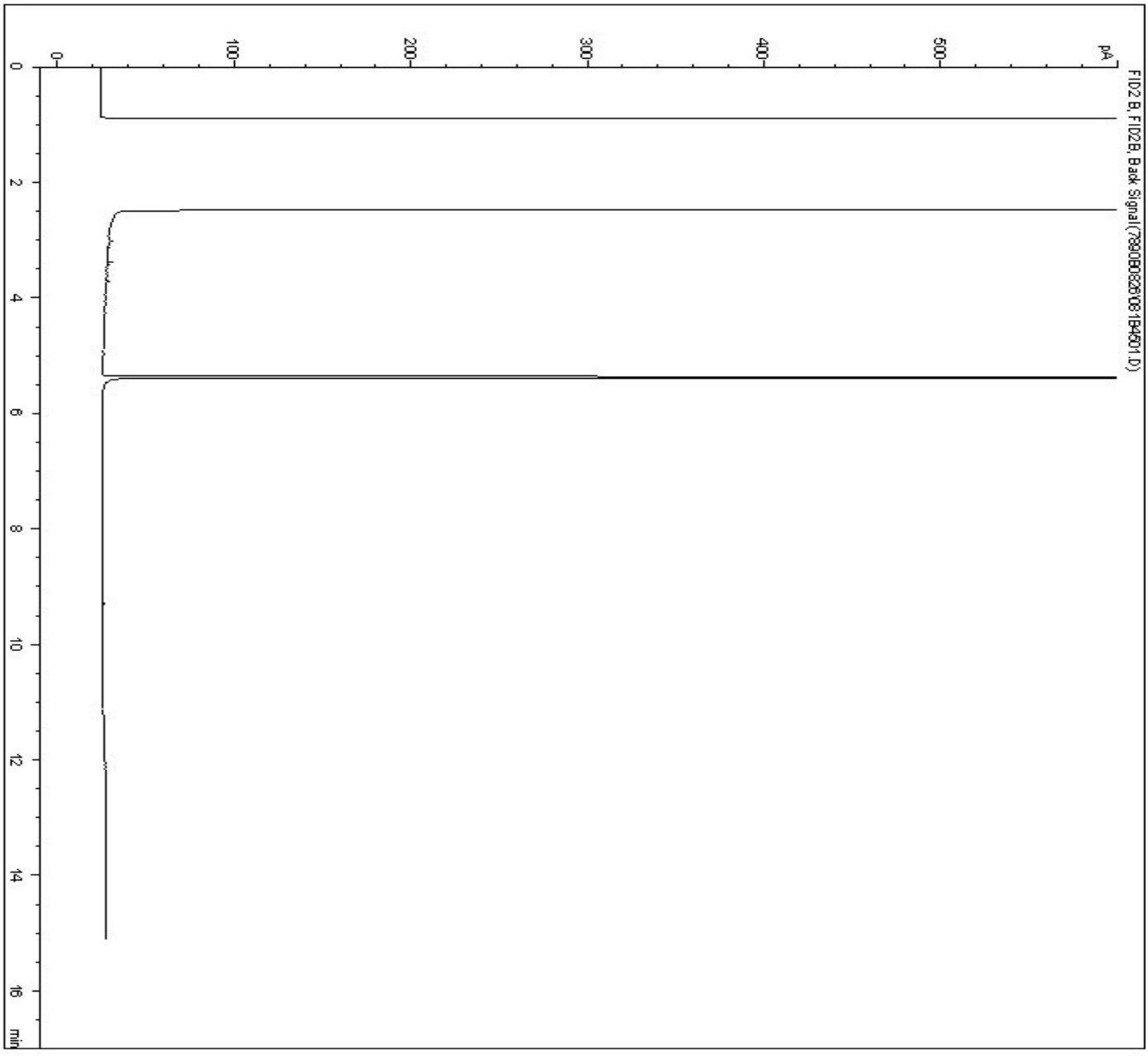
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0057

Client ID: 11W6-05 (25CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0826\081B4501.D
Sample Name: BI0057



*** End of Report ***

Instrument 1 2011/08/29 10:04:03 AM RC6

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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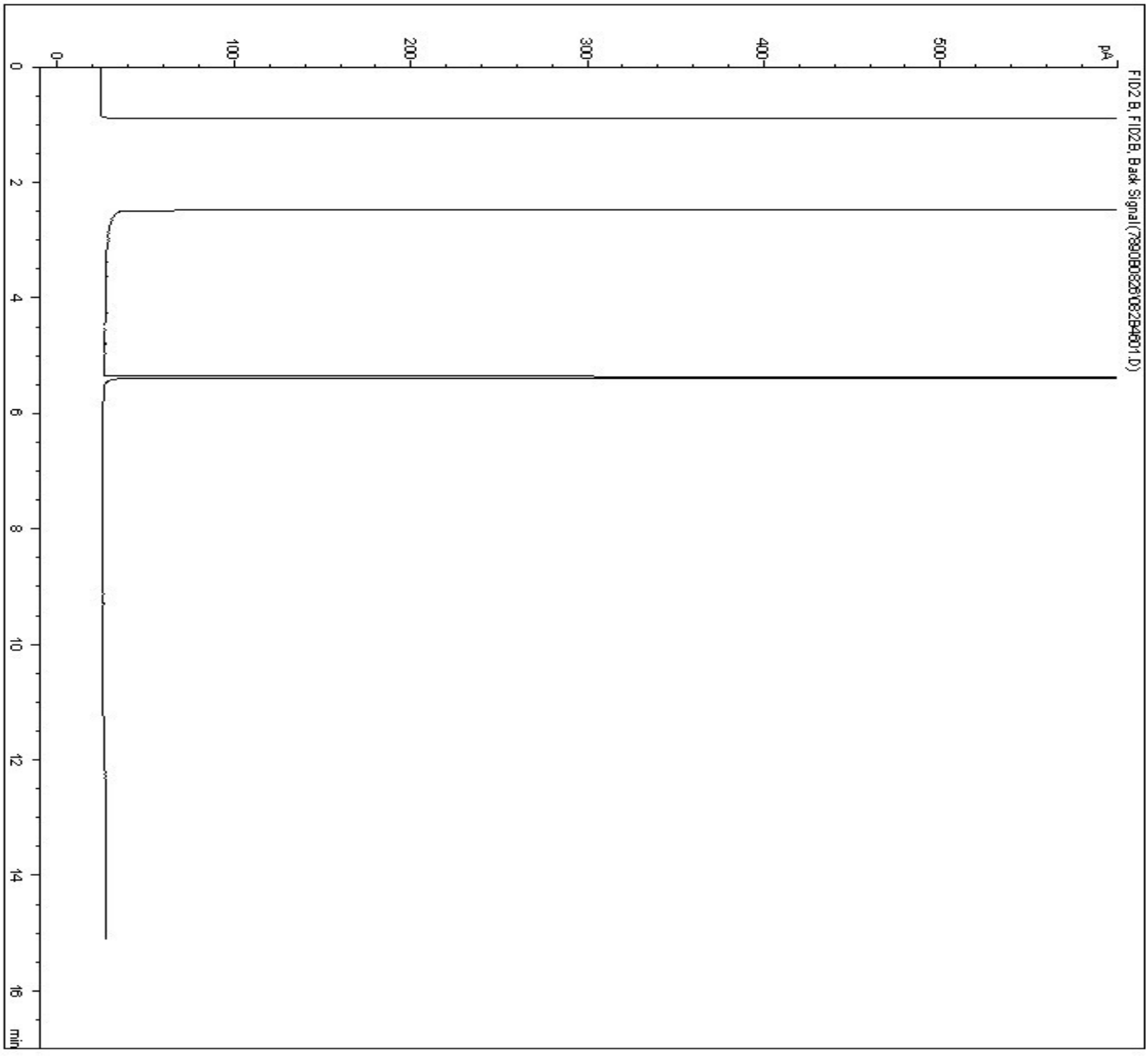
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0058

Client ID: 11W6-02 (20CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0826\082B4601.D
Sample Name: BI0058



*** End of Report ***

Instrument 1 2011/08/29 10:04:06 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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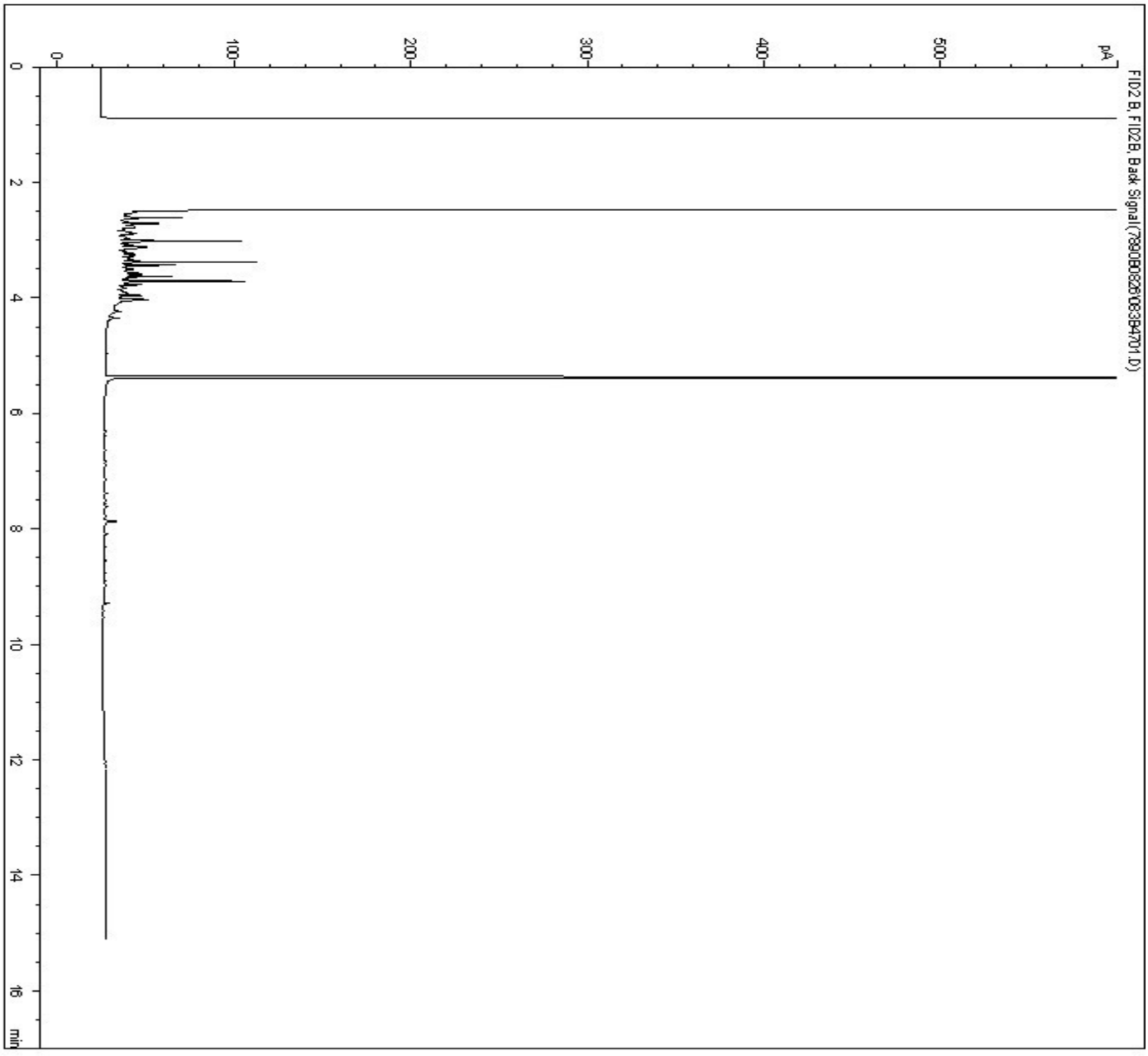
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0059

Client ID: 11W6-01 (30CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0826\083B4701.D
Sample Name: BI0059



*** End of Report ***

Instrument 1 2011/08/29 10:04:09 AM RC6

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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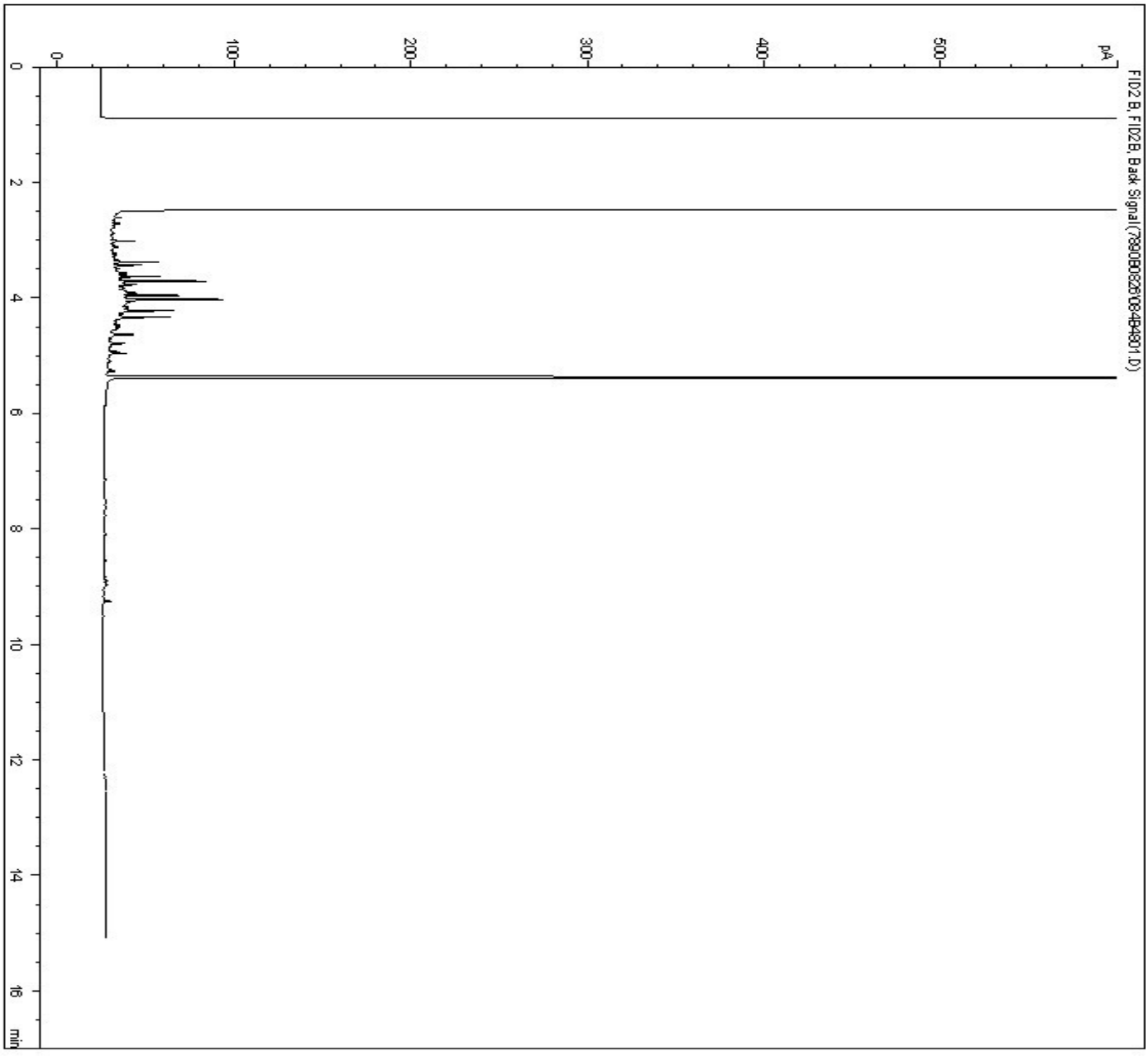
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0060

Client ID: 11W6-01 (0-5CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0826\084B4801.D
Sample Name: BI0060



*** End of Report ***

Instrument 1 2011/08/29 10:04:12 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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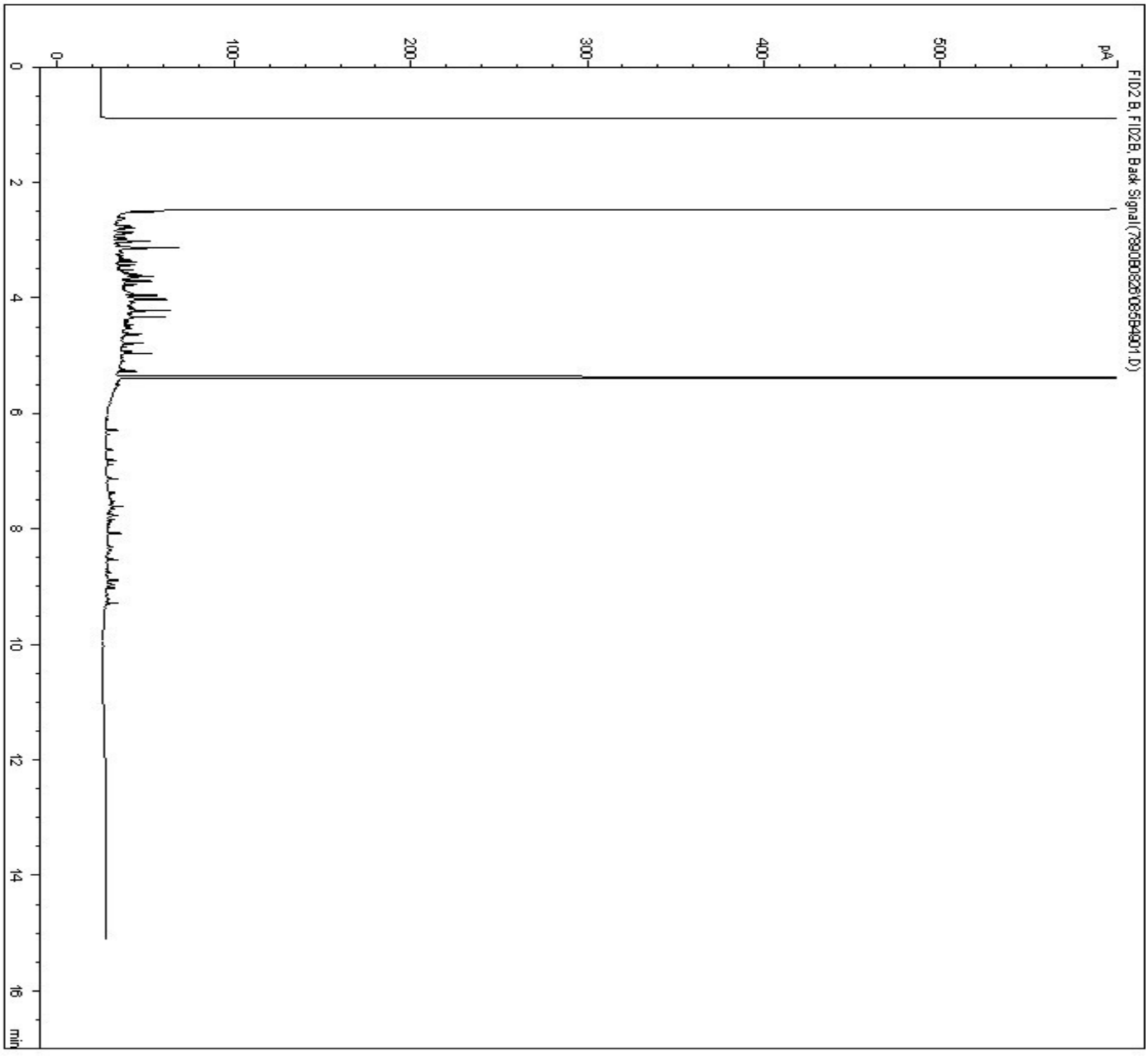
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0061

Client ID: 11W1-01 (0-5CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0826\085B4901.D
Sample Name: BI0061



*** End of Report ***

Instrument 1 2011/08/29 10:04:15 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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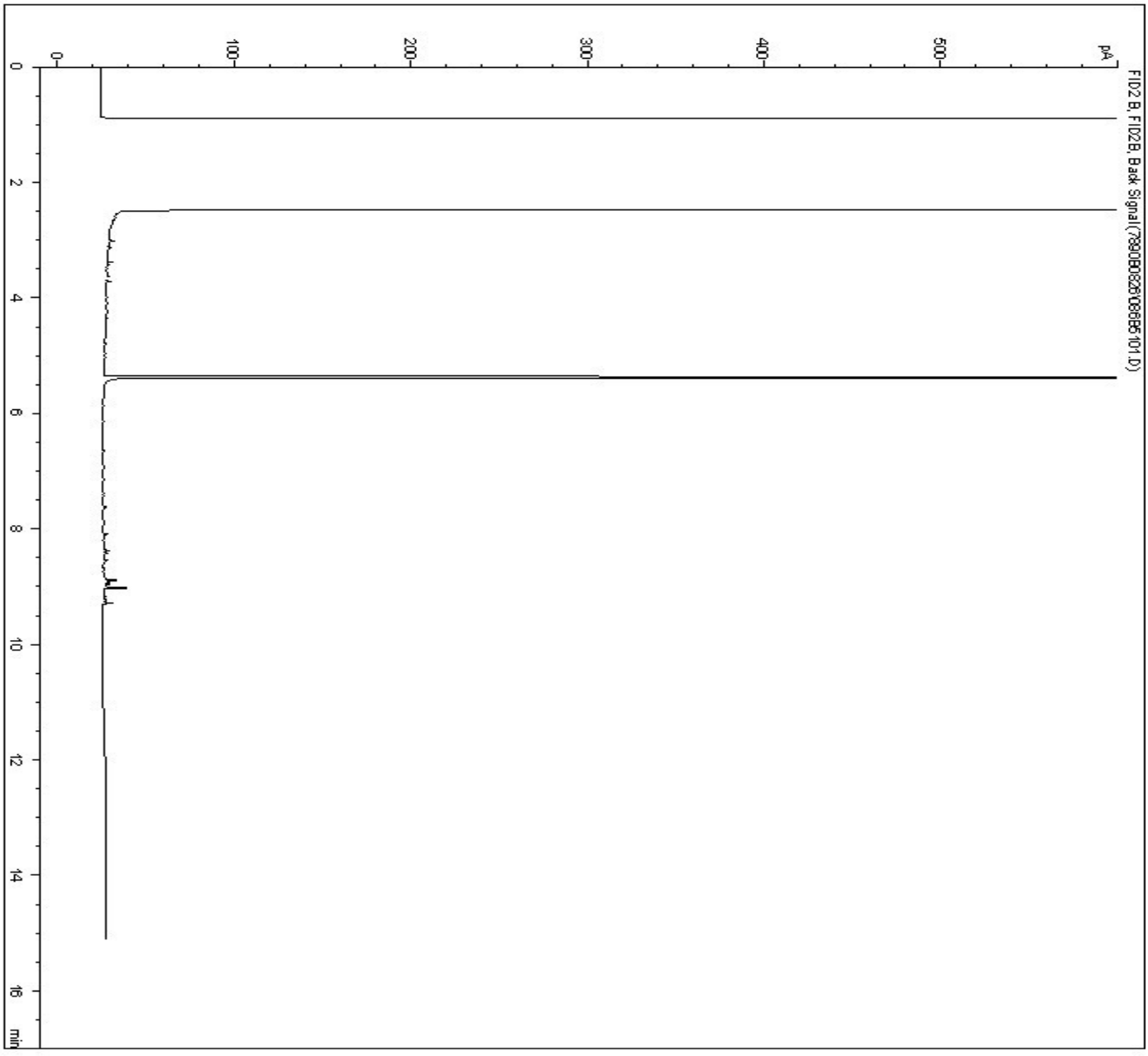
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0062

Client ID: 11W2-23 (30CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0826\086B5101.D
Sample Name: BI0062



*** End of Report ***

Instrument 1 2011/08/29 10:04:21 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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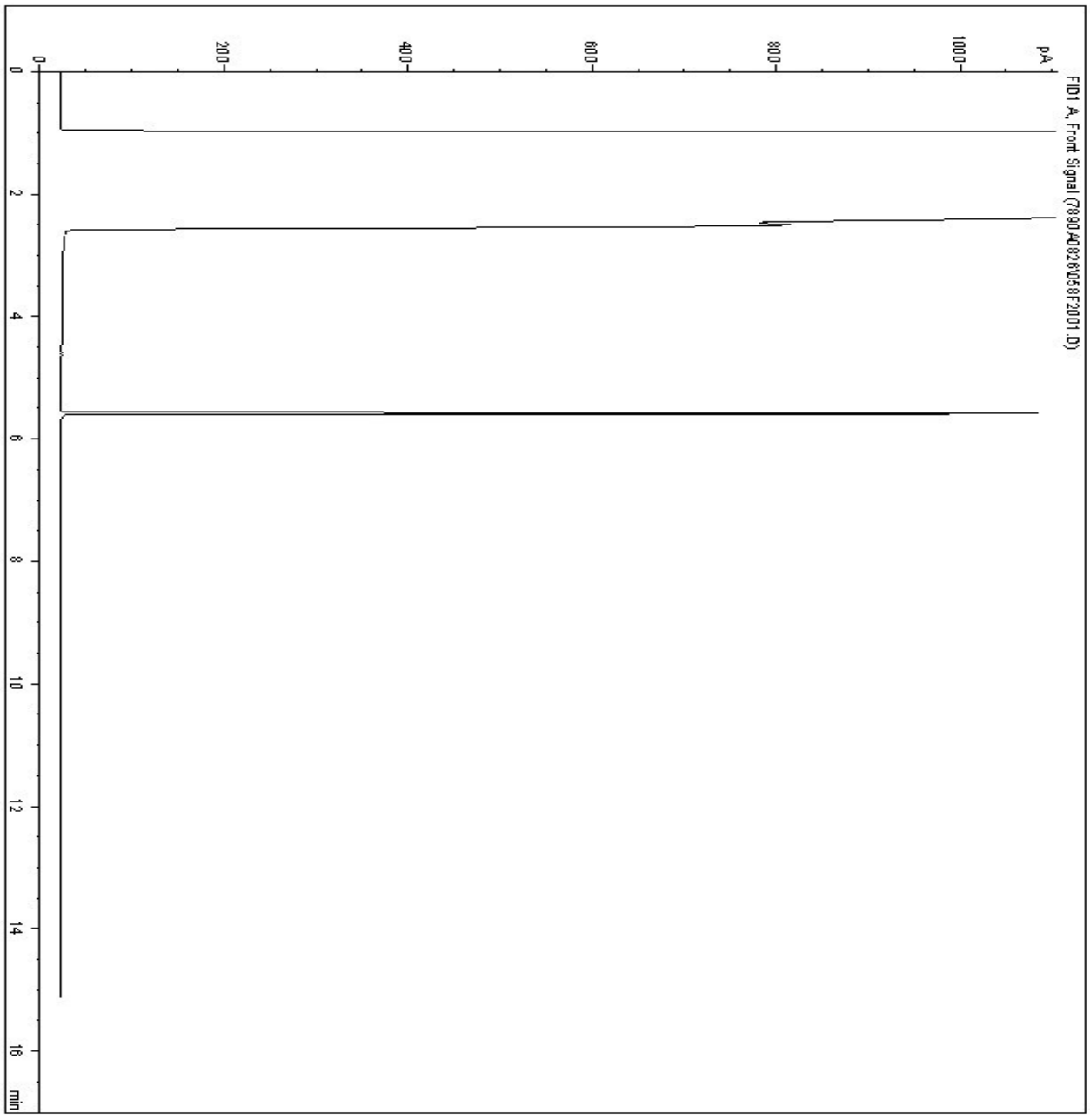
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0063

Client ID: 11W1-01 (15CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0826\058F2001.D
Sample Name: BI0063



*** End of Report ***

7890A GC 2011/08/28 9:56:32 AM AK8

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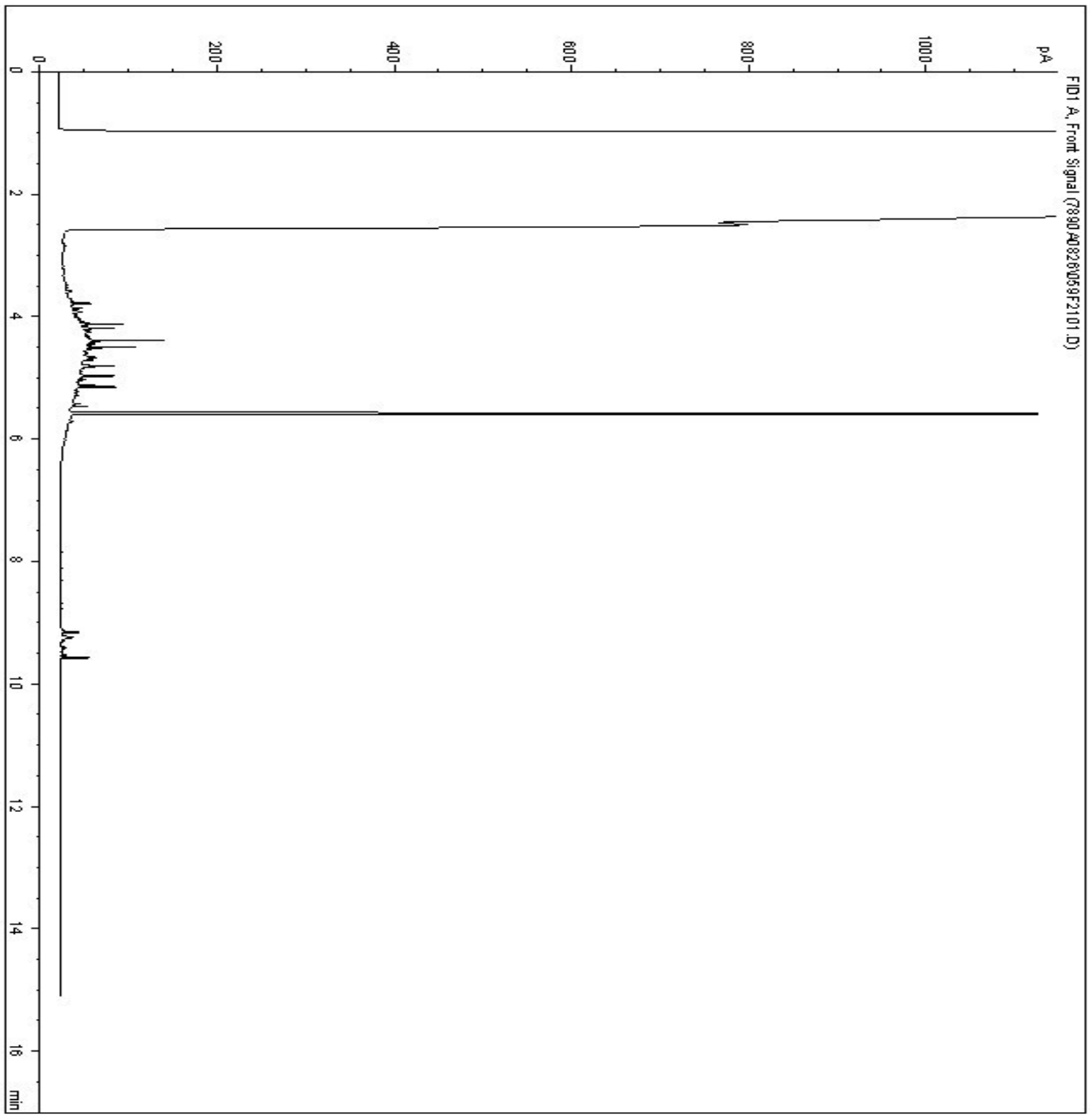
Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0064

Client ID: 11W1-05 (25CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0826\059F2101.D
Sample Name: BI0064



*** End of Report ***

7890A GC 2011/08/28 9:56:35 AM AK8

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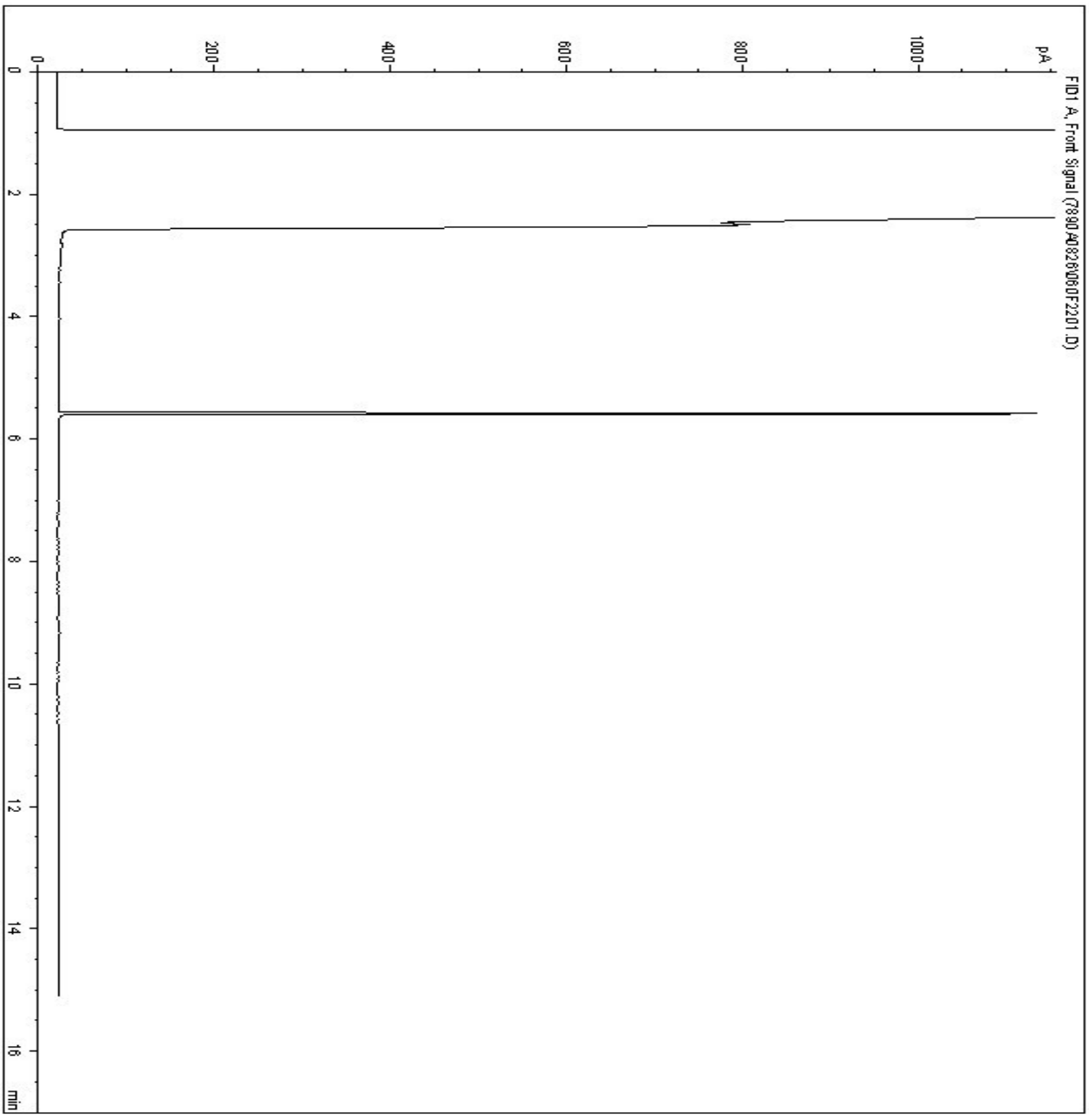
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0065

Client ID: 11W1-09 (20CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0826\060F2201.D
Sample Name: BI0065



*** End of Report ***

7890A GC 2011/08/28 9:56:38 AM AK8

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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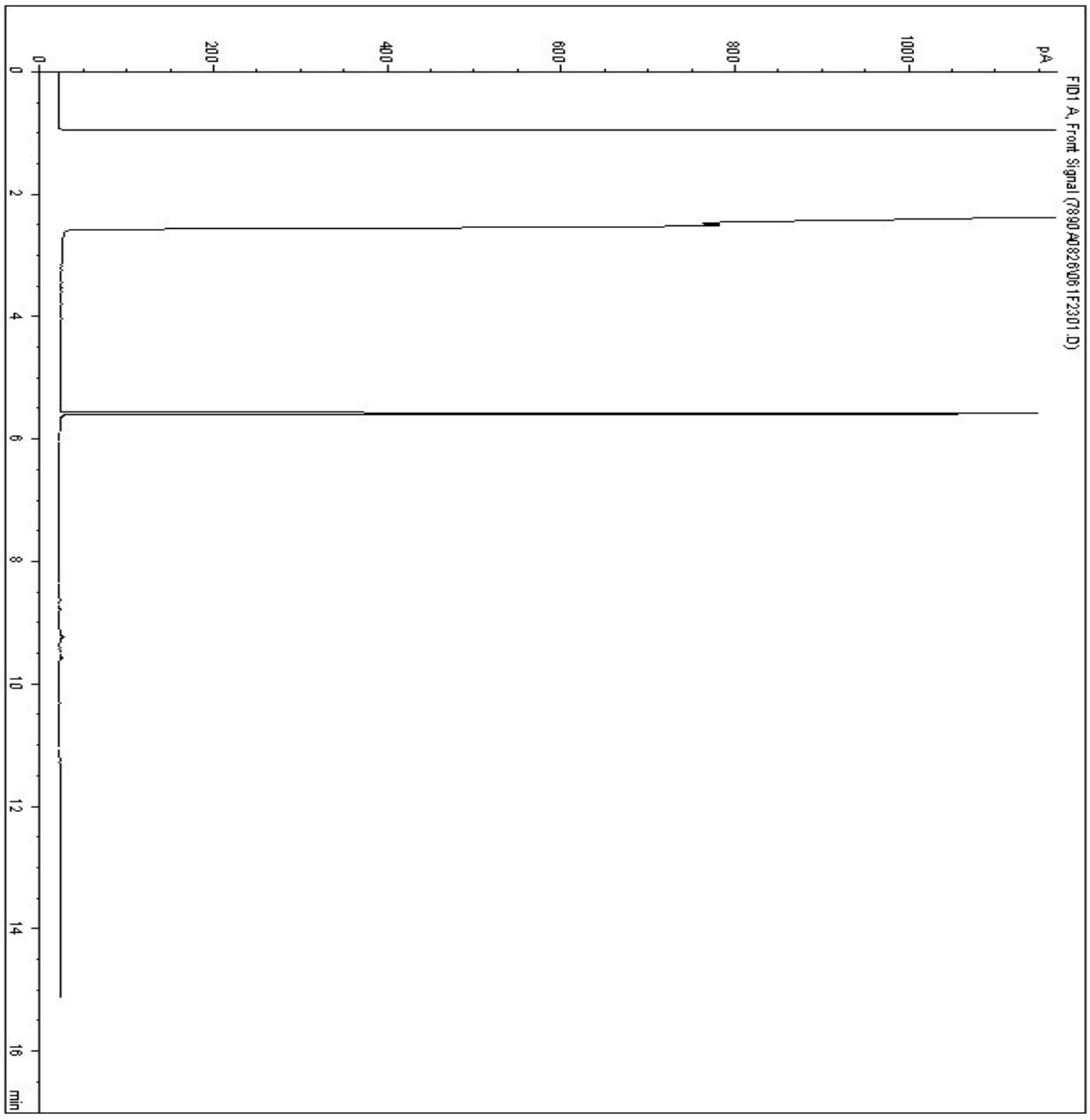
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0066

Client ID: 11W1-24 (20CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0826\061F2301.D
Sample Name: BI0066



*** End of Report ***

7890A GC 2011/08/28 9:56:41 AM AK8

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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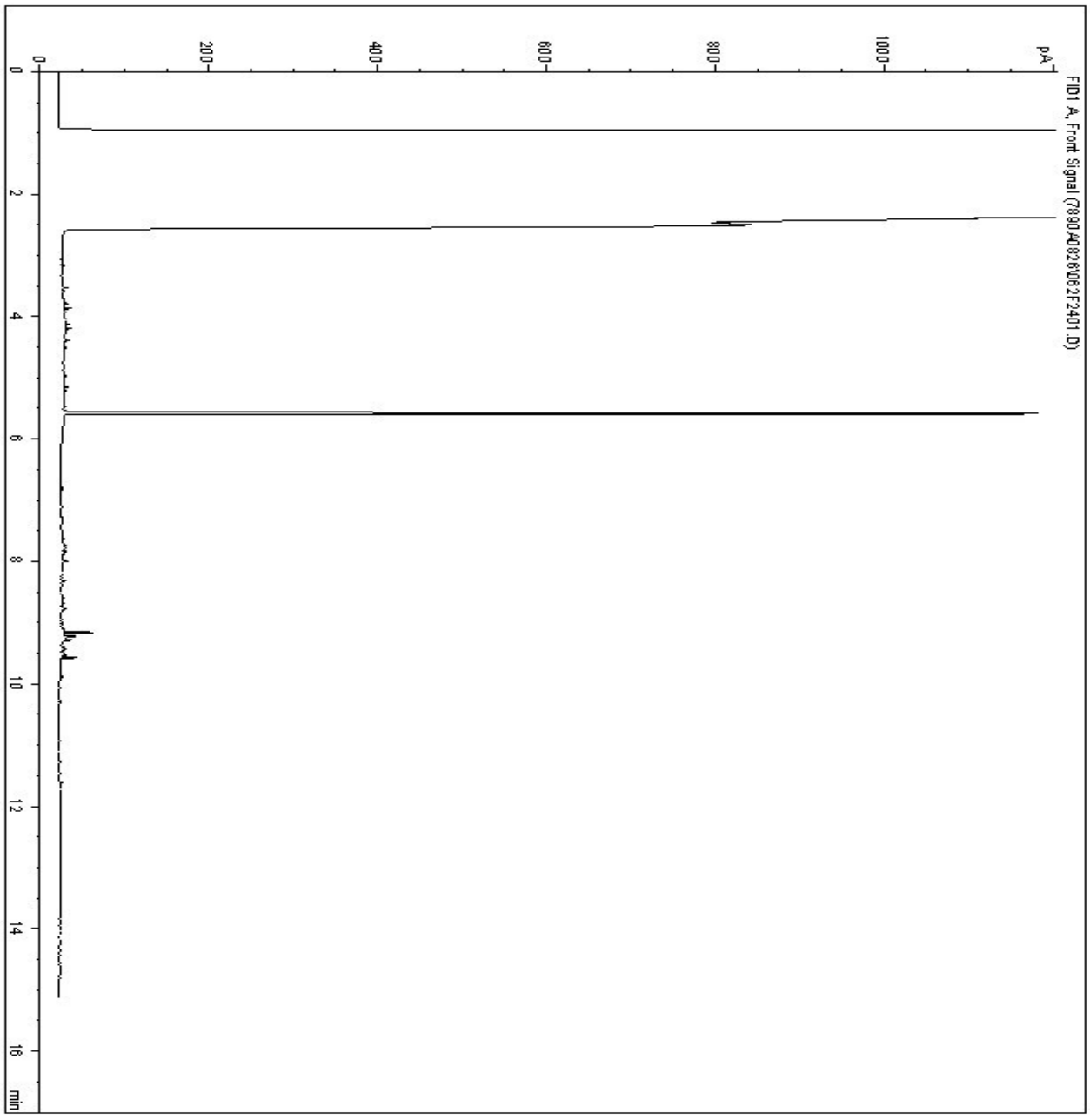
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0067

Client ID: 11W2-21 (25CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0826\062F2401.D
Sample Name: BI0067



*** End of Report ***

7890A GC 2011/08/28 9:56:44 AM AK8

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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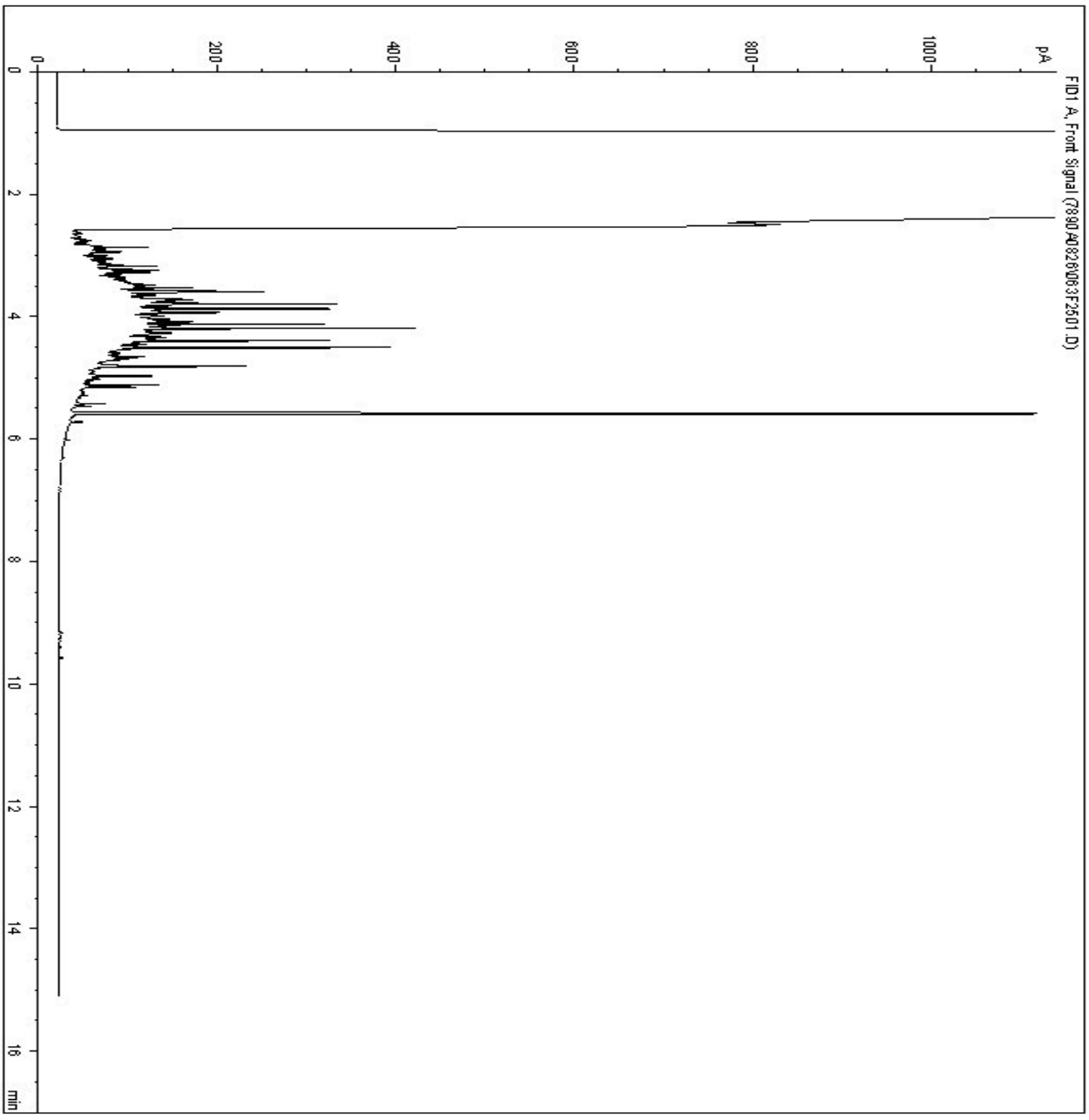
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0080

Client ID: 11W2-18 (25CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0826\063F2501.D
Sample Name: BI0080



*** End of Report ***

7890A GC 2011/08/28 9:56:47 AM AK8

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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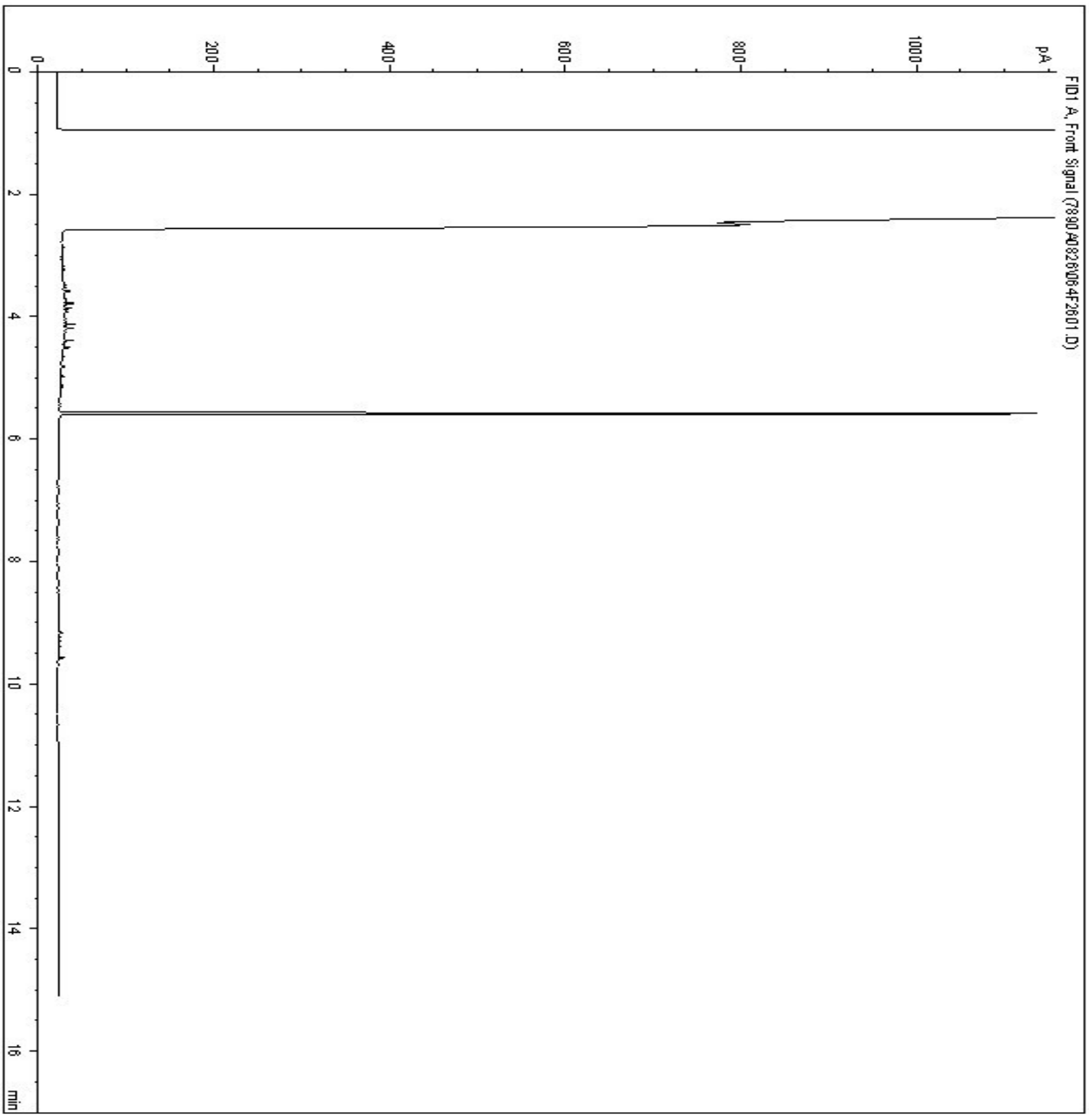
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0081

Client ID: 11W2-18 (50CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0826\064F2601.D
Sample Name: BI0081



*** End of Report ***

7890A GC 2011/08/28 9:56:50 AM AK8

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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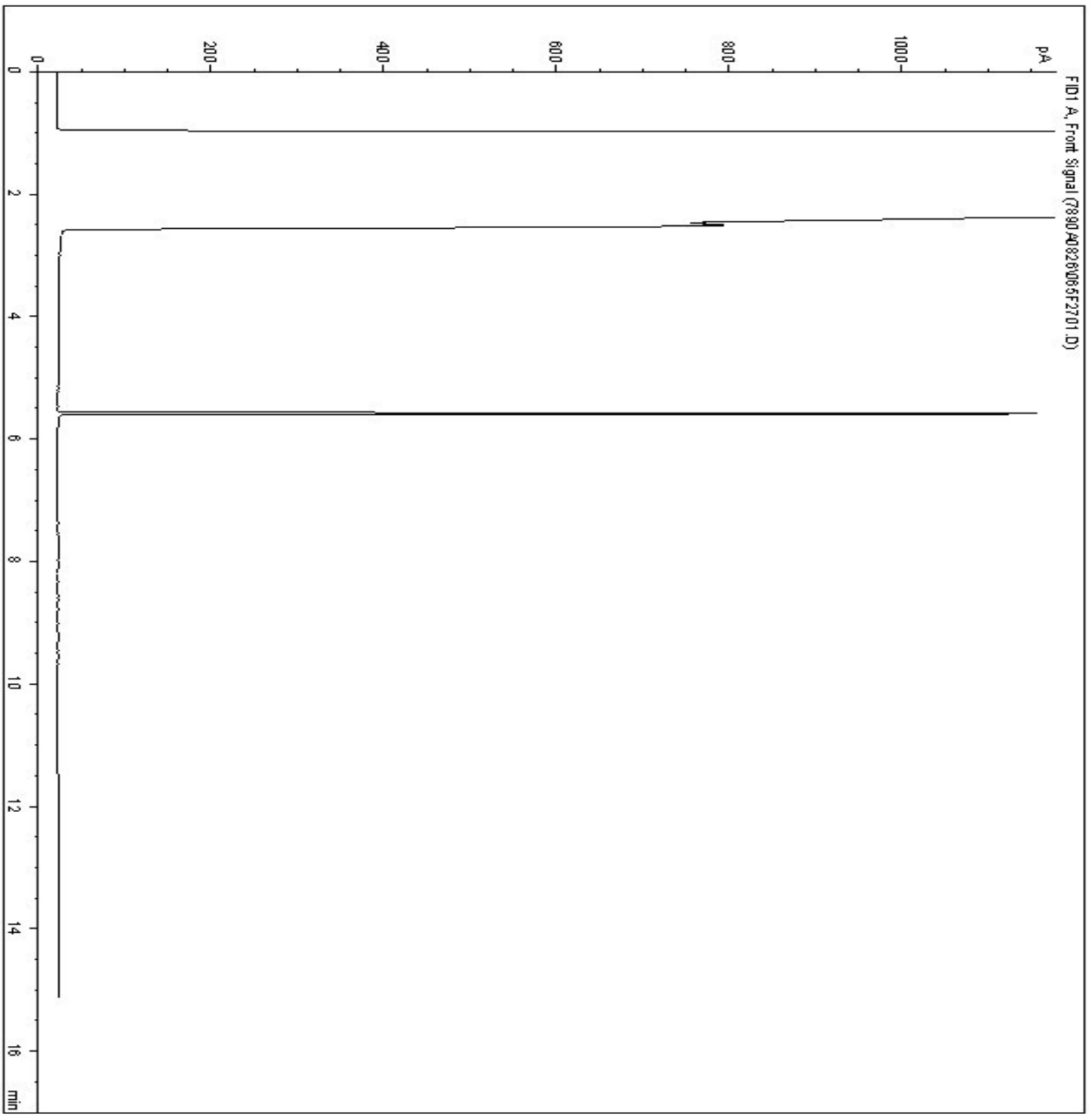
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0082

Client ID: 11W2-19 (20CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0826\065F2701.D
Sample Name: BI0082



*** End of Report ***

7890A GC 2011/08/28 9:56:53 AM AK8

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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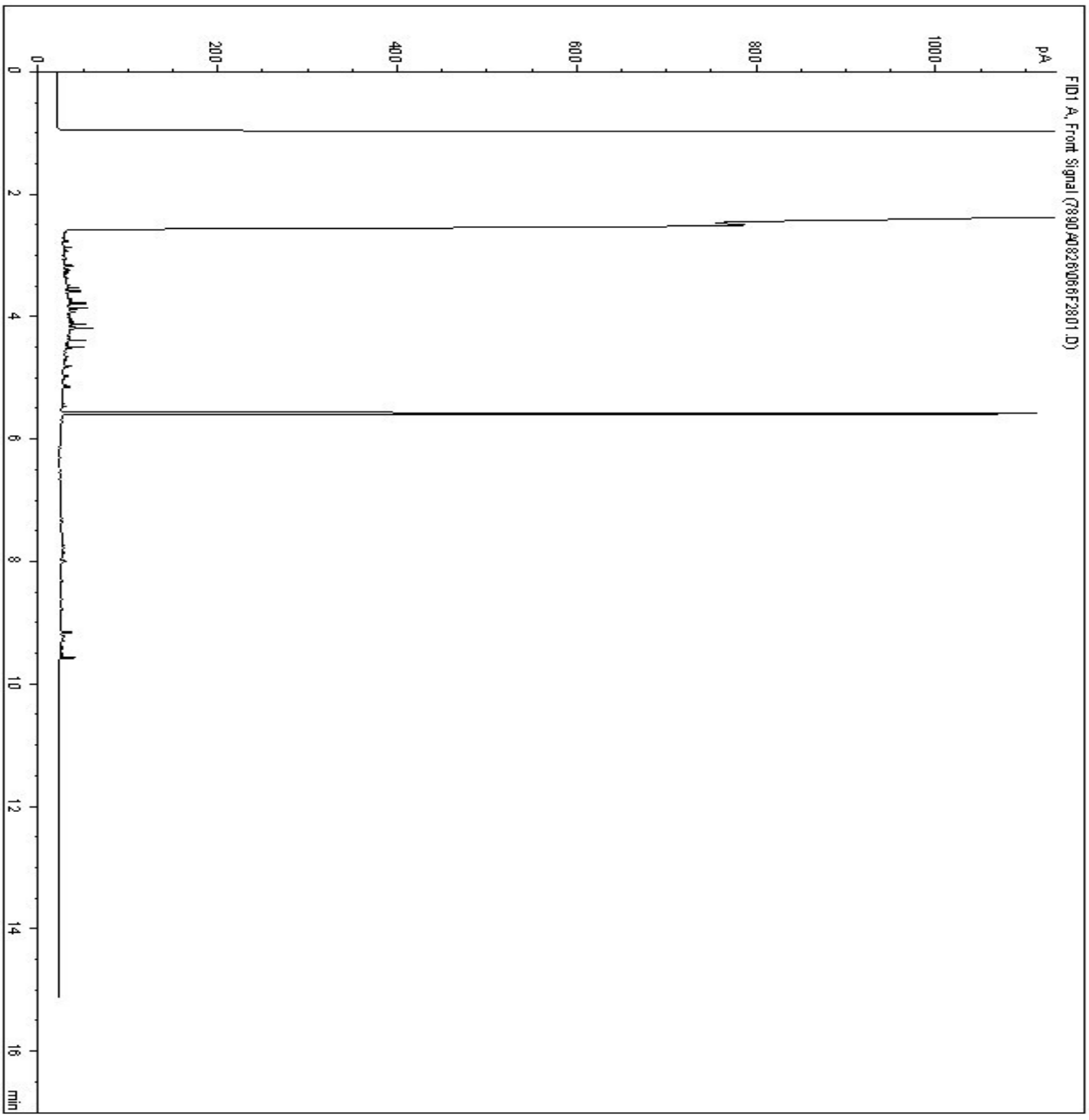
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0083

Client ID: 11W2-8 (20CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0826\066F2801.D
Sample Name: BI0083



*** End of Report ***

7890A GC 2011/08/28 9:56:56 AM AK8

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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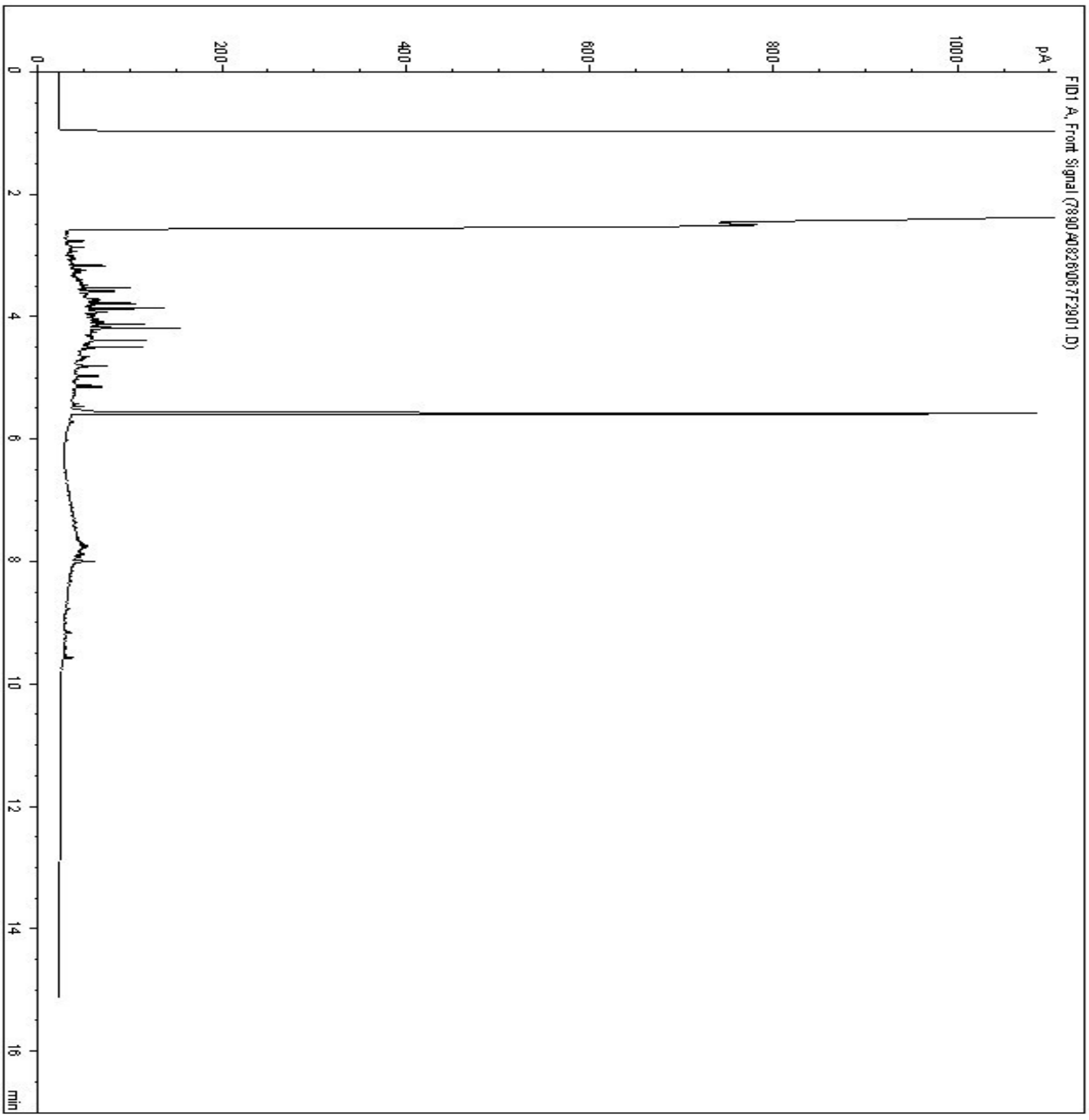
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0084

Client ID: 11W2-20 (25CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0826\067F2901.D
Sample Name: BI0084



*** End of Report ***

7890A GC 2011/08/28 9:56:58 AM AK8

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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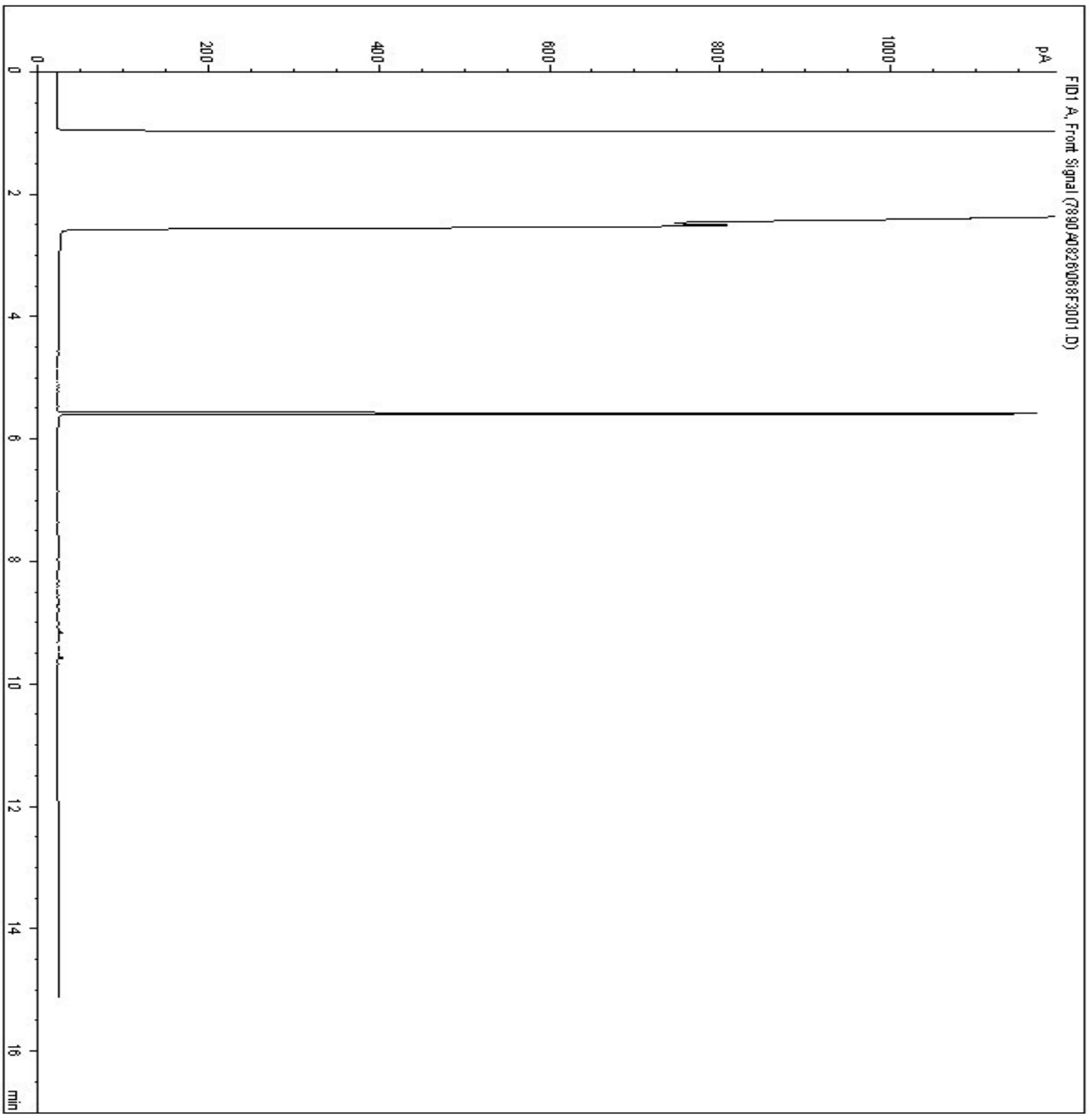
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0085

Client ID: 11W2-7 (20CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0826\068F3001.D
Sample Name: BI0085



*** End of Report ***

7890A GC 2011/08/28 9:57:01 AM AK8

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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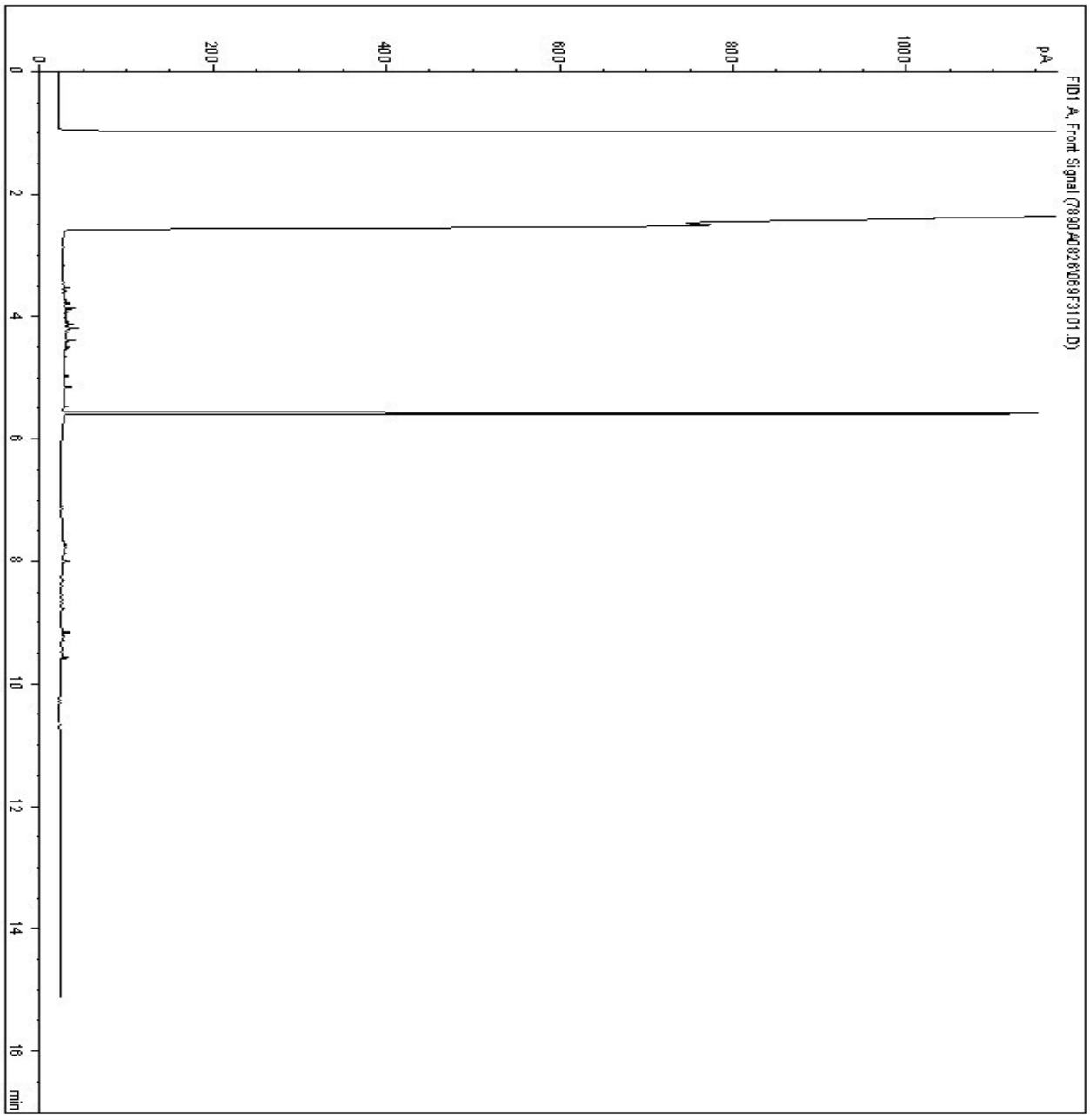
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0086

Client ID: 11W2-4 (25CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0826\069F3101.D
Sample Name: BI0086



*** End of Report ***

7890A GC 2011/08/28 9:57:04 AM AK8

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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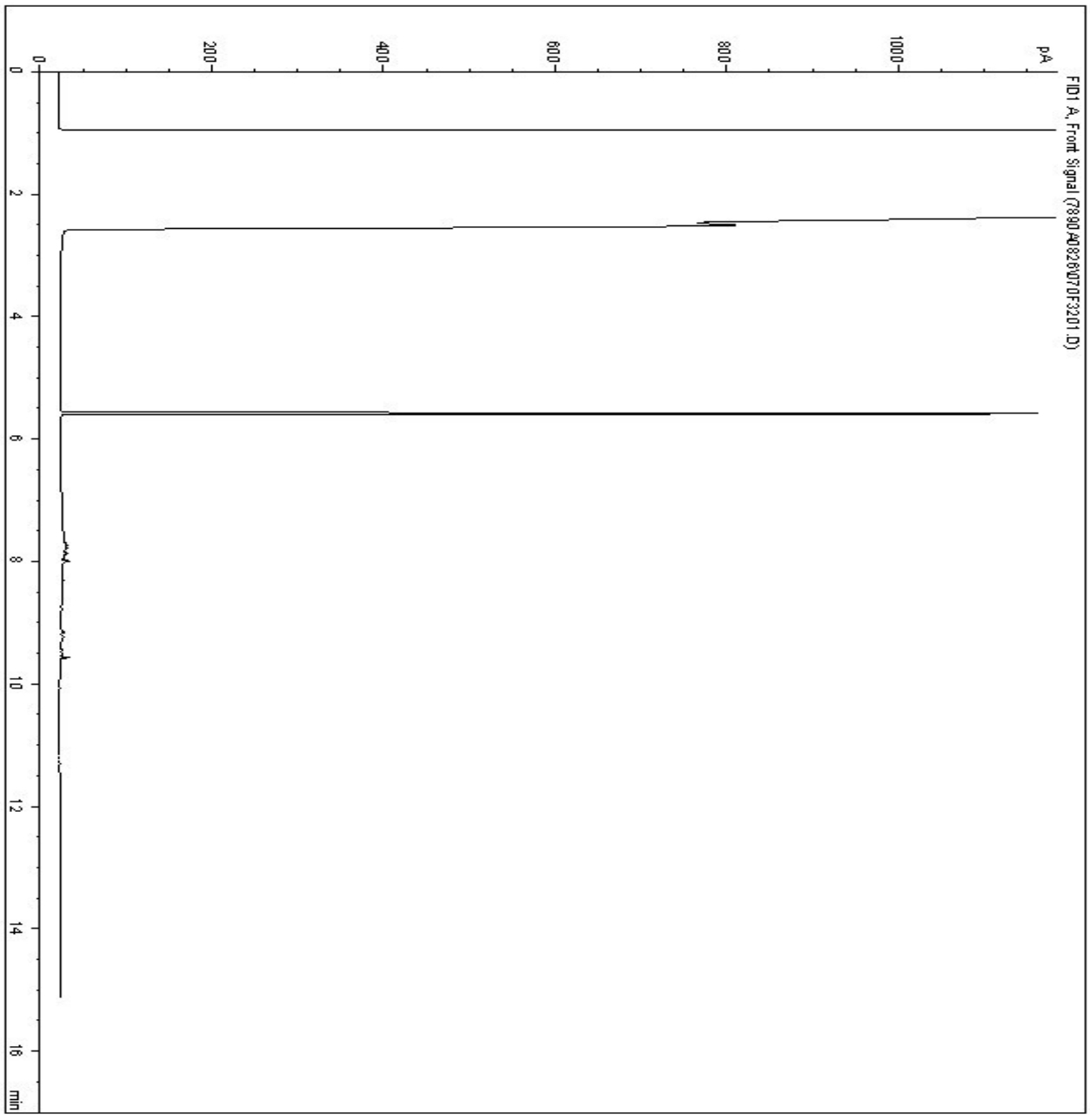
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0087

Client ID: 11W2-10 (25CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0826\070F3201.D
Sample Name: BI0087



*** End of Report ***

7890A GC 2011/08/28 9:57:07 AM AK8

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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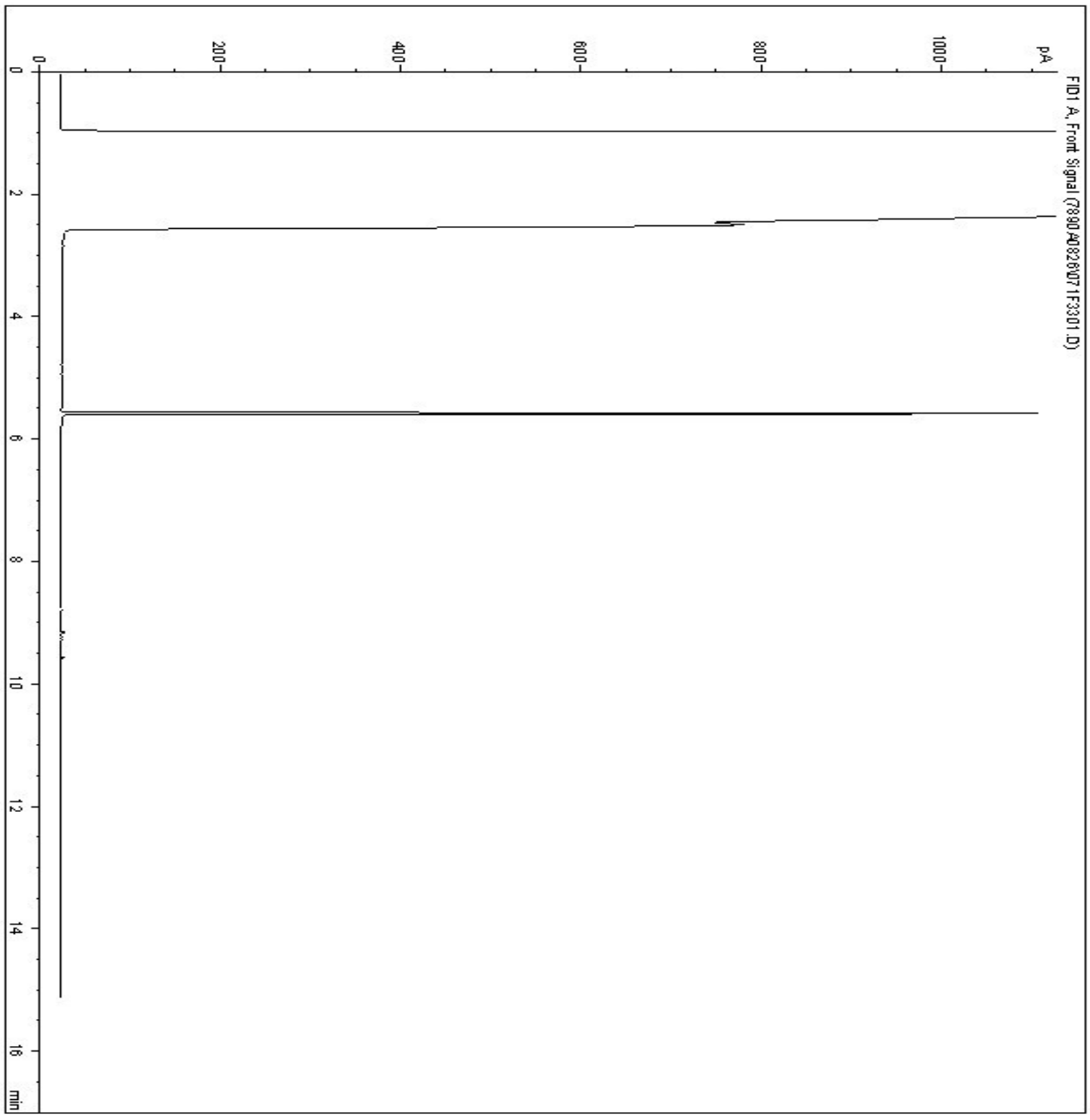
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0088

Client ID: 11W2-13 (25CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0826\071F3301.D
Sample Name: BI0088



*** End of Report ***

7890A GC 2011/08/28 9:57:10 AM AK8

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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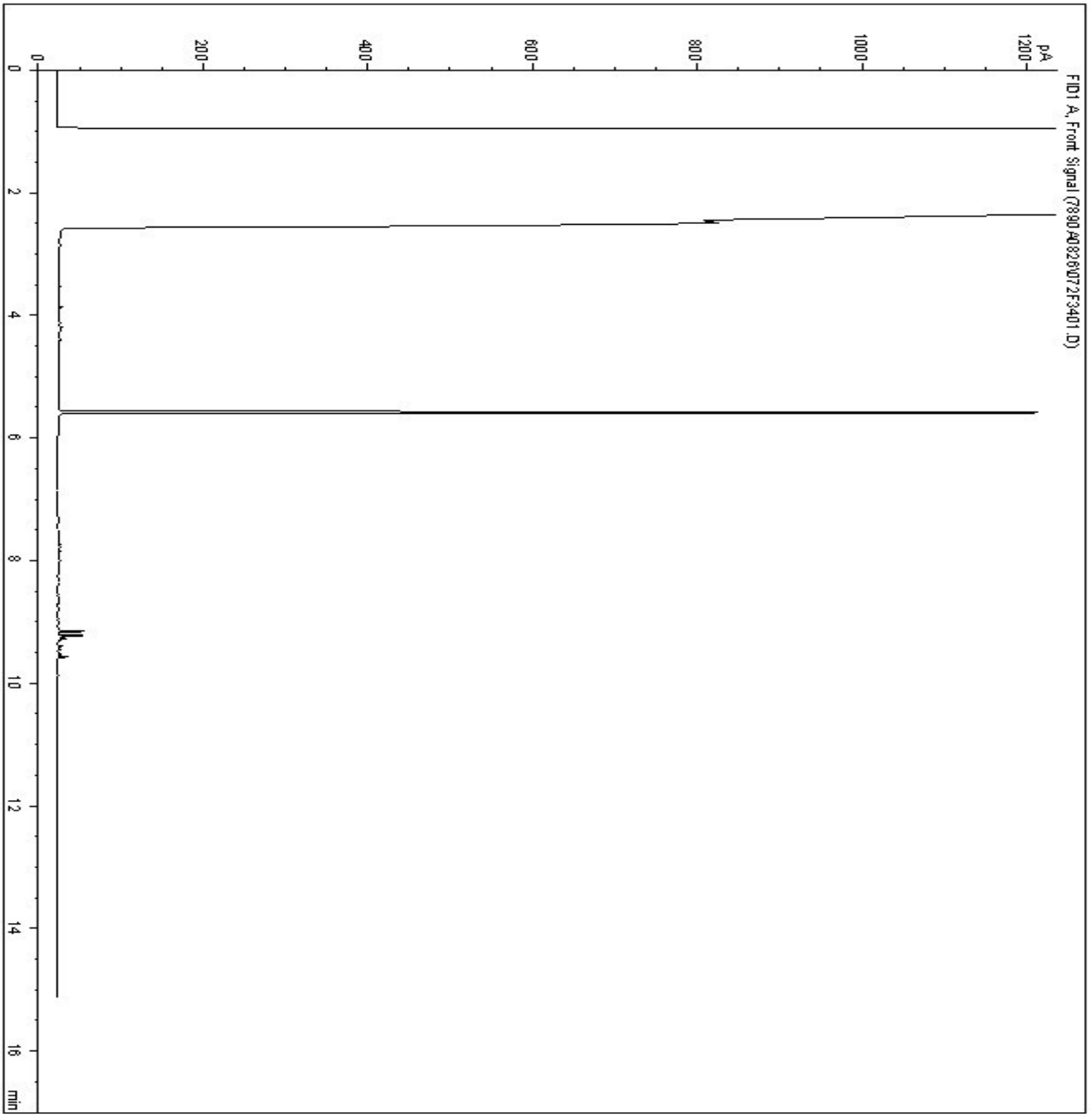
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0089

Client ID: 11W2-2 (20CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0826\072F3401.D
Sample Name: BI0089



*** End of Report ***

7890A GC 2011/08/28 9:57:13 AM AK8

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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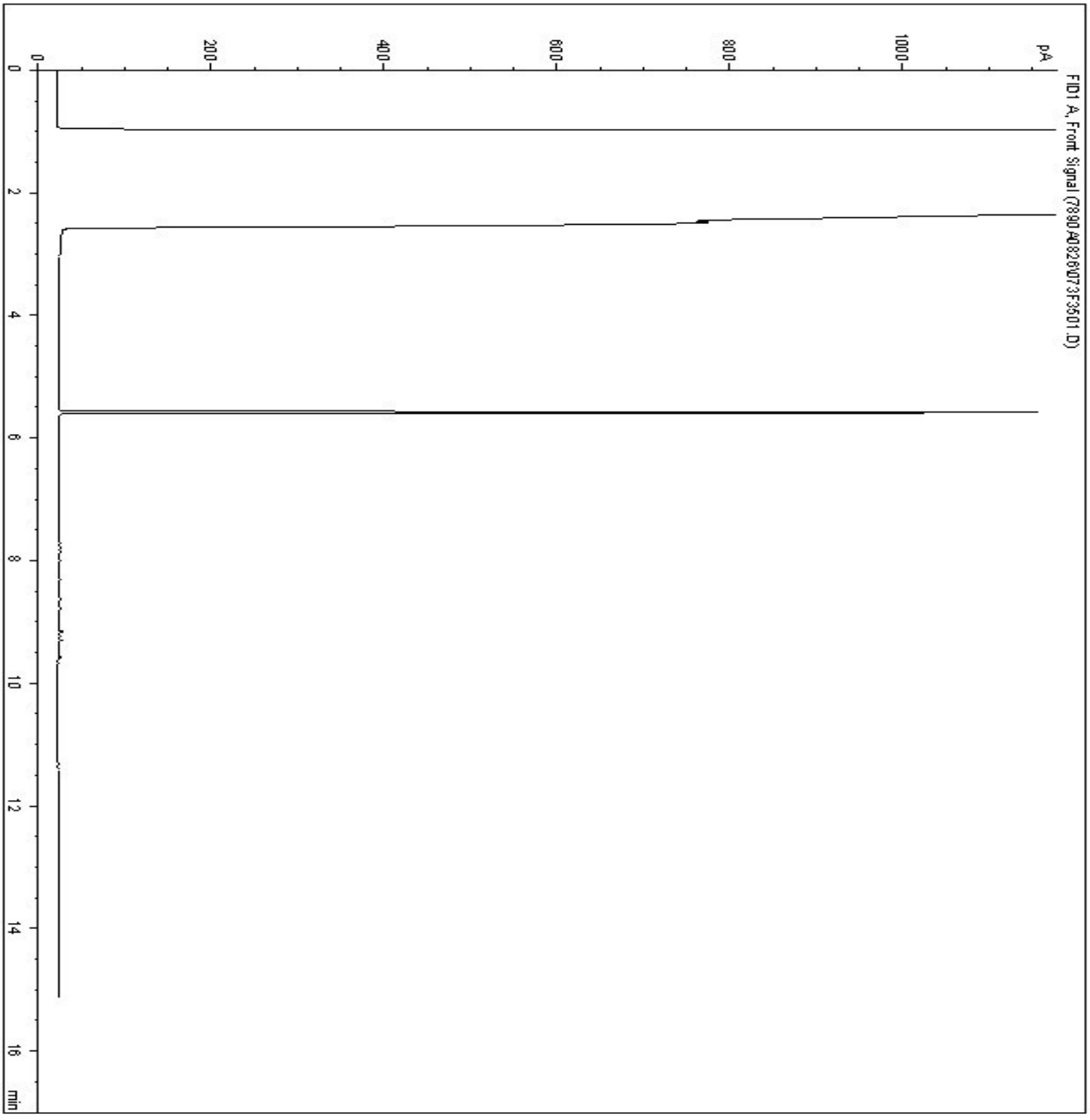
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0090

Client ID: 11W2-17 (20CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0826\073F3501.D
Sample Name: BI0090



*** End of Report ***

7890A GC 2011/08/28 9:57:15 AM AK8

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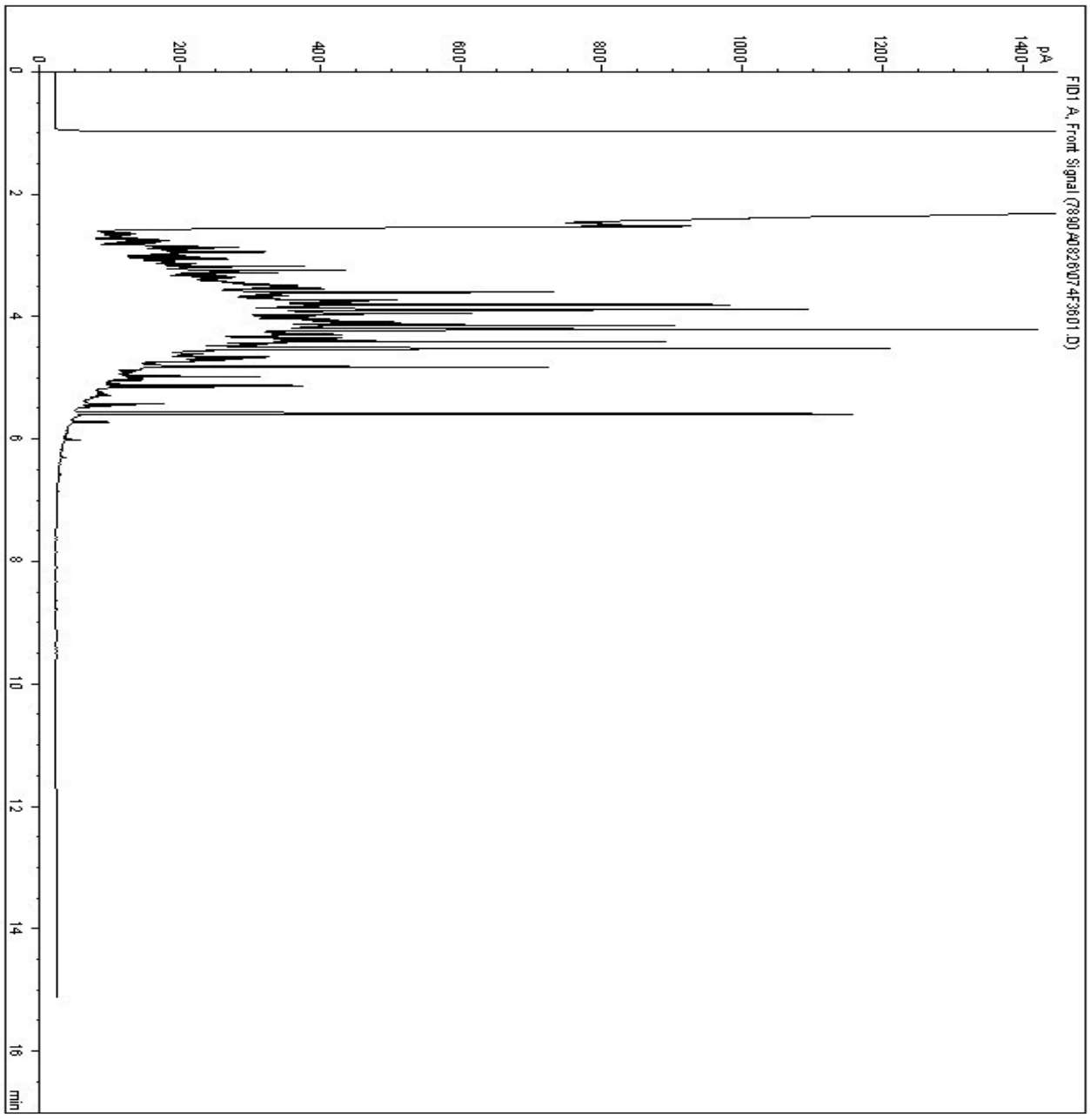
Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0091

Client ID: 11W4-01 (25CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0826\074F3601.D
Sample Name: BI0091



*** End of Report ***

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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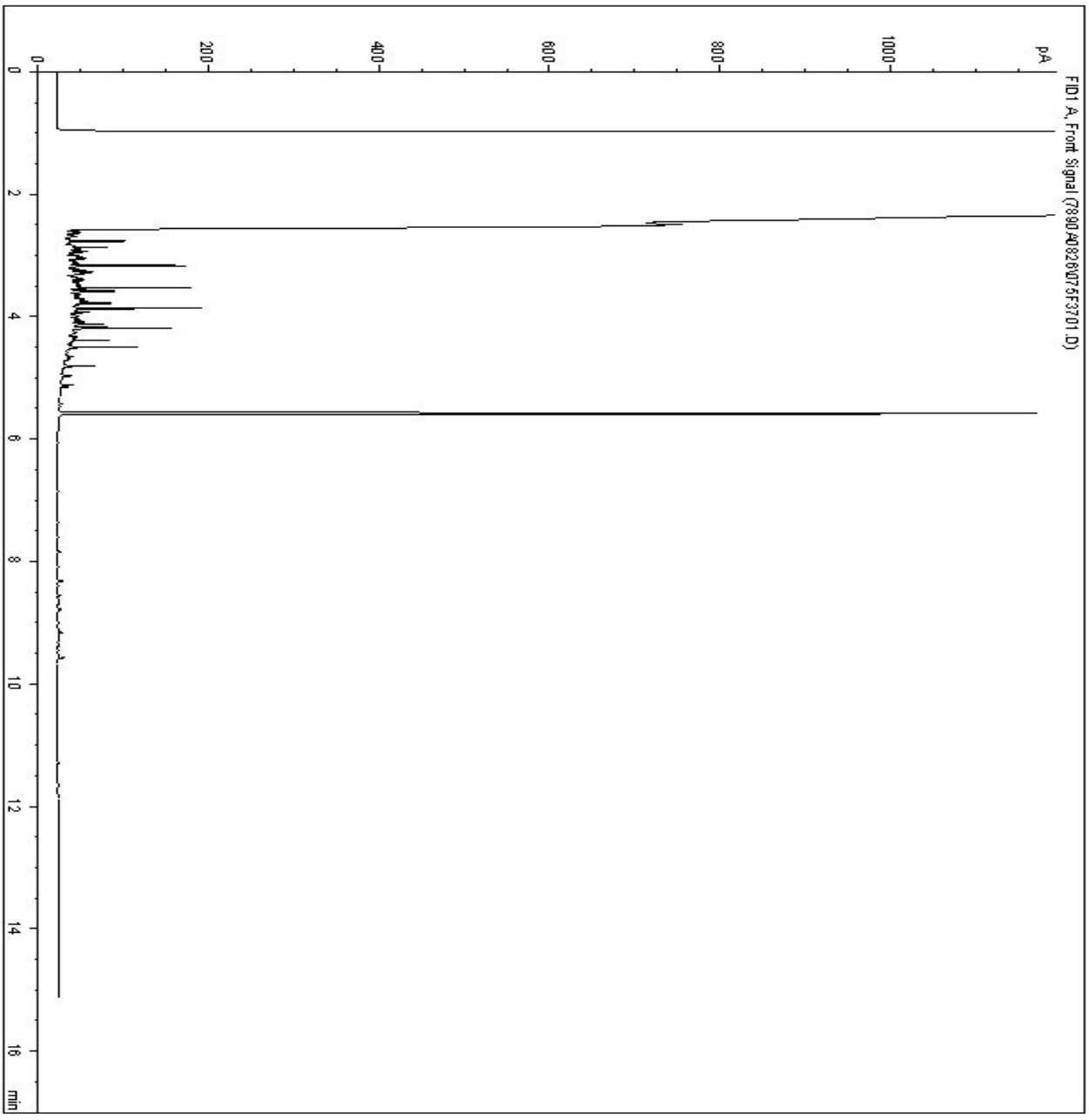
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0162

Client ID: 11W3-02 (10CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0826\075F3701.D
Sample Name: BI0162



*** End of Report ***

7890A GC 2011/08/28 9:57:21 AM AK8

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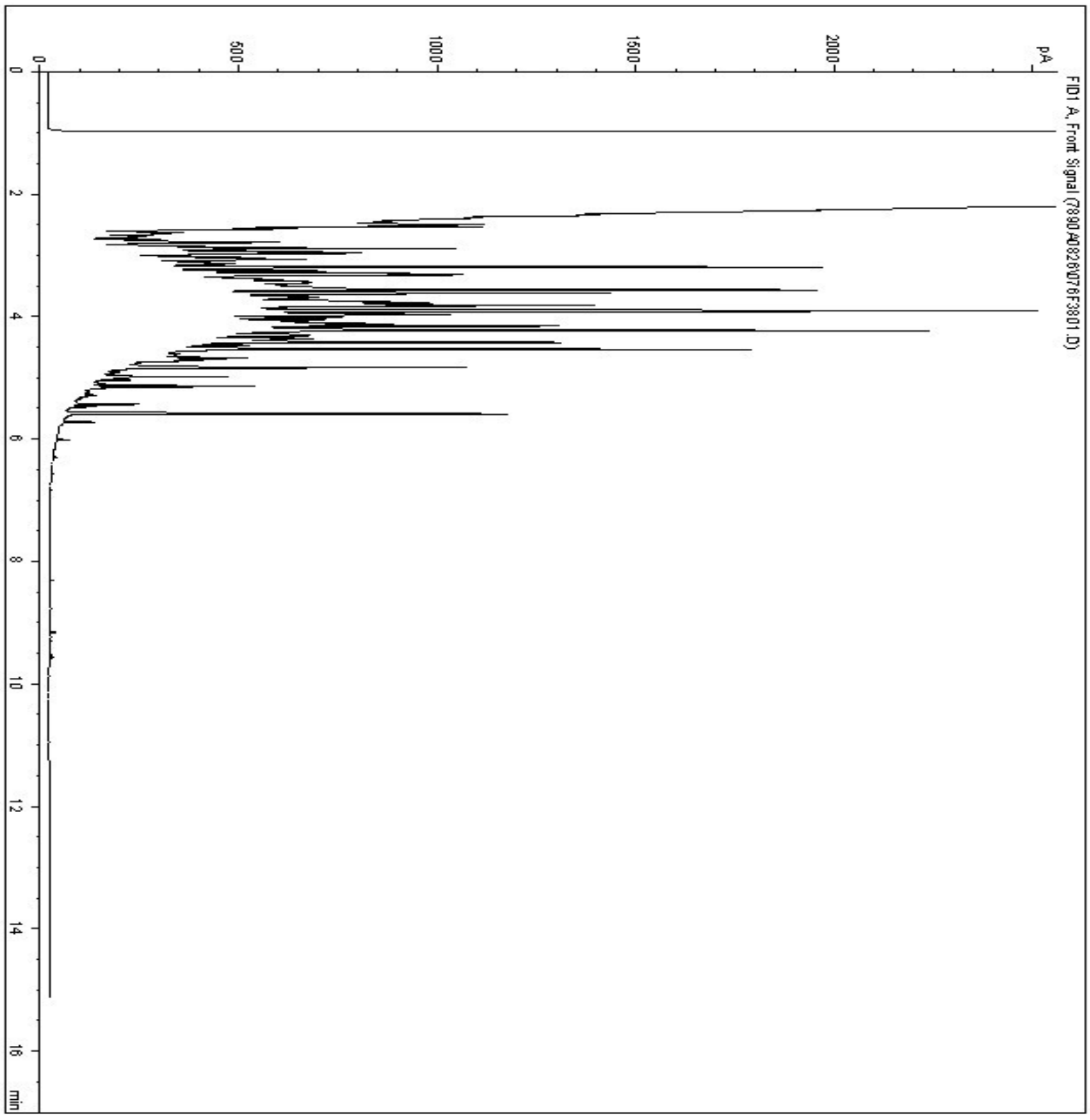
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0163

Client ID: 11W4-10 (50CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0826\076F3801.D
Sample Name: BI0163



*** End of Report ***

7890A GC 2011/08/28 9:57:24 AM AK8

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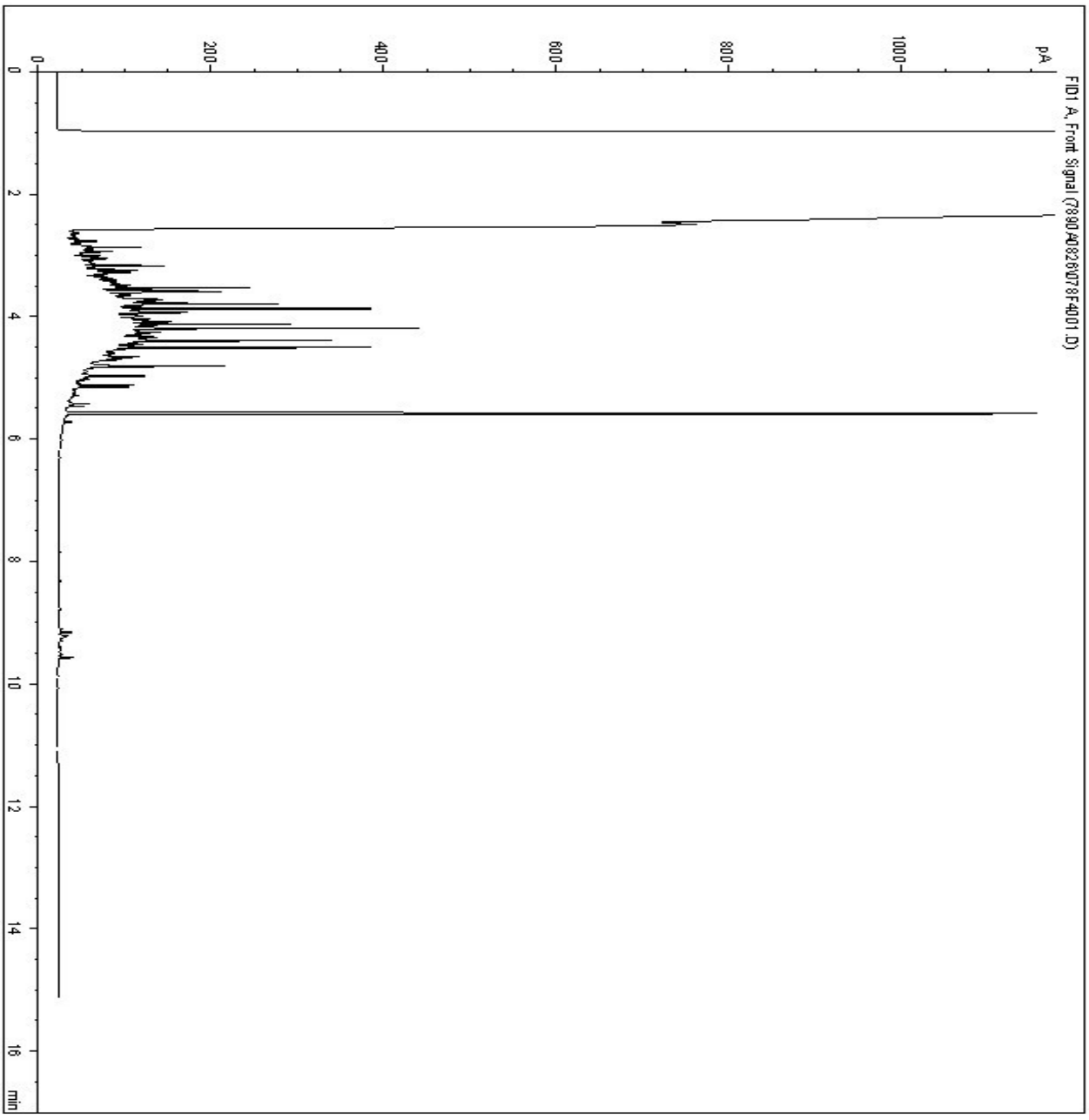
Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0164

Client ID: 11W3-01 (20CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0826\078F4001.D
Sample Name: BI0164



*** End of Report ***

7890A GC 2011/08/28 9:57:30 AM AK8

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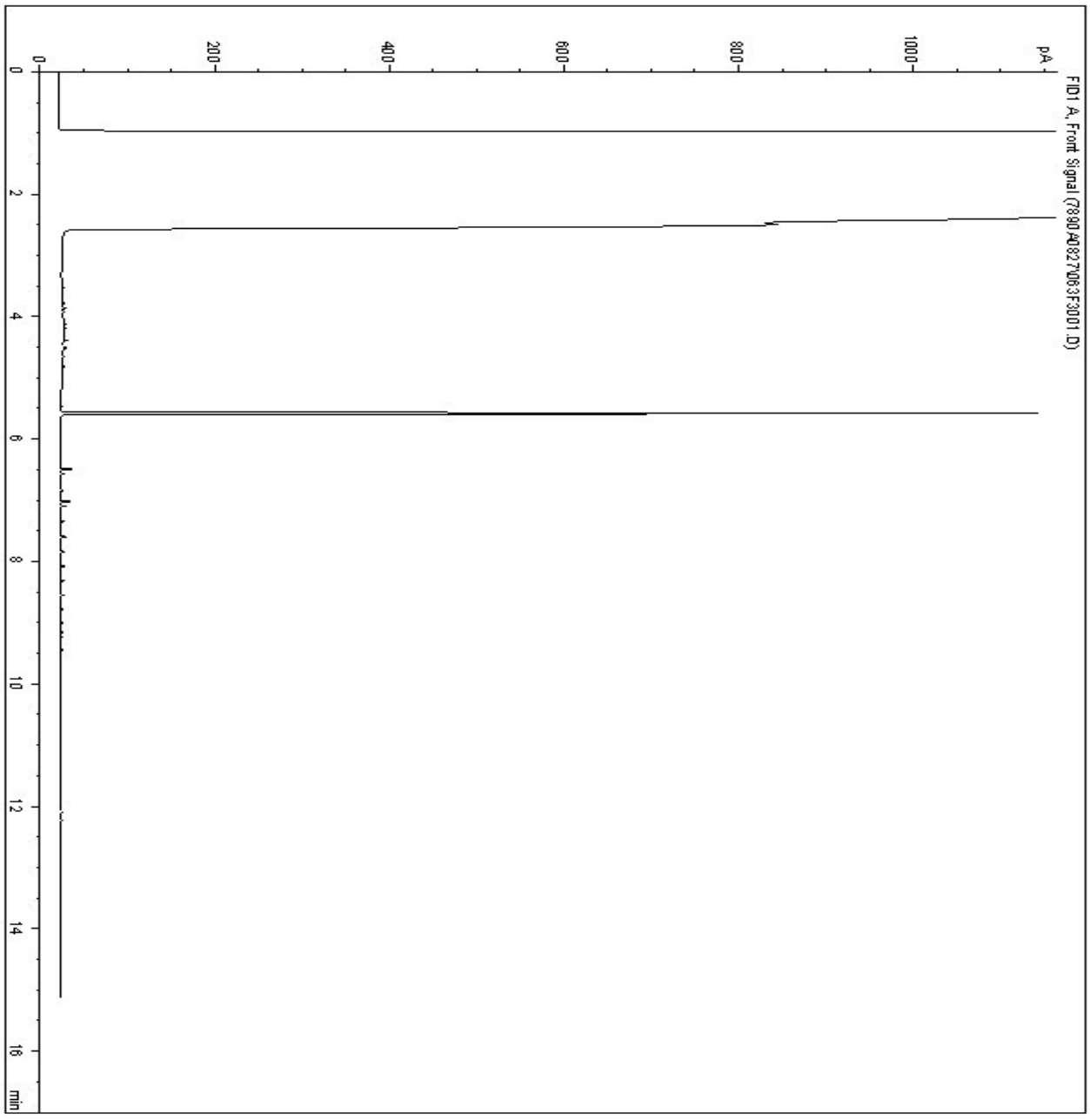
Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0165

Client ID: 11W7-02 (10CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0827\063F3001.D
Sample Name: BI0165



*** End of Report ***

7890A GC 2011/08/28 9:43:51 AM AK8

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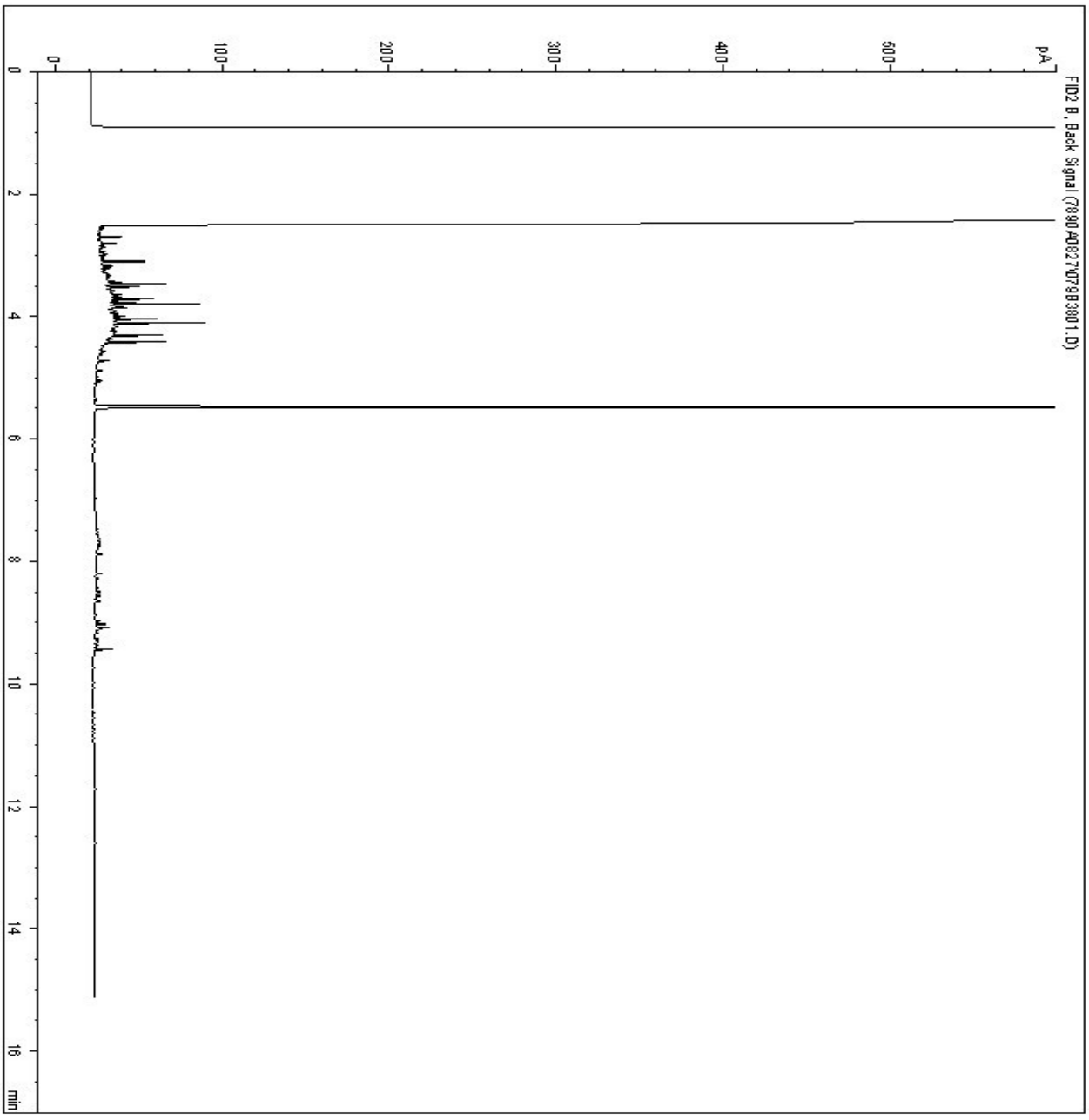
Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0166

Client ID: 11W3-10 (20CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0827\079B3801.D
Sample Name: BI0166



*** End of Report ***

7890A GC 2011/08/28 9:44:14 AM AK8

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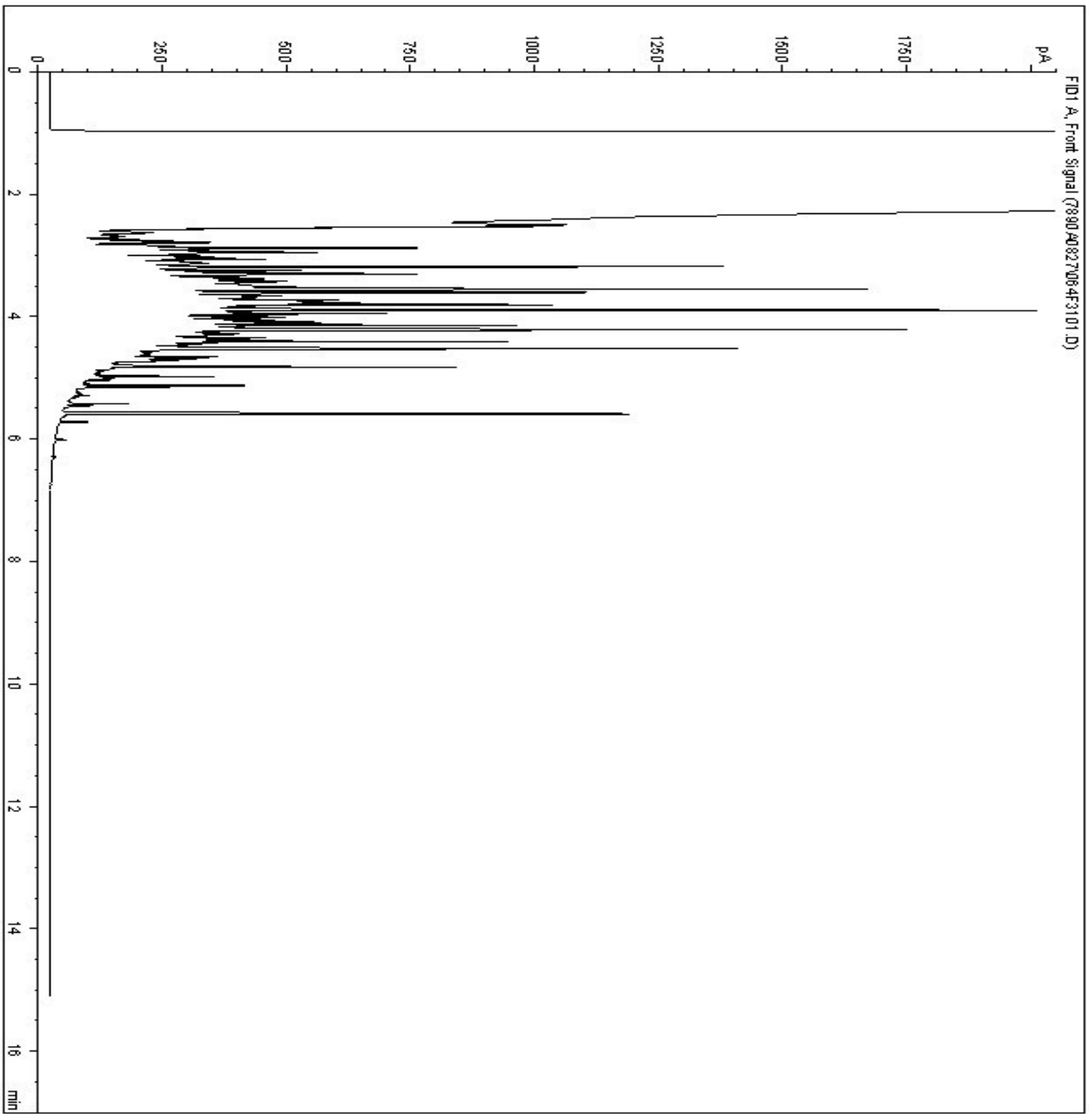
Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0167

Client ID: 11W4-01 (75CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0827\064F3101.D
Sample Name: BI0167



*** End of Report ***

7890A GC 2011/08/28 9:43:54 AM AK8

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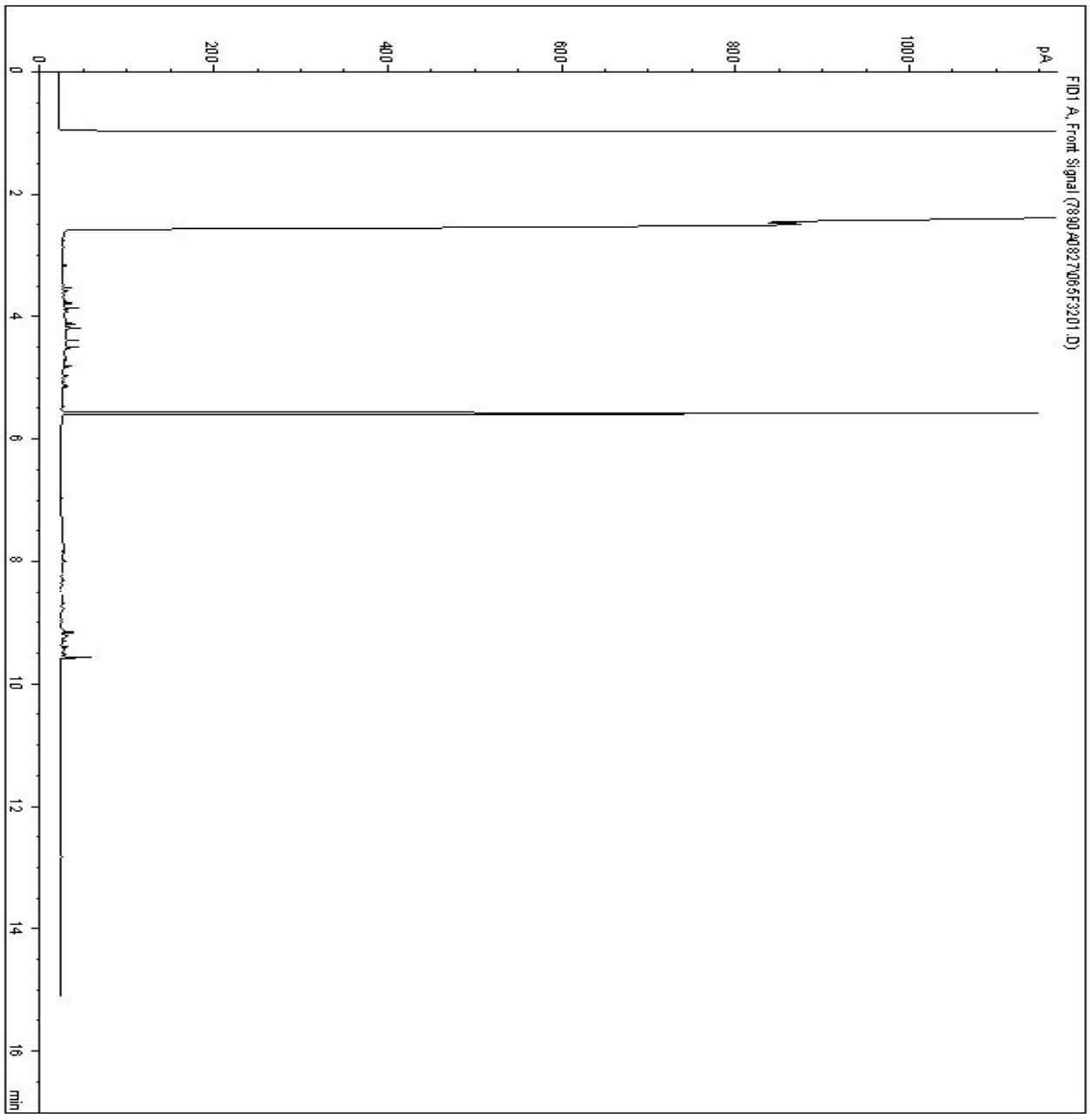
Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0168

Client ID: 11W3-04 (25CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0827\065F3201.D
Sample Name: BI0168



*** End of Report ***

7890A GC 2011/08/28 9:43:57 AM AK8

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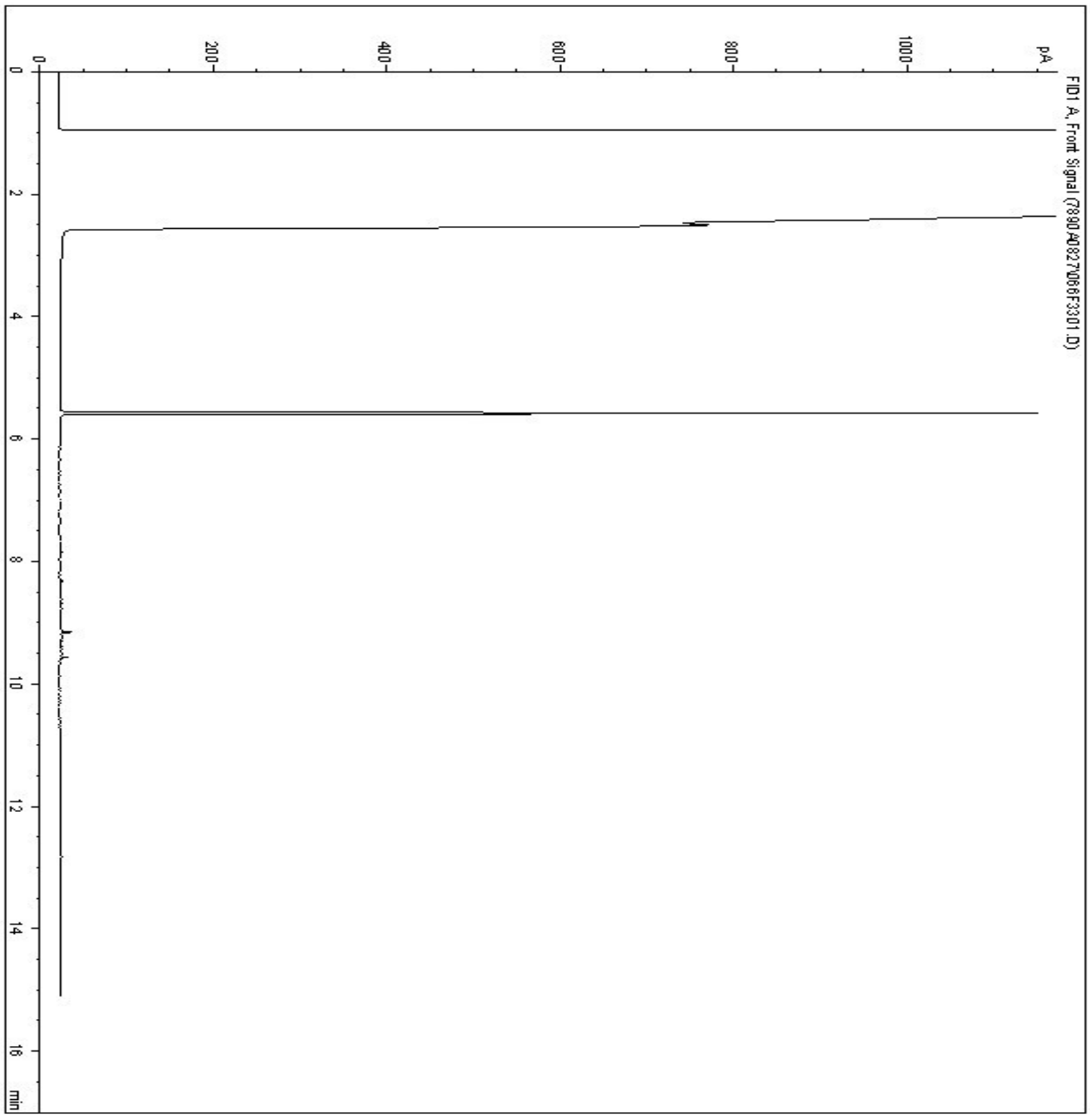
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0169

Client ID: 11W4-08 (20CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0827\066F3301.D
Sample Name: BI0169



*** End of Report ***

7890A GC 2011/08/28 9:44:00 AM AK8

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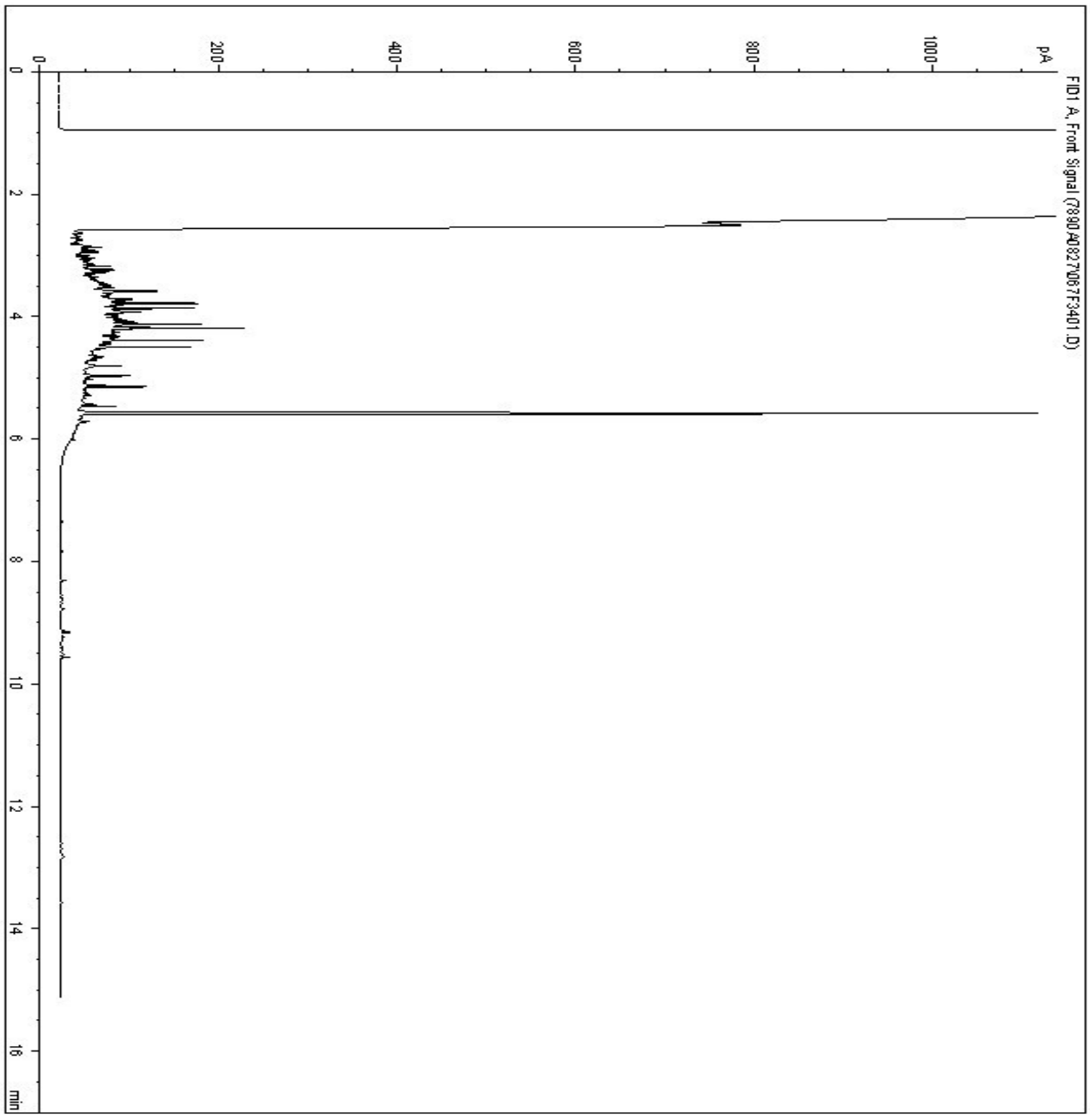
Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0170

Client ID: 11W4-02 (30CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0827\067F3401.D
Sample Name: BI0170



*** End of Report ***

7890A GC 2011/08/28 9:44:02 AM AK8

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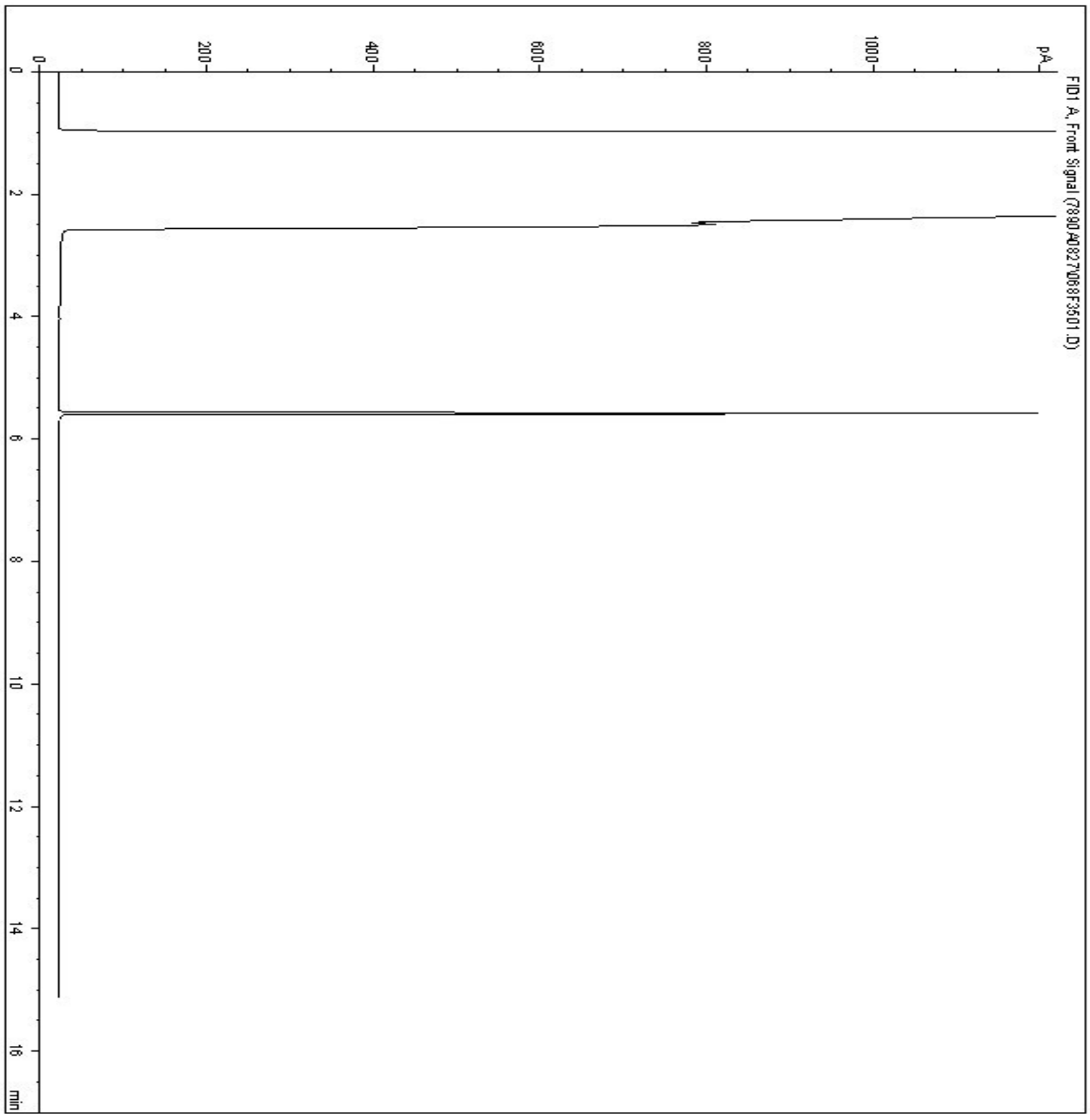
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0171

Client ID: 11W4-09 (25CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0827\068F3501.D
Sample Name: BI0171



*** End of Report ***

7890A GC 2011/08/28 9:44:05 AM AK8

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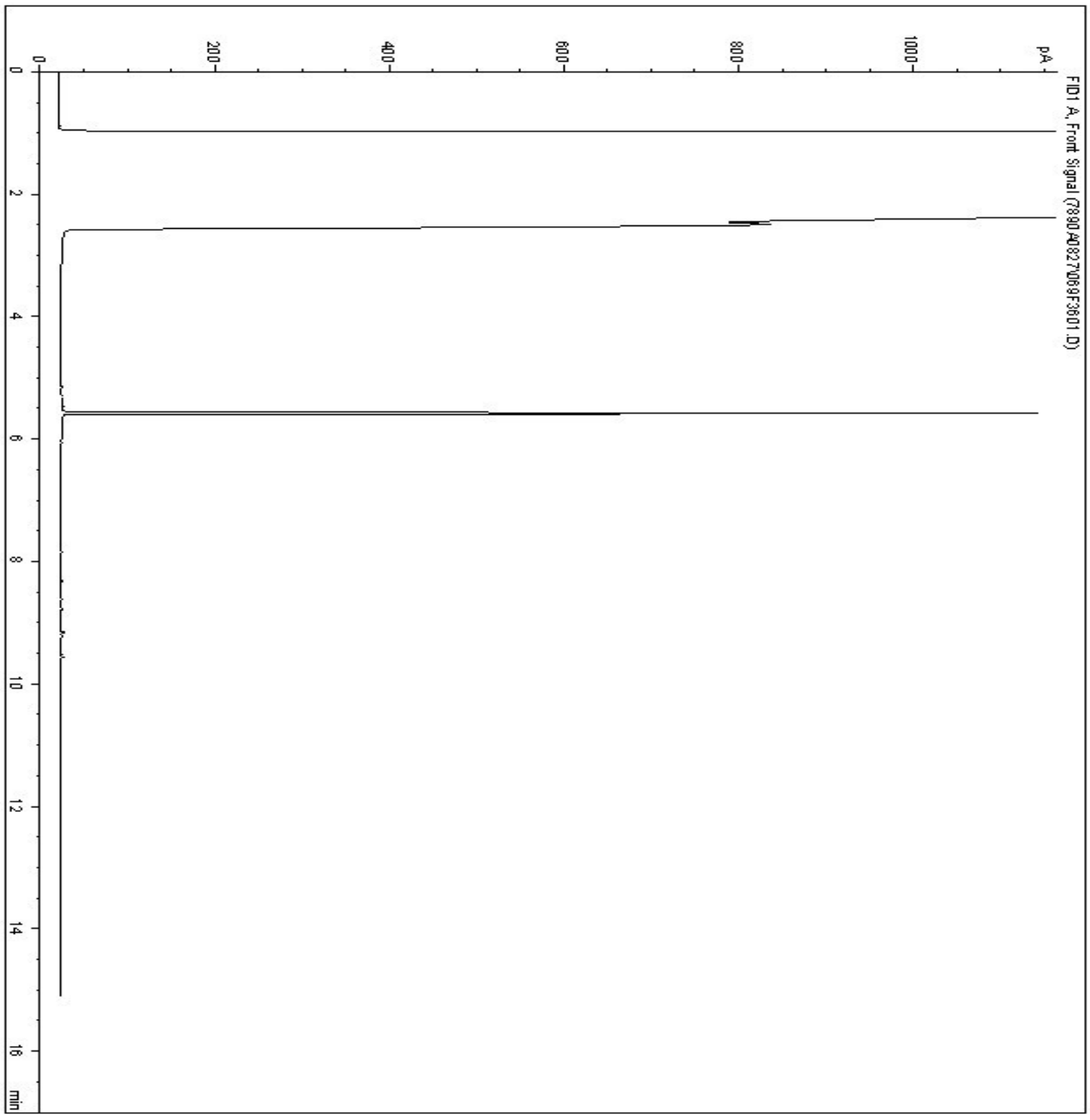
Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0175

Client ID: 11W4-07 (25CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0827\069F3601.D
Sample Name: BI0175



*** End of Report ***

7890A GC 2011/08/28 9:44:08 AM AK8

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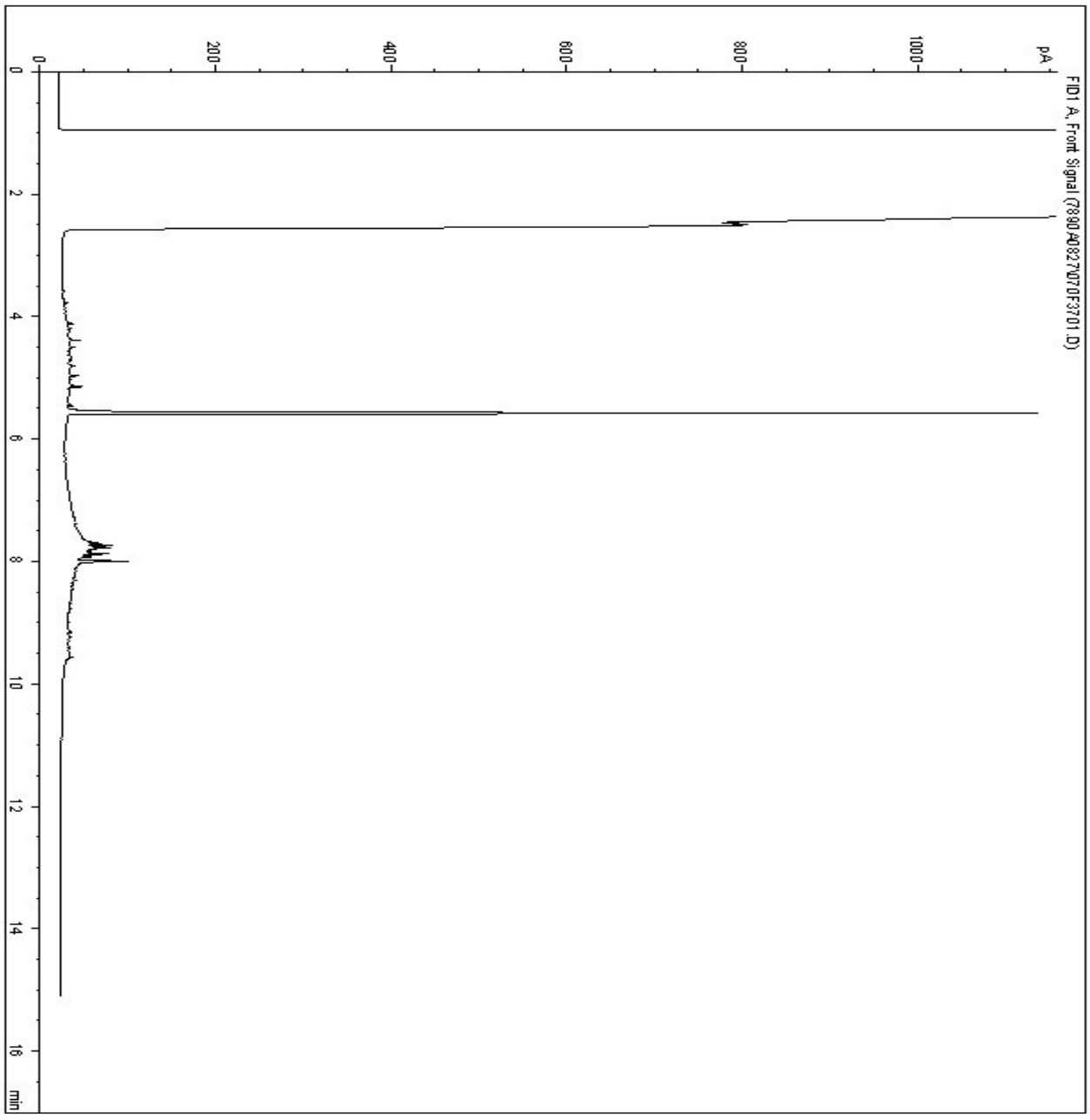
Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0176

Client ID: 11W06-1 (CS) (25CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0827\070F3701.D
Sample Name: BI0176



*** End of Report ***

7890A GC 2011/08/28 9:44:11 AM AK8

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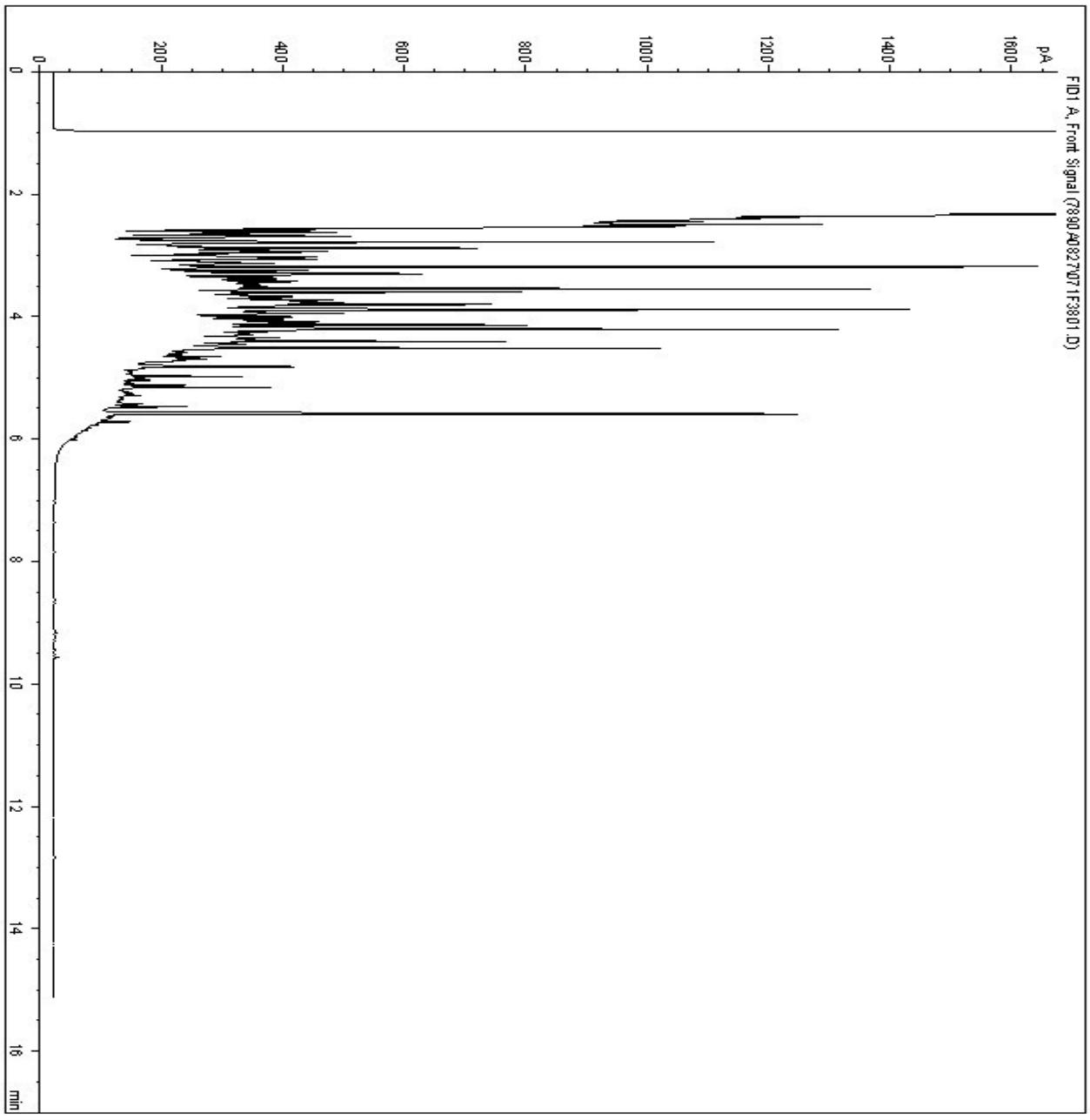
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0182

Client ID: 11W5E-01 (50CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0827\071F3801.D
Sample Name: BI0182



*** End of Report ***

7890A GC 2011/08/28 9:44:14 AM AK8

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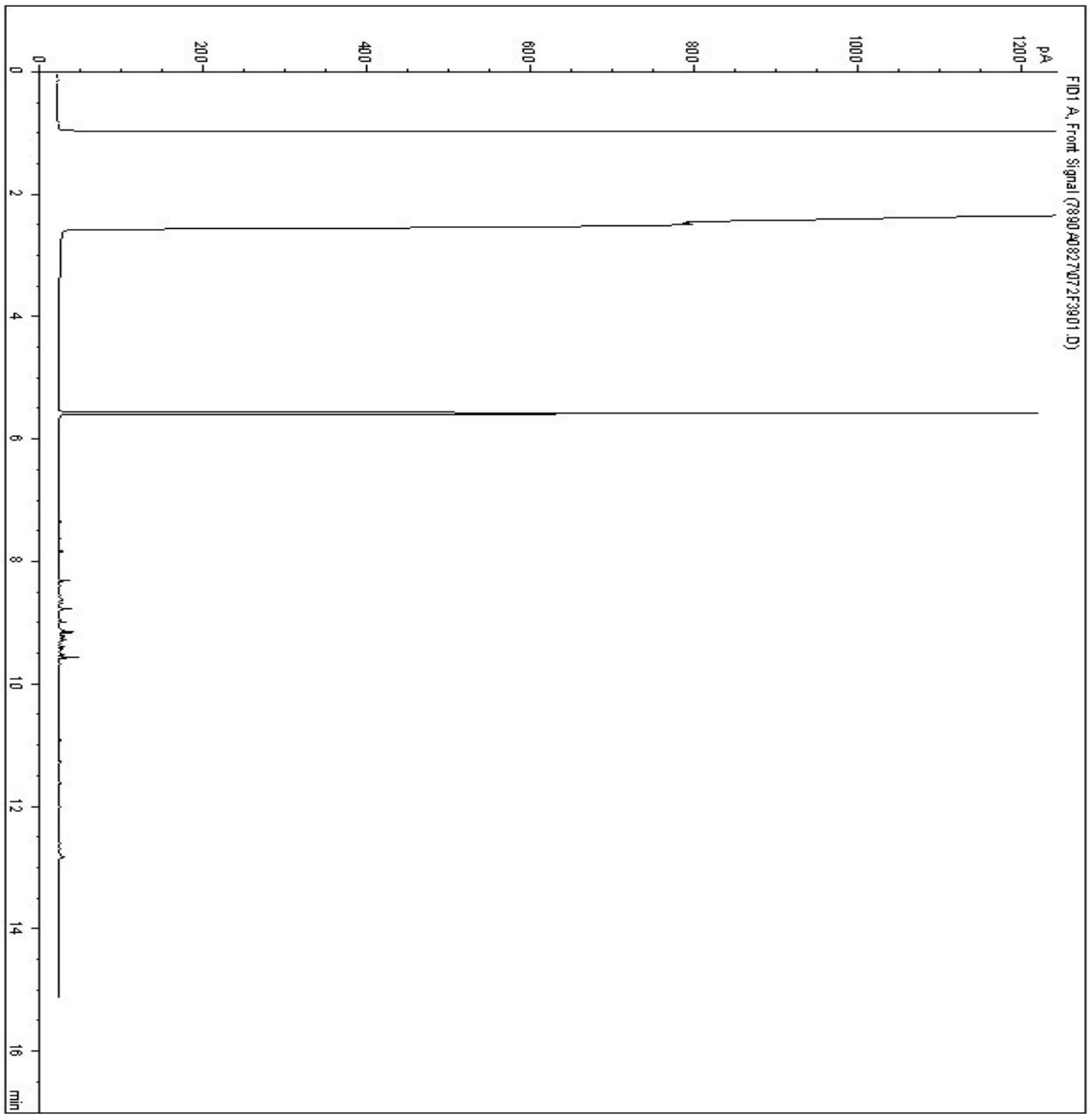
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0183

Client ID: BULK FUEL STORAGE (10CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0827\072F3901.D
Sample Name: BI0183



*** End of Report ***

7890A GC 2011/08/28 9:44:17 AM AK8

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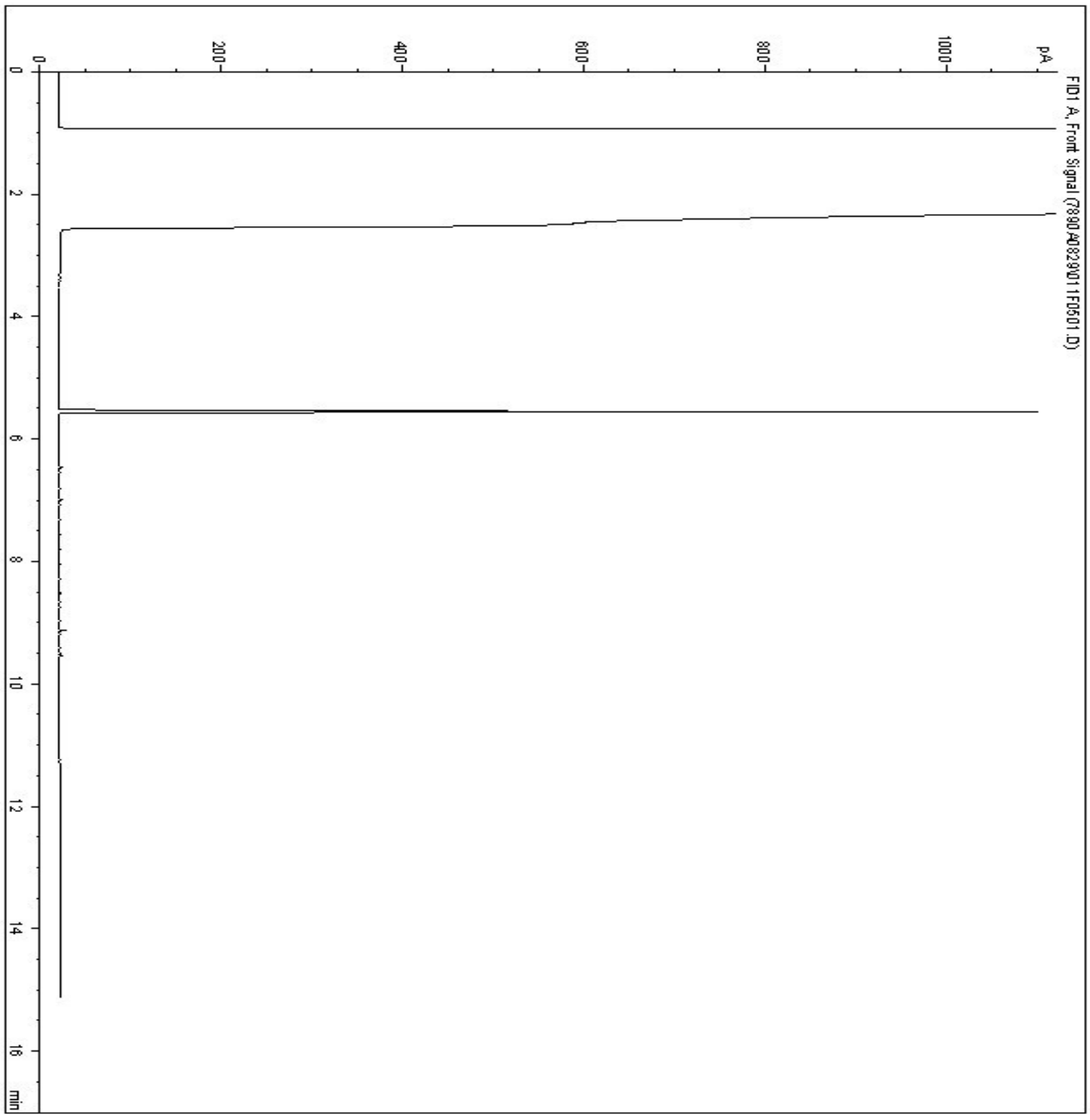
Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0184

Client ID: 11W5E-04 (20CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0829\011F0501.D
Sample Name: BI0184RR



*** End of Report ***

7890A GC 2011/08/29 10:25:47 AM AK8

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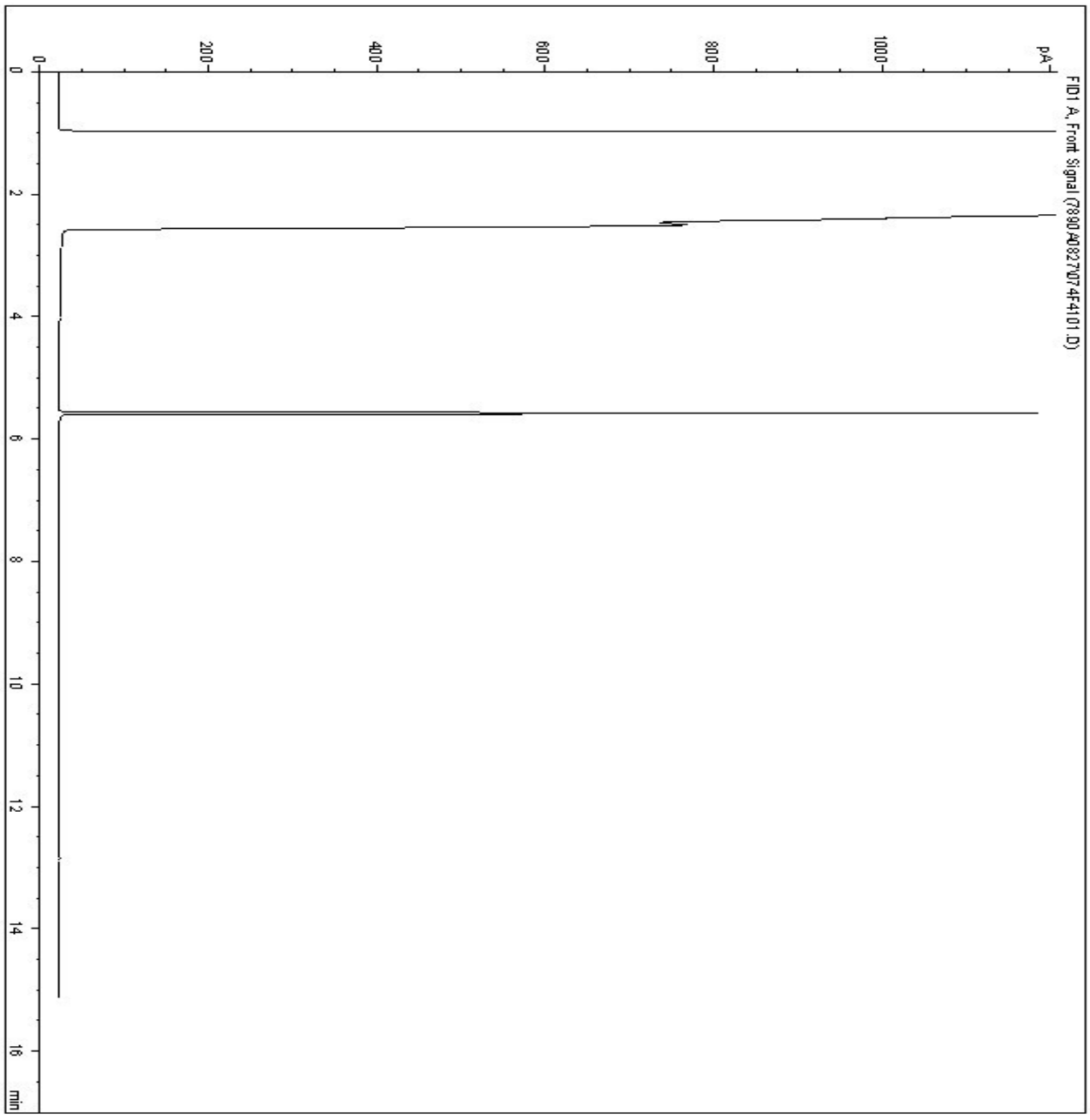
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0185

Client ID: 11W5F-02 (10CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0827\074F4101.D
Sample Name: BI0185



*** End of Report ***

7890A GC 2011/08/28 9:44:23 AM AK8

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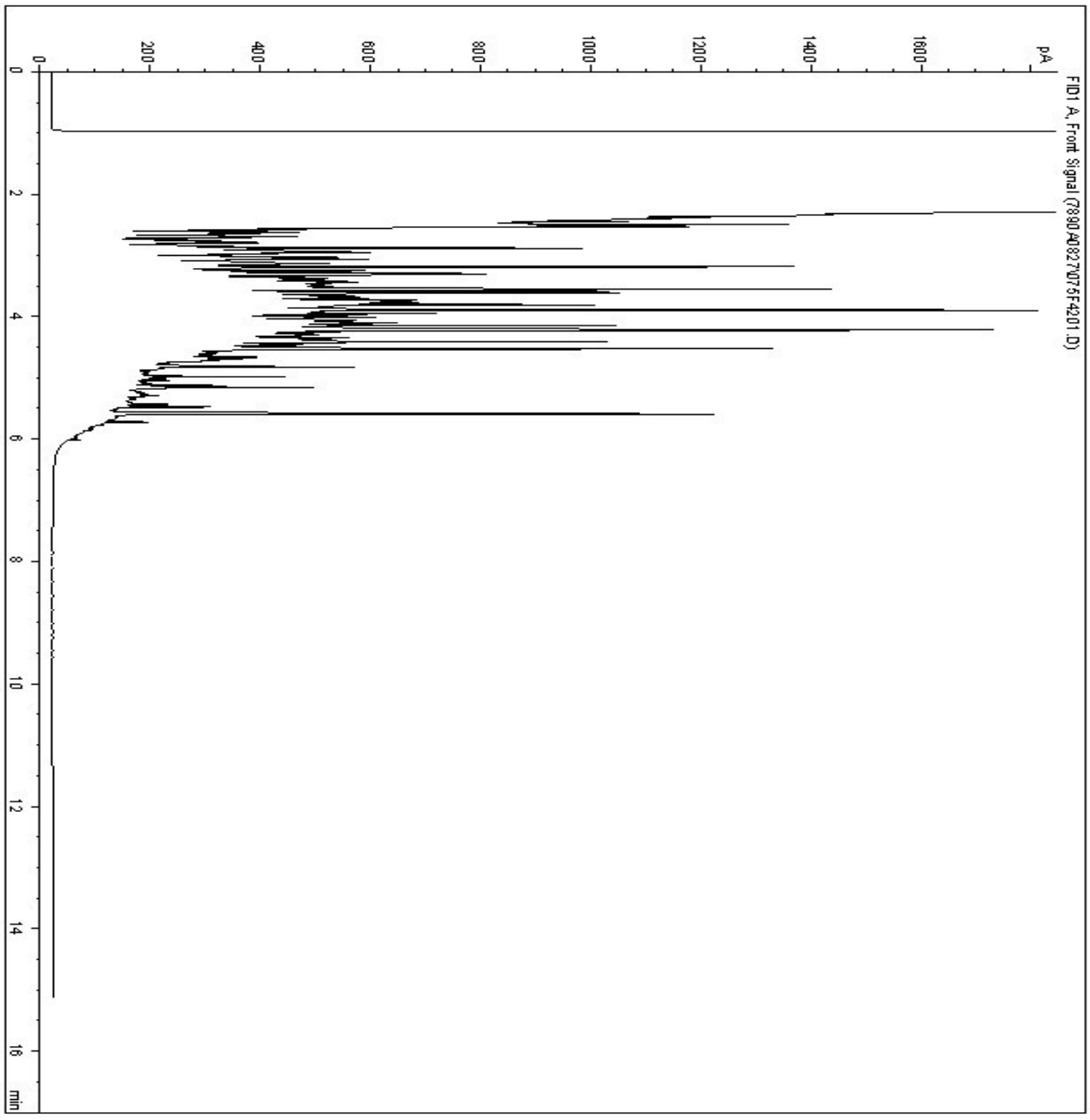
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0186

Client ID: 11W5E-01 (15CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0827\075F4201.D
Sample Name: BI0186



*** End of Report ***

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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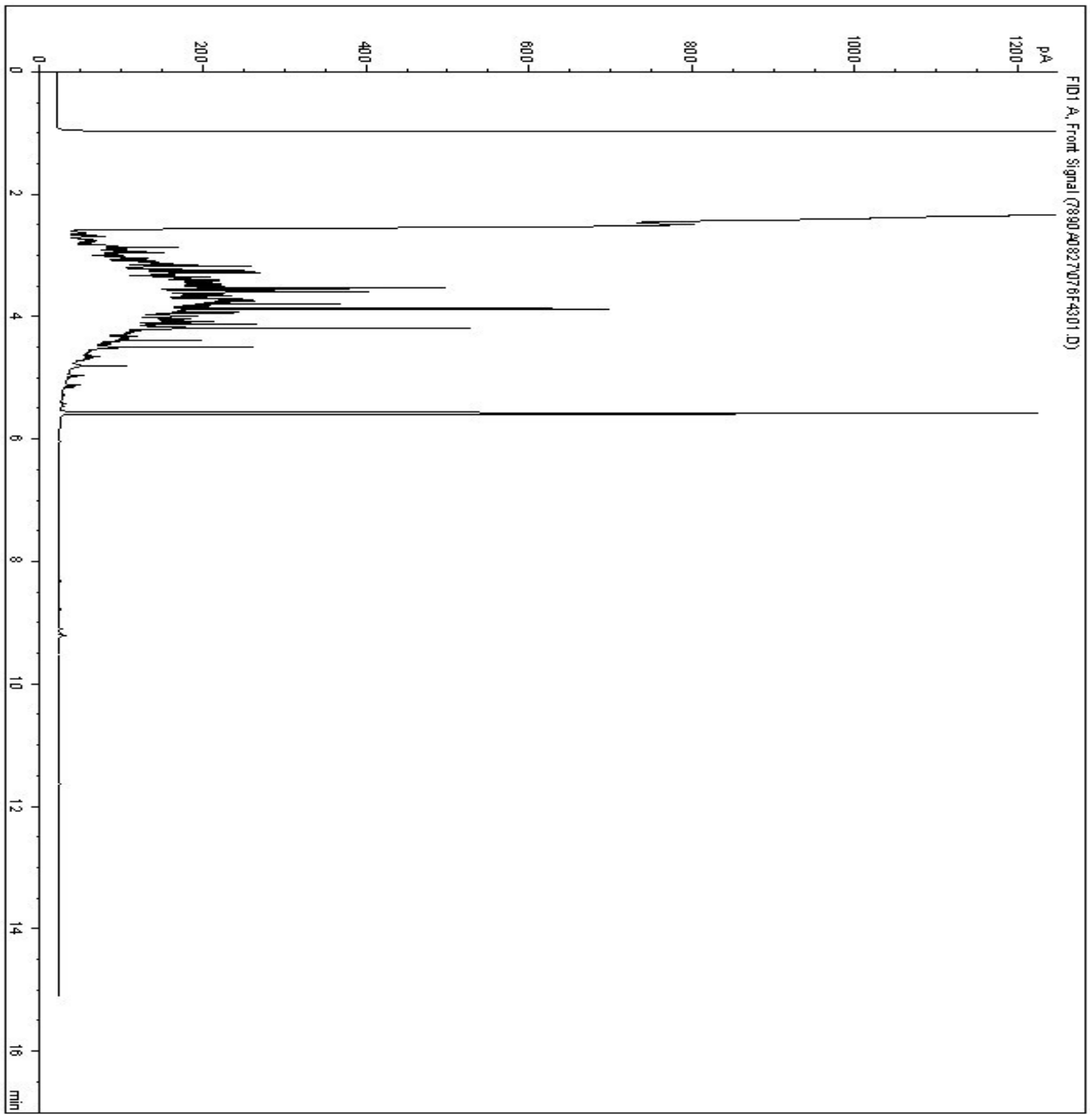
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0187

Client ID: 11W5D-01 (15CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0827\076F4301.D
Sample Name: BI0187



*** End of Report ***

7890A GC 2011/08/28 9:44:28 AM AK8

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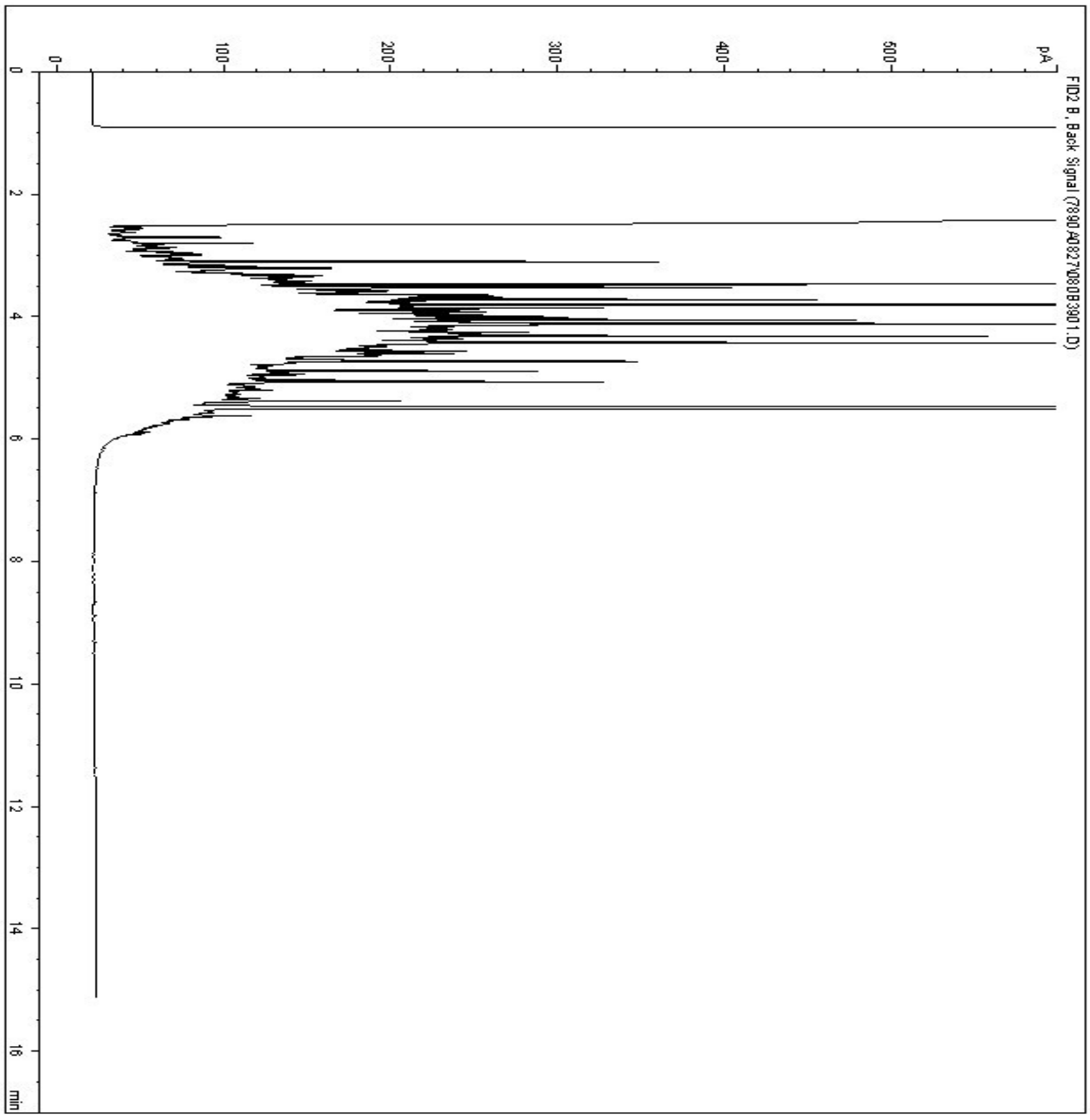
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0188

Client ID: 11W5B-01 (10CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0827\080B3901.D
Sample Name: BI0188



*** End of Report ***

7890A GC 2011/08/28 9:44:17 AM AK8

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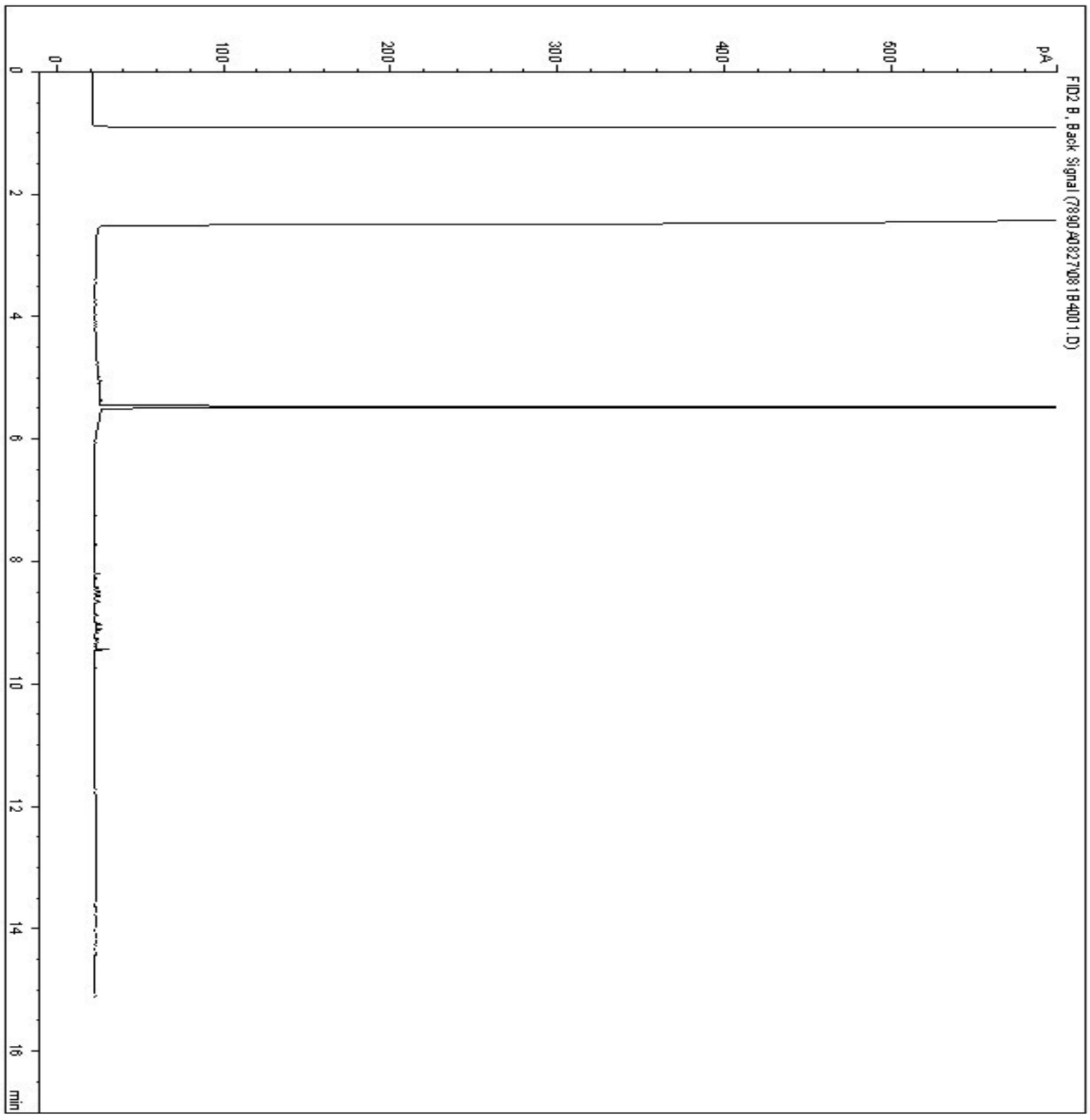
Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0189

Client ID: 11W5E-02 (20CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0827\081B4001.D
Sample Name: BI0189



*** End of Report ***

7890A GC 2011/08/28 9:44:20 AM AK8

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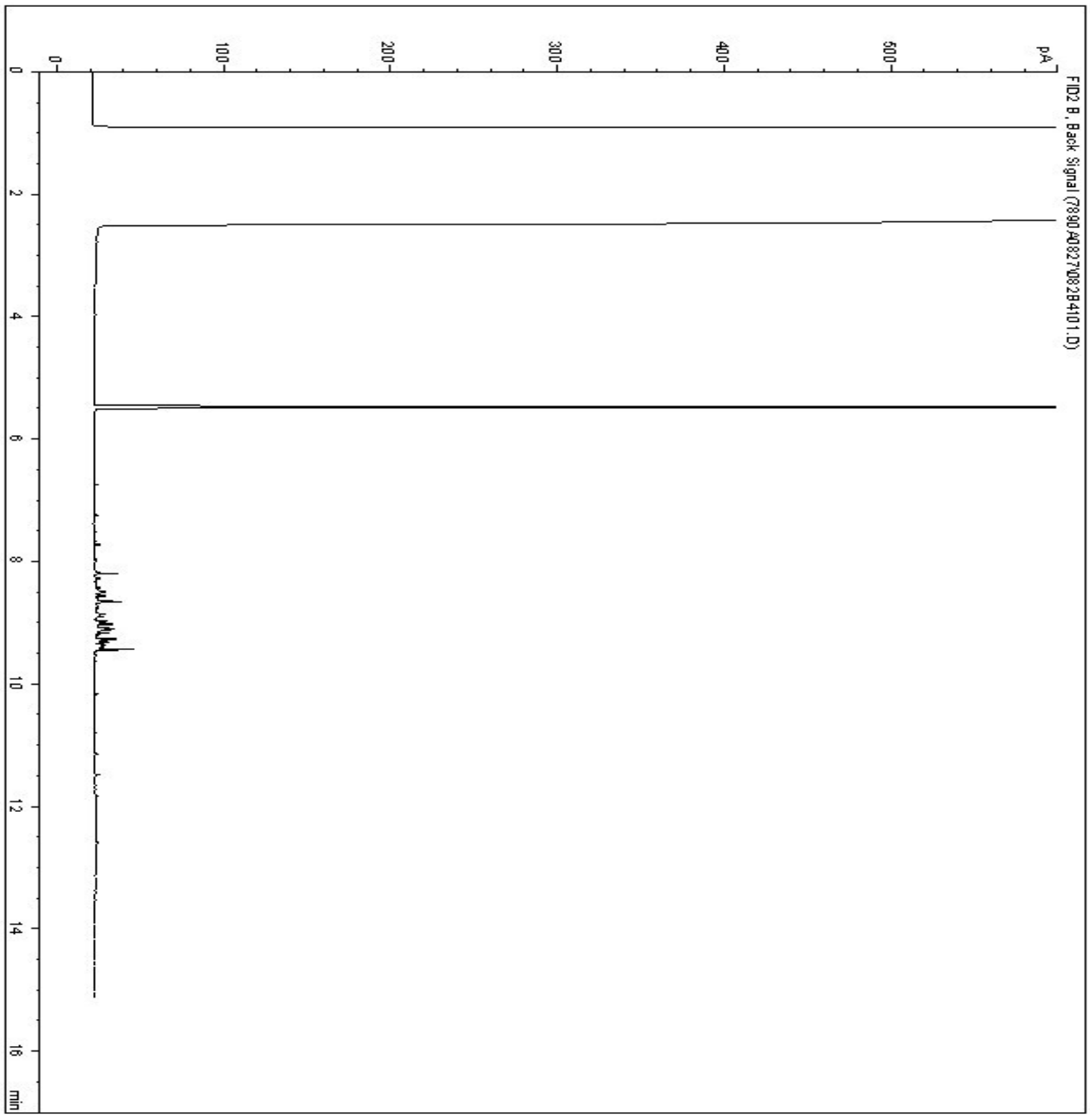
Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0190

Client ID: 11W5C-01 (10CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0827\082B4101.D
Sample Name: BI0190



*** End of Report ***

7890A GC 2011/08/28 9:44:23 AM AK8

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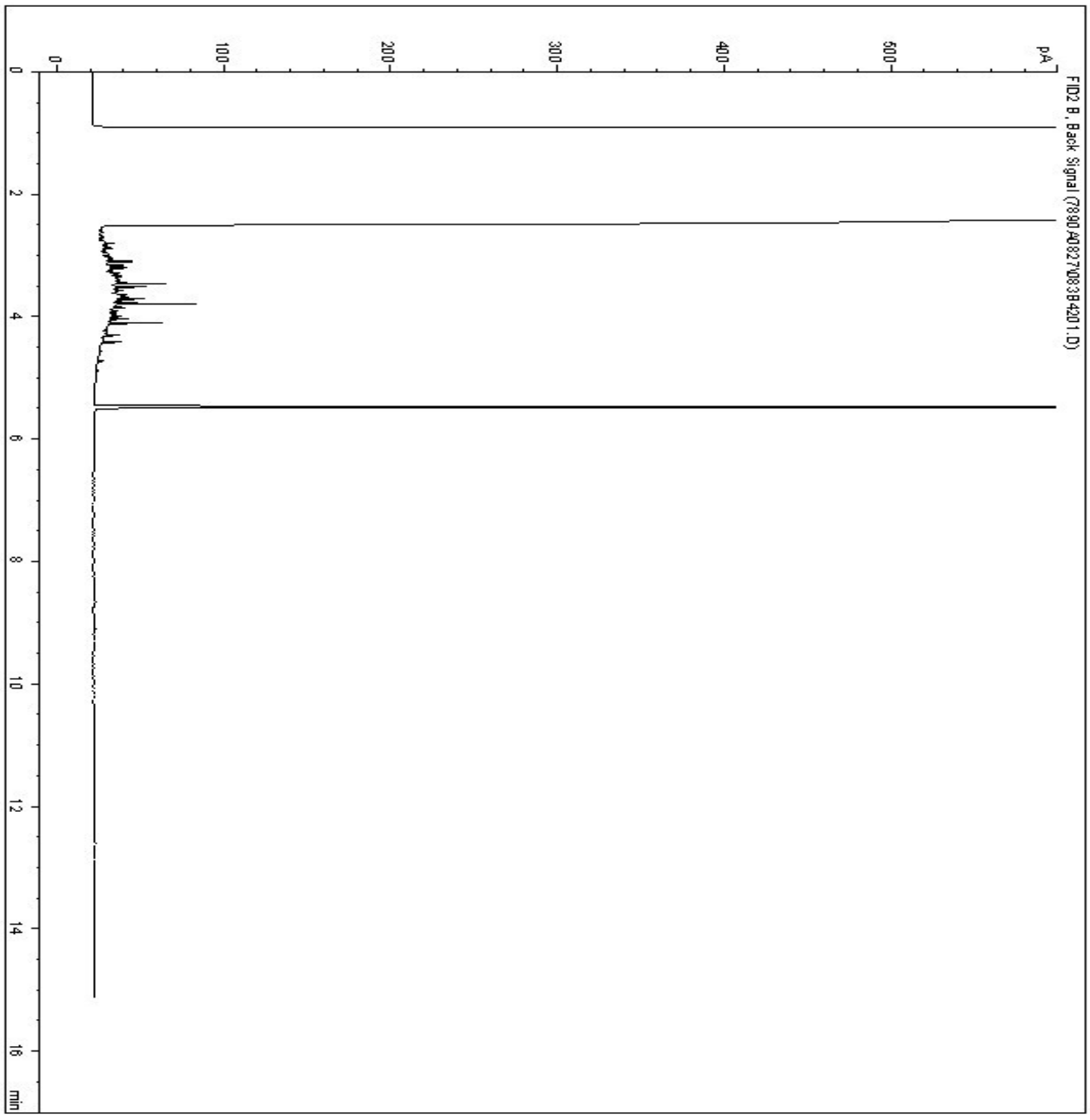
Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0191

Client ID: 11W5D-01 (30CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0827\083B4201.D
Sample Name: BI0191



*** End of Report ***

7890A GC 2011/08/28 9:44:26 AM AK8

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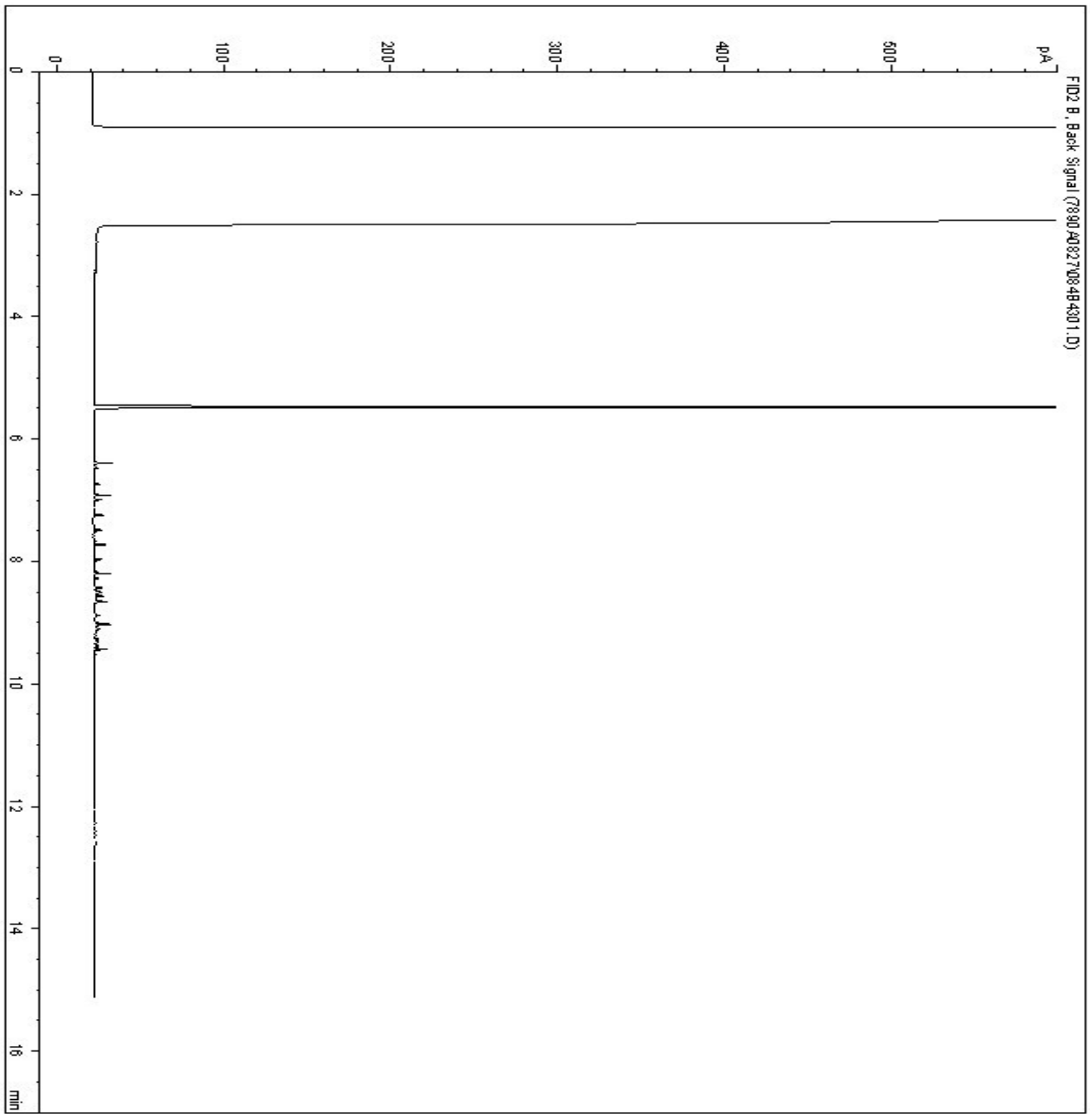
Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0192

Client ID: 11W5A-01 (20CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0827\084B4301.D
Sample Name: BI0192



*** End of Report ***

7890A GC 2011/08/28 9:44:29 AM AK8

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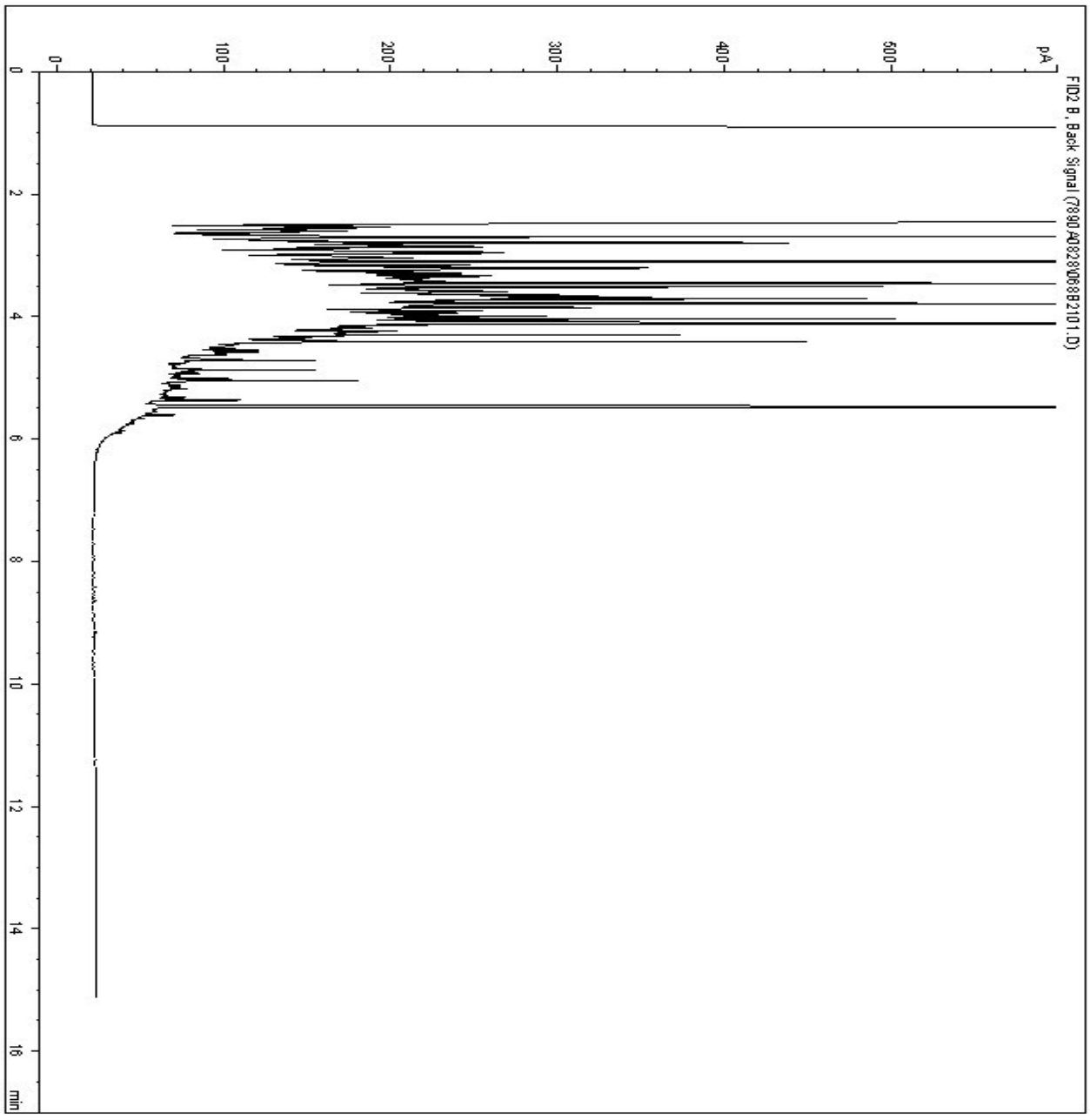
Report Date: 2011/08/30
Maxxam Job #: B177775
Maxxam Sample: BI0196

Client ID: 11W5H-04 (20CM)

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890A0828\068B2101.D
Sample Name: BI0196



*** End of Report ***

7890A GC 2011/08/29 8:29:59 AM AK8

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Maxxam

Your P.O. #: Y22101187.001
Site Location: WINDY CAMP
Your C.O.C. #: A050087

Attention: DANIELA FELSKE
EBA ENGINEERING CONSULTANTS LTD.
EDMONTON - Rebate
14940-123 AVENUE
EDMONTON, AB
CANADA T5V 1B4

Report Date: 2011/08/22

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B174898
Received: 2011/08/13, 10:00

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	4	N/A	2011/08/17	AB SOP-00005	SM 2320-B
BTEX/F1 in Water by HS GC/MS	4	N/A	2011/08/18	EENVSOP-00004 EENVSOP-00002	EPA 8260C/5021A/CCME
Cadmium - low level CCME - Dissolved	4	N/A	2011/08/18	AB SOP-00043	EPA 200.8
Cadmium - low level CCME (Total)	4	2011/08/15	2011/08/18	AB SOP-00043	EPA 200.8
Chloride by Automated Colourimetry	4	N/A	2011/08/17	AB SOP-00020	EPA 325.2
Conductivity @25C	4	N/A	2011/08/17	AB SOP-00005	SM 2510-B
CCME Hydrocarbons in Water (F2; C10-C16)	4	2011/08/17	2011/08/18	AB SOP-00040 AB SOP-00037	EPA3510/CCME PHCCWS
Hardness	4	N/A	2011/08/18	AB WI-00065	SM 2340B
Elements by ICP - Dissolved	3	N/A	2011/08/17	AB SOP-00042	EPA 200.7
Elements by ICP - Dissolved	1	N/A	2011/08/20	AB SOP-00042	EPA 200.7
Elements by ICP - Total	4	2011/08/17	2011/08/17	AB SOP-00042	EPA 200.7
Elements by ICPMS - Dissolved	4	N/A	2011/08/18	AB SOP-00043	EPA 200.8
Elements by ICPMS - Total	4	2011/08/17	2011/08/18	AB SOP-00043	EPA 200.8
Ion Balance	4	N/A	2011/08/18	AB WI-00065	SM 1030E
Sum of cations, anions	4	N/A	2011/08/18	AB WI-00065	SM 1030E
Nitrate and Nitrite	4	N/A	2011/08/18	Calc	
Nitrate + Nitrite-N (calculated)	4	N/A	2011/08/18	AB SOP-00023	SM 4110-B
Nitrogen, (Nitrite, Nitrate) by IC	2	N/A	2011/08/17	AB SOP-00023	SM 4110-B
Nitrogen, (Nitrite, Nitrate) by IC	2	N/A	2011/08/18	AB SOP-00023	SM 4110-B
pH @25°C (Alkalinity titrator)	4	N/A	2011/08/17	AB SOP-00005	SM 4500-H+B
Sulphate by Automated Colourimetry	4	N/A	2011/08/17	AB SOP-00018	EPA 375.4
Total Dissolved Solids (Calculated)	4	N/A	2011/08/18	AB WI-00065	SM 1030E

../2

Your P.O. #: Y22101187.001
Site Location: WINDY CAMP
Your C.O.C. #: A050087

Attention: DANIELA FELSKE
EBA ENGINEERING CONSULTANTS LTD.
EDMONTON - Rebate
14940-123 AVENUE
EDMONTON, AB
CANADA T5V 1B4

Report Date: 2011/08/22

CERTIFICATE OF ANALYSIS

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Jeremy Wakaruk, B.Sc., Senior Project Manager
Email: JWakaruk@maxxam.ca
Phone# (780) 577-7105 Ext:7105

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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 #: B174898
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: WINDY CAMP
Your P.O. #: Y22101187.001
Sampler Initials: MH

AT1 BTEX AND F1-F2 (WATER)

Maxxam ID		BG4061	BG4080	BG4081	BG4082		
Sampling Date		2011/08/10 10:00	2011/08/10 10:15	2011/08/10 10:45	2011/08/10 12:00		
COC Number		A050087	A050087	A050087	A050087		
	Units	**11W8-1**	**11W8-2**	**11W6-1**	**11W1-1**	**RDL**	**QC Batch**
Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	mg/L	3.3	<0.1	<0.1	<0.1	0.1	5097598
Volatiles							
Benzene	mg/L	<0.0004	<0.0004	<0.0004	<0.0004	0.0004	5097840
Toluene	mg/L	<0.0004	<0.0004	<0.0004	<0.0004	0.0004	5097840
Ethylbenzene	mg/L	<0.0004	<0.0004	<0.0004	<0.0004	0.0004	5097840
o-Xylene	mg/L	<0.0004	<0.0004	<0.0004	<0.0004	0.0004	5097840
m & p-Xylene	mg/L	<0.0008	<0.0008	<0.0008	<0.0008	0.0008	5097840
Xylenes (Total)	mg/L	<0.0008	<0.0008	<0.0008	<0.0008	0.0008	5097840
F1 (C6-C10) - BTEX	mg/L	<0.1	<0.1	<0.1	<0.1	0.1	5097840
(C6-C10)	mg/L	<0.1	<0.1	<0.1	<0.1	0.1	5097840
Surrogate Recovery (%)							
4-BROMOFLUOROBENZENE (sur.)	%	103	102	103	99	N/A	5097840
D4-1,2-DICHLOROETHANE (sur.)	%	94	88	92	91	N/A	5097840
D8-TOLUENE (sur.)	%	88	87	88	88	N/A	5097840
O-TERPHENYL (sur.)	%	109	104	108	102	N/A	5097598

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: B174898
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: WINDY CAMP
Your P.O. #: Y22101187.001
Sampler Initials: MH

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		BG4061		BG4080			BG4081		
Sampling Date		2011/08/10 10:00		2011/08/10 10:15			2011/08/10 10:45		
COC Number		A050087		A050087			A050087		
	Units	**11W8-1**	**QC Batch**	**11W8-2**	**RDL**	**QC Batch**	**11W6-1**	**RDL**	**QC Batch**
Calculated Parameters									
Anion Sum	meq/L	5.7	5092261	4.4	N/A	5092261	37	N/A	5092261
Cation Sum	meq/L	5.9	5092261	4.4	N/A	5092261	32	N/A	5092261
Hardness (CaCO3)	mg/L	200	5092259	170	0.5	5092259	710	0.5	5092259
Ion Balance	N/A	1.0	5092260	0.99	0.01	5092260	0.87	0.01	5092260
Dissolved Nitrate (NO3)	mg/L	<0.01	5092262	0.04	0.01	5092262	2.0	0.01	5092262
Nitrate plus Nitrite (N)	mg/L	<0.003	5092263	0.008	0.003	5092263	0.45	0.003	5092263
Dissolved Nitrite (NO2)	mg/L	<0.01	5092262	<0.01	0.01	5092262	<0.01	0.01	5092262
Total Dissolved Solids	mg/L	290	5092264	230	10	5092264	2000	10	5092264
Misc. Inorganics									
Conductivity	uS/cm	570	5097973	420	1	5097973	3900	1	5097973
pH	N/A	7.10	5098009	7.70	N/A	5098009	7.97	N/A	5098009
Low Level Elements									
Dissolved Cadmium (Cd)	ug/L	0.012	5095501	0.009	0.005	5095501	0.05	0.03	5095501
Anions									
Alkalinity (PP as CaCO3)	mg/L	<0.5	5097680	<0.5	0.5	5097680	<0.5	0.5	5097680
Alkalinity (Total as CaCO3)	mg/L	250	5097680	170	0.5	5097680	430	0.5	5097680
Bicarbonate (HCO3)	mg/L	310	5097680	210	0.5	5097680	530	0.5	5097680
Carbonate (CO3)	mg/L	<0.5	5097680	<0.5	0.5	5097680	<0.5	0.5	5097680
Hydroxide (OH)	mg/L	<0.5	5097680	<0.5	0.5	5097680	<0.5	0.5	5097680
Dissolved Sulphate (SO4)	mg/L	18	5097600	19	1	5097600	320 (1)	5	5097600
Dissolved Chloride (Cl)	mg/L	10	5097503	23	1	5097503	770 (1)	30	5097503
Nutrients									
Dissolved Nitrite (N)	mg/L	<0.003	5098871	<0.003	0.003	5098871	<0.003	0.003	5098871
Dissolved Nitrate (N)	mg/L	<0.003	5098871	0.008	0.003	5098871	0.45	0.003	5098871
Elements									
Dissolved Aluminum (Al)	mg/L	0.075	5098027	0.009	0.001	5098027	0.037	0.001	5098027
Dissolved Antimony (Sb)	mg/L	0.0010	5098027	<0.0006	0.0006	5098027	0.0008 (2)	0.0006	5098027
Dissolved Arsenic (As)	mg/L	0.0033	5098027	0.0009	0.0002	5098027	0.0042	0.0002	5098027
Dissolved Barium (Ba)	mg/L	0.04	5100406	<0.01	0.01	5109488	0.08	0.01	5100406
Dissolved Beryllium (Be)	mg/L	<0.001	5098027	<0.001	0.001	5098027	<0.001	0.001	5098027

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.
(2) Dissolved greater than total. Results are within limits of uncertainty(MU).

Maxxam Job #: B174898
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: WINDY CAMP
Your P.O. #: Y22101187.001
Sampler Initials: MH

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		BG4061		BG4080			BG4081		
Sampling Date		2011/08/10 10:00		2011/08/10 10:15			2011/08/10 10:45		
COC Number		A050087		A050087			A050087		
	Units	**11W8-1**	**QC Batch**	**11W8-2**	**RDL**	**QC Batch**	**11W6-1**	**RDL**	**QC Batch**
Dissolved Boron (B)	mg/L	0.12	5100406	0.14	0.02	5109488	0.08	0.02	5100406
Dissolved Calcium (Ca)	mg/L	52	5100406	44	0.3	5109488	140	0.3	5100406
Dissolved Chromium (Cr)	mg/L	<0.001	5098027	<0.001	0.001	5098027	0.002	0.001	5098027
Dissolved Cobalt (Co)	mg/L	0.0018	5098027	0.0005	0.0003	5098027	0.0034	0.0003	5098027
Dissolved Copper (Cu)	mg/L	0.0033	5098027	0.0019	0.0002	5098027	0.014	0.0002	5098027
Dissolved Iron (Fe)	mg/L	6.6	5100406	0.59	0.06	5109488	0.87	0.06	5100406
Dissolved Lead (Pb)	mg/L	<0.0002	5098027	<0.0002	0.0002	5098027	<0.0002	0.0002	5098027
Dissolved Lithium (Li)	mg/L	<0.02	5100406	<0.02	0.02	5109488	<0.02	0.02	5100406
Dissolved Magnesium (Mg)	mg/L	17	5100406	14	0.2	5109488	88	0.2	5100406
Dissolved Manganese (Mn)	mg/L	0.39	5100406	0.11	0.004	5109488	3.2	0.004	5100406
Dissolved Molybdenum (Mo)	mg/L	0.0007	5098027	<0.0002	0.0002	5098027	0.0071	0.0002	5098027
Dissolved Nickel (Ni)	mg/L	0.0032	5098027	0.0018	0.0005	5098027	0.0081	0.0005	5098027
Dissolved Phosphorus (P)	mg/L	0.2	5100406	<0.1	0.1	5109488	0.1	0.1	5100406
Dissolved Potassium (K)	mg/L	3.6	5100406	2.4	0.3	5109488	14	0.3	5100406
Dissolved Selenium (Se)	mg/L	<0.0002	5098027	<0.0002	0.0002	5098027	0.0009	0.0002	5098027
Dissolved Silicon (Si)	mg/L	6.6	5100406	3.8	0.1	5109488	7.6	0.1	5100406
Dissolved Silver (Ag)	mg/L	<0.0001	5098027	<0.0001	0.0001	5098027	<0.0001	0.0001	5098027
Dissolved Sodium (Na)	mg/L	35 (1)	5100406	22	0.5	5109488	410	0.5	5100406
Dissolved Strontium (Sr)	mg/L	0.11	5100406	0.09	0.02	5109488	0.38	0.02	5100406
Dissolved Sulphur (S)	mg/L	5.4	5100406	6.3	0.2	5109488	110	0.2	5100406
Dissolved Thallium (Tl)	mg/L	<0.0002	5098027	<0.0002	0.0002	5098027	<0.0002	0.0002	5098027
Dissolved Tin (Sn)	mg/L	<0.001	5098027	<0.001	0.001	5098027	<0.001	0.001	5098027
Dissolved Titanium (Ti)	mg/L	0.001	5098027	<0.001	0.001	5098027	0.003	0.001	5098027
Dissolved Uranium (U)	mg/L	0.0004	5098027	0.0002	0.0001	5098027	0.0058	0.0001	5098027
Dissolved Vanadium (V)	mg/L	0.002	5098027	<0.001	0.001	5098027	0.008	0.001	5098027
Dissolved Zinc (Zn)	mg/L	0.013	5098027	0.008	0.003	5098027	0.009	0.003	5098027

RDL = Reportable Detection Limit
(1) Dissolved greater than total. Results within acceptable limits of precision.

Maxxam

Maxxam Job #: B174898
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: WINDY CAMP
Your P.O. #: Y22101187.001
Sampler Initials: MH

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		BG4082		
Sampling Date		2011/08/10 12:00		
COC Number		A050087		
	Units	**11W1-1**	**RDL**	**QC Batch**
Calculated Parameters				
Anion Sum	meq/L	3.9	N/A	5092261
Cation Sum	meq/L	4.3	N/A	5092261
Hardness (CaCO3)	mg/L	170	0.5	5092259
Ion Balance	N/A	1.1	0.01	5092260
Dissolved Nitrate (NO3)	mg/L	0.89	0.01	5092262
Nitrate plus Nitrite (N)	mg/L	0.20	0.003	5092263
Dissolved Nitrite (NO2)	mg/L	<0.01	0.01	5092262
Total Dissolved Solids	mg/L	210	10	5092264
Misc. Inorganics				
Conductivity	uS/cm	410	1	5097973
pH	N/A	7.28	N/A	5098009
Low Level Elements				
Dissolved Cadmium (Cd)	ug/L	0.12	0.005	5095501
Anions				
Alkalinity (PP as CaCO3)	mg/L	<0.5	0.5	5097680
Alkalinity (Total as CaCO3)	mg/L	110	0.5	5097680
Bicarbonate (HCO3)	mg/L	140	0.5	5097680
Carbonate (CO3)	mg/L	<0.5	0.5	5097680
Hydroxide (OH)	mg/L	<0.5	0.5	5097680
Dissolved Sulphate (SO4)	mg/L	7	1	5097600
Dissolved Chloride (Cl)	mg/L	53	1	5097503
Nutrients				
Dissolved Nitrite (N)	mg/L	<0.003	0.003	5098871
Dissolved Nitrate (N)	mg/L	0.20	0.003	5098871
Elements				
Dissolved Aluminum (Al)	mg/L	0.22	0.001	5098027
Dissolved Antimony (Sb)	mg/L	<0.0006	0.0006	5098027
Dissolved Arsenic (As)	mg/L	0.0031	0.0002	5098027
Dissolved Barium (Ba)	mg/L	0.03	0.01	5100406
Dissolved Beryllium (Be)	mg/L	<0.001	0.001	5098027
Dissolved Boron (B)	mg/L	0.03	0.02	5100406
Dissolved Calcium (Ca)	mg/L	51	0.3	5100406

RDL = Reportable Detection Limit

Maxxam Job #: B174898
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: WINDY CAMP
Your P.O. #: Y22101187.001
Sampler Initials: MH

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		BG4082		
Sampling Date		2011/08/10 12:00		
COC Number		A050087		
	Units	**11W1-1**	**RDL**	**QC Batch**
Dissolved Chromium (Cr)	mg/L	0.001	0.001	5098027
Dissolved Cobalt (Co)	mg/L	0.0040	0.0003	5098027
Dissolved Copper (Cu)	mg/L	0.0053	0.0002	5098027
Dissolved Iron (Fe)	mg/L	4.8	0.06	5100406
Dissolved Lead (Pb)	mg/L	0.0006	0.0002	5098027
Dissolved Lithium (Li)	mg/L	<0.02	0.02	5100406
Dissolved Magnesium (Mg)	mg/L	11	0.2	5100406
Dissolved Manganese (Mn)	mg/L	0.78	0.004	5100406
Dissolved Molybdenum (Mo)	mg/L	0.0006	0.0002	5098027
Dissolved Nickel (Ni)	mg/L	0.0044	0.0005	5098027
Dissolved Phosphorus (P)	mg/L	0.2	0.1	5100406
Dissolved Potassium (K)	mg/L	3.7	0.3	5100406
Dissolved Selenium (Se)	mg/L	<0.0002	0.0002	5098027
Dissolved Silicon (Si)	mg/L	7.7	0.1	5100406
Dissolved Silver (Ag)	mg/L	<0.0001	0.0001	5098027
Dissolved Sodium (Na)	mg/L	11	0.5	5100406
Dissolved Strontium (Sr)	mg/L	0.17	0.02	5100406
Dissolved Sulphur (S)	mg/L	3.1	0.2	5100406
Dissolved Thallium (Tl)	mg/L	<0.0002	0.0002	5098027
Dissolved Tin (Sn)	mg/L	<0.001	0.001	5098027
Dissolved Titanium (Ti)	mg/L	0.005	0.001	5098027
Dissolved Uranium (U)	mg/L	0.0004	0.0001	5098027
Dissolved Vanadium (V)	mg/L	0.004	0.001	5098027
Dissolved Zinc (Zn)	mg/L	0.012	0.003	5098027

RDL = Reportable Detection Limit

Maxxam Job #: B174898
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: WINDY CAMP
Your P.O. #: Y22101187.001
Sampler Initials: MH

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		BG4061		BG4080		BG4081		
Sampling Date		2011/08/10 10:00		2011/08/10 10:15		2011/08/10 10:45		
COC Number		A050087		A050087		A050087		
	Units	**11W8-1**	**RDL**	**11W8-2**	**RDL**	**11W6-1**	**RDL**	**QC Batch**
Low Level Elements								
Total Cadmium (Cd)	ug/L	0.35	0.05	0.010	0.005	0.11	0.03	5096067
Elements								
Total Aluminum (Al)	mg/L	13 (1)	0.02	0.072	0.001	2.4 (1)	0.005	5100287
Total Antimony (Sb)	mg/L	<0.006	0.006	0.0008	0.0006	<0.0006	0.0006	5100287
Total Arsenic (As)	mg/L	0.013	0.002	0.0015	0.0002	0.0091	0.0002	5100287
Total Barium (Ba)	mg/L	0.16	0.01	<0.01	0.01	0.12	0.01	5100381
Total Beryllium (Be)	mg/L	<0.01	0.01	<0.001	0.001	<0.001	0.001	5100287
Total Boron (B)	mg/L	0.14	0.02	0.15	0.02	0.09	0.02	5100381
Total Calcium (Ca)	mg/L	63	0.3	49	0.3	150	0.3	5100381
Total Chromium (Cr)	mg/L	0.04	0.01	<0.001	0.001	0.009	0.001	5100287
Total Cobalt (Co)	mg/L	0.013	0.003	0.0008	0.0003	0.0063	0.0003	5100287
Total Copper (Cu)	mg/L	0.087	0.002	0.0021	0.0002	0.028	0.0002	5100287
Total Iron (Fe)	mg/L	38	0.06	1.7	0.06	7.9	0.06	5100381
Total Lead (Pb)	mg/L	0.016	0.002	<0.0002	0.0002	0.0017	0.0002	5100287
Total Lithium (Li)	mg/L	0.03	0.02	<0.02	0.02	<0.02	0.02	5100381
Total Magnesium (Mg)	mg/L	26	0.2	15	0.2	96	0.2	5100381
Total Manganese (Mn)	mg/L	0.69	0.004	0.12	0.004	3.6	0.004	5100381
Total Molybdenum (Mo)	mg/L	<0.002	0.002	<0.0002	0.0002	0.0074	0.0002	5100287
Total Nickel (Ni)	mg/L	0.029	0.005	0.0022	0.0005	0.013	0.0005	5100287
Total Phosphorus (P)	mg/L	0.8	0.1	<0.1	0.1	0.2	0.1	5100381
Total Potassium (K)	mg/L	8.0	0.3	2.1	0.3	15	0.3	5100381
Total Selenium (Se)	mg/L	<0.002	0.002	<0.0002	0.0002	0.0012	0.0002	5100287
Total Silicon (Si)	mg/L	27	0.1	4.2	0.1	14	0.1	5100381
Total Silver (Ag)	mg/L	<0.001	0.001	<0.0001	0.0001	<0.0001	0.0001	5100287
Total Sodium (Na)	mg/L	33	0.5	18	0.5	430	0.5	5100381
Total Strontium (Sr)	mg/L	0.14	0.02	0.09	0.02	0.41	0.02	5100381
Total Sulphur (S)	mg/L	5.6	0.2	4.5	0.2	110	0.2	5100381
Total Thallium (Tl)	mg/L	<0.002	0.002	<0.0002	0.0002	<0.0002	0.0002	5100287
Total Tin (Sn)	mg/L	<0.01	0.01	<0.001 (2)	0.001	<0.001	0.001	5100287
Total Titanium (Ti)	mg/L	0.70	0.01	0.004	0.001	0.17	0.001	5100287

RDL = Reportable Detection Limit
(1) Detection limit raised due to dilution to bring analyte within the calibrated range.
(2) Matrix Spike exceeds acceptance limits for Total Sn due to matrix interference. (Recovery: 125%, limits: 80-120%)

Maxxam Job #: B174898
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: WINDY CAMP
Your P.O. #: Y22101187.001
Sampler Initials: MH

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		BG4061		BG4080		BG4081		
Sampling Date		2011/08/10 10:00		2011/08/10 10:15		2011/08/10 10:45		
COC Number		A050087		A050087		A050087		
	Units	**11W8-1**	**RDL**	**11W8-2**	**RDL**	**11W6-1**	**RDL**	**QC Batch**
Total Uranium (U)	mg/L	0.002	0.001	0.0002	0.0001	0.0062	0.0001	5100287
Total Vanadium (V)	mg/L	0.06	0.01	0.002	0.001	0.023	0.001	5100287
Total Zinc (Zn)	mg/L	0.09	0.03	<0.003	0.003	0.012	0.003	5100287

RDL = Reportable Detection Limit

Maxxam Job #: B174898
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: WINDY CAMP
Your P.O. #: Y22101187.001
Sampler Initials: MH

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		BG4082		
Sampling Date		2011/08/10 12:00		
COC Number		A050087		
	Units	**11W1-1**	**RDL**	**QC Batch**
Low Level Elements				
Total Cadmium (Cd)	ug/L	0.21	0.05	5096067
Elements				
Total Aluminum (Al)	mg/L	20 (1)	0.02	5100287
Total Antimony (Sb)	mg/L	<0.006	0.006	5100287
Total Arsenic (As)	mg/L	0.011	0.002	5100287
Total Barium (Ba)	mg/L	0.19	0.01	5100381
Total Beryllium (Be)	mg/L	<0.01	0.01	5100287
Total Boron (B)	mg/L	0.04	0.02	5100381
Total Calcium (Ca)	mg/L	61	0.3	5100381
Total Chromium (Cr)	mg/L	0.06	0.01	5100287
Total Cobalt (Co)	mg/L	0.018	0.003	5100287
Total Copper (Cu)	mg/L	0.11	0.002	5100287
Total Iron (Fe)	mg/L	47	0.06	5100381
Total Lead (Pb)	mg/L	0.011	0.002	5100287
Total Lithium (Li)	mg/L	0.05	0.02	5100381
Total Magnesium (Mg)	mg/L	25	0.2	5100381
Total Manganese (Mn)	mg/L	1.2	0.004	5100381
Total Molybdenum (Mo)	mg/L	<0.002	0.002	5100287
Total Nickel (Ni)	mg/L	0.041	0.005	5100287
Total Phosphorus (P)	mg/L	0.6	0.1	5100381
Total Potassium (K)	mg/L	9.0	0.3	5100381
Total Selenium (Se)	mg/L	<0.002	0.002	5100287
Total Silicon (Si)	mg/L	37	0.1	5100381
Total Silver (Ag)	mg/L	<0.001	0.001	5100287
Total Sodium (Na)	mg/L	11	0.5	5100381
Total Strontium (Sr)	mg/L	0.21	0.02	5100381
Total Sulphur (S)	mg/L	3.5	0.2	5100381
Total Thallium (Tl)	mg/L	<0.002	0.002	5100287
Total Tin (Sn)	mg/L	<0.01	0.01	5100287
Total Titanium (Ti)	mg/L	1.2	0.01	5100287

RDL = Reportable Detection Limit
(1) Detection limit raised due to dilution to bring analyte within the calibrated range.

Maxxam Job #: B174898
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: WINDY CAMP
Your P.O. #: Y22101187.001
Sampler Initials: MH

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		BG4082		
Sampling Date		2011/08/10 12:00		
COC Number		A050087		
	Units	**11W1-1**	**RDL**	**QC Batch**
Total Uranium (U)	mg/L	0.002	0.001	5100287
Total Vanadium (V)	mg/L	0.07	0.01	5100287
Total Zinc (Zn)	mg/L	0.08	0.03	5100287

RDL = Reportable Detection Limit

Maxxam Job #: B174898
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: WINDY CAMP
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Sampler Initials: MH

General Comments

Sample BG4061-01: Detection limits raised due to sample matrix. Parameters affected are Total Cr, Co, Cu, Pb, Sb, Mo, Ni, Se, Ag, As, Tl, Sn, Ti, U, V, Zn, Be, Cd.

Sample BG4081-01: Detection limit raised for Dissolved and Total Cd due to sample matrix.

Cation anion balance investigated, data quality confirmed.

Sample BG4082-01: Detection limits raised due to sample matrix. Parameters affected are Total Cr, Co, Cu, Pb, Sb, Mo, Ni, Se, Ag, As, Tl, Sn, Ti, U, V, Zn, Be, Cd.

Results relate only to the items tested.

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: Y22101187.001
Site Location: WINDY CAMP

Quality Assurance Report

Maxxam Job Number: EB174898

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5097503	BA3	Matrix Spike	Dissolved Chloride (Cl)	2011/08/17		NC	%	80 - 120
		Spiked Blank	Dissolved Chloride (Cl)	2011/08/17		110	%	80 - 120
		Method Blank	Dissolved Chloride (Cl)	2011/08/17	<1		mg/L	
		RPD	Dissolved Chloride (Cl)	2011/08/17	1.3		%	20
5097598	RC6	Matrix Spike	O-TERPHENYL (sur.)	2011/08/18		94	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/18		83	%	70 - 130
		Spiked Blank	O-TERPHENYL (sur.)	2011/08/18		98	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/18		97	%	70 - 130
		Method Blank	O-TERPHENYL (sur.)	2011/08/18		109	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/18	<0.1		mg/L	
		RPD	F2 (C10-C16 Hydrocarbons)	2011/08/18	NC		%	40
5097600	BA3	Matrix Spike	Dissolved Sulphate (SO4)	2011/08/17		NC	%	80 - 120
		Spiked Blank	Dissolved Sulphate (SO4)	2011/08/17		109	%	80 - 120
		Method Blank	Dissolved Sulphate (SO4)	2011/08/17	<1		mg/L	
		RPD	Dissolved Sulphate (SO4)	2011/08/17	3.1		%	20
5097680	KG6	Spiked Blank	Alkalinity (Total as CaCO3)	2011/08/17		98	%	80 - 120
		Method Blank	Alkalinity (PP as CaCO3)	2011/08/17	<0.5		mg/L	
			Alkalinity (Total as CaCO3)	2011/08/17	<0.5		mg/L	
			Bicarbonate (HCO3)	2011/08/17	<0.5		mg/L	
			Carbonate (CO3)	2011/08/17	<0.5		mg/L	
			Hydroxide (OH)	2011/08/17	<0.5		mg/L	
		RPD	Alkalinity (PP as CaCO3)	2011/08/17	NC		%	20
			Alkalinity (Total as CaCO3)	2011/08/17	0.2		%	20
			Bicarbonate (HCO3)	2011/08/17	0.2		%	20
			Carbonate (CO3)	2011/08/17	NC		%	20
			Hydroxide (OH)	2011/08/17	NC		%	20
5097840	NSE	Matrix Spike	4-BROMOFLUOROBENZENE (sur.)	2011/08/18		109	%	70 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2011/08/18		126	%	70 - 130
			D8-TOLUENE (sur.)	2011/08/18		80	%	70 - 130
			Benzene	2011/08/18		91	%	70 - 130
			Toluene	2011/08/18		90	%	70 - 130
			Ethylbenzene	2011/08/18		93	%	70 - 130
			o-Xylene	2011/08/18		100	%	70 - 130
			m & p-Xylene	2011/08/18		88	%	70 - 130
			(C6-C10)	2011/08/18		116	%	70 - 130
		Spiked Blank	4-BROMOFLUOROBENZENE (sur.)	2011/08/18		103	%	70 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2011/08/18		91	%	70 - 130
			D8-TOLUENE (sur.)	2011/08/18		87	%	70 - 130
			Benzene	2011/08/18		97	%	70 - 130
			Toluene	2011/08/18		100	%	70 - 130
			Ethylbenzene	2011/08/18		112	%	70 - 130
			o-Xylene	2011/08/18		109	%	70 - 130
			m & p-Xylene	2011/08/18		105	%	70 - 130
			(C6-C10)	2011/08/18		96	%	70 - 130
		Method Blank	4-BROMOFLUOROBENZENE (sur.)	2011/08/18		107	%	70 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2011/08/18		91	%	70 - 130
			D8-TOLUENE (sur.)	2011/08/18		89	%	70 - 130
			Benzene	2011/08/18	<0.0004		mg/L	
			Toluene	2011/08/18	<0.0004		mg/L	
			Ethylbenzene	2011/08/18	<0.0004		mg/L	
			o-Xylene	2011/08/18	<0.0004		mg/L	
			m & p-Xylene	2011/08/18	<0.0008		mg/L	
			Xylenes (Total)	2011/08/18	<0.0008		mg/L	
			F1 (C6-C10) - BTEX	2011/08/18	<0.1		mg/L	
			(C6-C10)	2011/08/18	<0.1		mg/L	

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
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Quality Assurance Report (Continued)

Maxxam Job Number: EB174898

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5097840	NSE	RPD	Benzene	2011/08/18	NC		%	40
			Toluene	2011/08/18	NC		%	40
			Ethylbenzene	2011/08/18	NC		%	40
			o-Xylene	2011/08/18	NC		%	40
			m & p-Xylene	2011/08/18	NC		%	40
			Xylenes (Total)	2011/08/18	NC		%	40
			F1 (C6-C10) - BTEX	2011/08/18	NC		%	40
			(C6-C10)	2011/08/18	NC		%	40
5097973	KG6	Spiked Blank	Conductivity	2011/08/17		100	%	90 - 110
		Method Blank	Conductivity	2011/08/17	<1		uS/cm	
		RPD	Conductivity	2011/08/17	0.3		%	20
5098009	KG6	Spiked Blank	pH	2011/08/17		100	%	97 - 103
		RPD	pH	2011/08/17	0.08		%	5
5098027	EO1	Matrix Spike						
		[BG4080-01]	Dissolved Aluminum (Al)	2011/08/18		89	%	80 - 120
			Dissolved Antimony (Sb)	2011/08/18		98	%	80 - 120
			Dissolved Arsenic (As)	2011/08/18		91	%	80 - 120
			Dissolved Beryllium (Be)	2011/08/18		96	%	80 - 120
			Dissolved Chromium (Cr)	2011/08/18		91	%	80 - 120
			Dissolved Cobalt (Co)	2011/08/18		93	%	80 - 120
			Dissolved Copper (Cu)	2011/08/18		91	%	80 - 120
			Dissolved Lead (Pb)	2011/08/18		96	%	80 - 120
			Dissolved Molybdenum (Mo)	2011/08/18		101	%	80 - 120
			Dissolved Nickel (Ni)	2011/08/18		93	%	80 - 120
			Dissolved Selenium (Se)	2011/08/18		100	%	80 - 120
			Dissolved Silver (Ag)	2011/08/18		82	%	80 - 120
			Dissolved Thallium (Tl)	2011/08/18		96	%	80 - 120
			Dissolved Tin (Sn)	2011/08/18		115	%	80 - 120
			Dissolved Titanium (Ti)	2011/08/18		93	%	80 - 120
			Dissolved Uranium (U)	2011/08/18		98	%	80 - 120
			Dissolved Vanadium (V)	2011/08/18		100	%	80 - 120
			Dissolved Zinc (Zn)	2011/08/18		85	%	80 - 120
		Spiked Blank	Dissolved Aluminum (Al)	2011/08/18		98	%	80 - 120
			Dissolved Antimony (Sb)	2011/08/18		88	%	80 - 120
			Dissolved Arsenic (As)	2011/08/18		92	%	80 - 120
			Dissolved Beryllium (Be)	2011/08/18		94	%	80 - 120
			Dissolved Chromium (Cr)	2011/08/18		91	%	80 - 120
			Dissolved Cobalt (Co)	2011/08/18		94	%	80 - 120
			Dissolved Copper (Cu)	2011/08/18		95	%	80 - 120
			Dissolved Lead (Pb)	2011/08/18		95	%	80 - 120
			Dissolved Molybdenum (Mo)	2011/08/18		95	%	80 - 120
			Dissolved Nickel (Ni)	2011/08/18		95	%	80 - 120
			Dissolved Selenium (Se)	2011/08/18		94	%	80 - 120
			Dissolved Silver (Ag)	2011/08/18		81	%	80 - 120
			Dissolved Thallium (Tl)	2011/08/18		96	%	80 - 120
			Dissolved Tin (Sn)	2011/08/18		111	%	80 - 120
			Dissolved Titanium (Ti)	2011/08/18		93	%	80 - 120
			Dissolved Uranium (U)	2011/08/18		95	%	80 - 120
			Dissolved Vanadium (V)	2011/08/18		98	%	80 - 120
			Dissolved Zinc (Zn)	2011/08/18		95	%	80 - 120
		Method Blank	Dissolved Aluminum (Al)	2011/08/18	<0.001		mg/L	
			Dissolved Antimony (Sb)	2011/08/18	<0.0006		mg/L	
			Dissolved Arsenic (As)	2011/08/18	<0.0002		mg/L	
			Dissolved Beryllium (Be)	2011/08/18	<0.001		mg/L	
			Dissolved Chromium (Cr)	2011/08/18	<0.001		mg/L	

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
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Site Location: WINDY CAMP

Quality Assurance Report (Continued)

Maxxam Job Number: EB174898

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5098027	EO1	Method Blank	Dissolved Cobalt (Co)	2011/08/18	<0.0003		mg/L	
			Dissolved Copper (Cu)	2011/08/18	<0.0002		mg/L	
			Dissolved Lead (Pb)	2011/08/18	<0.0002		mg/L	
			Dissolved Molybdenum (Mo)	2011/08/18	<0.0002		mg/L	
			Dissolved Nickel (Ni)	2011/08/18	<0.0005		mg/L	
			Dissolved Selenium (Se)	2011/08/18	<0.0002		mg/L	
			Dissolved Silver (Ag)	2011/08/18	<0.0001		mg/L	
			Dissolved Thallium (Tl)	2011/08/18	<0.0002		mg/L	
			Dissolved Tin (Sn)	2011/08/18	<0.001		mg/L	
			Dissolved Titanium (Ti)	2011/08/18	<0.001		mg/L	
			Dissolved Uranium (U)	2011/08/18	<0.0001		mg/L	
			Dissolved Vanadium (V)	2011/08/18	<0.001		mg/L	
			Dissolved Zinc (Zn)	2011/08/18	<0.003		mg/L	
		RPD [BG4080-01]	Dissolved Aluminum (Al)	2011/08/18	1.6		%	20
			Dissolved Antimony (Sb)	2011/08/18	NC		%	20
			Dissolved Arsenic (As)	2011/08/18	NC		%	20
			Dissolved Beryllium (Be)	2011/08/18	NC		%	20
			Dissolved Chromium (Cr)	2011/08/18	NC		%	20
			Dissolved Cobalt (Co)	2011/08/18	NC		%	20
			Dissolved Copper (Cu)	2011/08/18	1.4		%	20
			Dissolved Lead (Pb)	2011/08/18	NC		%	20
			Dissolved Molybdenum (Mo)	2011/08/18	NC		%	20
			Dissolved Nickel (Ni)	2011/08/18	NC		%	20
			Dissolved Selenium (Se)	2011/08/18	NC		%	20
			Dissolved Silver (Ag)	2011/08/18	NC		%	20
			Dissolved Thallium (Tl)	2011/08/18	NC		%	20
			Dissolved Tin (Sn)	2011/08/18	NC		%	20
			Dissolved Titanium (Ti)	2011/08/18	NC		%	20
			Dissolved Uranium (U)	2011/08/18	NC		%	20
			Dissolved Vanadium (V)	2011/08/18	NC		%	20
			Dissolved Zinc (Zn)	2011/08/18	NC		%	20
5098871	KU	Matrix Spike	Dissolved Nitrite (N)	2011/08/17		102	%	80 - 120
			Dissolved Nitrate (N)	2011/08/17		NC	%	80 - 120
		Spiked Blank	Dissolved Nitrite (N)	2011/08/17		99	%	80 - 120
			Dissolved Nitrate (N)	2011/08/17		102	%	90 - 110
		Method Blank	Dissolved Nitrite (N)	2011/08/17	<0.003		mg/L	
			Dissolved Nitrate (N)	2011/08/17	<0.003		mg/L	
		RPD	Dissolved Nitrite (N)	2011/08/17	NC		%	20
			Dissolved Nitrate (N)	2011/08/17	0.1		%	20
5100287	EO1	Matrix Spike [BG4080-01]	Total Aluminum (Al)	2011/08/18		NC	%	80 - 120
			Total Antimony (Sb)	2011/08/18		108	%	80 - 120
			Total Arsenic (As)	2011/08/18		89	%	80 - 120
			Total Beryllium (Be)	2011/08/18		90	%	80 - 120
			Total Chromium (Cr)	2011/08/18		103	%	80 - 120
			Total Cobalt (Co)	2011/08/18		100	%	80 - 120
			Total Copper (Cu)	2011/08/18		100	%	80 - 120
			Total Lead (Pb)	2011/08/18		98	%	80 - 120
			Total Molybdenum (Mo)	2011/08/18		114	%	80 - 120
			Total Nickel (Ni)	2011/08/18		105	%	80 - 120
			Total Selenium (Se)	2011/08/18		83	%	80 - 120
			Total Silver (Ag)	2011/08/18		103	%	80 - 120
			Total Thallium (Tl)	2011/08/18		99	%	80 - 120
			Total Titanium (Ti)	2011/08/18		108	%	80 - 120
			Total Uranium (U)	2011/08/18		105	%	80 - 120

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: Y22101187.001
Site Location: WINDY CAMP

Quality Assurance Report (Continued)

Maxxam Job Number: EB174898

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5100287	EO1	Matrix Spike						
		[BG4080-01]	Total Vanadium (V)	2011/08/18		110	%	80 - 120
			Total Zinc (Zn)	2011/08/18		82	%	80 - 120
		Spiked Blank	Total Aluminum (Al)	2011/08/18		93	%	80 - 120
			Total Antimony (Sb)	2011/08/18		104	%	80 - 120
			Total Arsenic (As)	2011/08/18		88	%	80 - 120
			Total Beryllium (Be)	2011/08/18		88	%	80 - 120
			Total Chromium (Cr)	2011/08/18		101	%	80 - 120
			Total Cobalt (Co)	2011/08/18		100	%	80 - 120
			Total Copper (Cu)	2011/08/18		103	%	80 - 120
			Total Lead (Pb)	2011/08/18		102	%	80 - 120
			Total Molybdenum (Mo)	2011/08/18		105	%	80 - 120
			Total Nickel (Ni)	2011/08/18		105	%	80 - 120
			Total Selenium (Se)	2011/08/18		81	%	80 - 120
			Total Silver (Ag)	2011/08/18		103	%	80 - 120
			Total Thallium (Tl)	2011/08/18		101	%	80 - 120
			Total Tin (Sn)	2011/08/18		119	%	80 - 120
			Total Titanium (Ti)	2011/08/18		103	%	80 - 120
			Total Uranium (U)	2011/08/18		102	%	80 - 120
			Total Vanadium (V)	2011/08/18		106	%	80 - 120
			Total Zinc (Zn)	2011/08/18		86	%	80 - 120
		Method Blank	Total Aluminum (Al)	2011/08/18	0.002, RDL=0.001		mg/L	
			Total Antimony (Sb)	2011/08/18	0.0008, RDL=0.0006		mg/L	
			Total Arsenic (As)	2011/08/18	0.0003, RDL=0.0002		mg/L	
			Total Beryllium (Be)	2011/08/18	<0.001		mg/L	
			Total Chromium (Cr)	2011/08/18	<0.001		mg/L	
			Total Cobalt (Co)	2011/08/18	<0.0003		mg/L	
			Total Copper (Cu)	2011/08/18	0.0003, RDL=0.0002		mg/L	
			Total Lead (Pb)	2011/08/18	<0.0002		mg/L	
			Total Molybdenum (Mo)	2011/08/18	<0.0002		mg/L	
			Total Nickel (Ni)	2011/08/18	<0.0005		mg/L	
			Total Selenium (Se)	2011/08/18	<0.0002		mg/L	
			Total Silver (Ag)	2011/08/18	<0.0001		mg/L	
			Total Thallium (Tl)	2011/08/18	<0.0002		mg/L	
			Total Tin (Sn)	2011/08/18	<0.001		mg/L	
			Total Titanium (Ti)	2011/08/18	<0.001		mg/L	
			Total Uranium (U)	2011/08/18	<0.0001		mg/L	
			Total Vanadium (V)	2011/08/18	<0.001		mg/L	
			Total Zinc (Zn)	2011/08/18	<0.003		mg/L	
		RPD [BG4080-01]	Total Aluminum (Al)	2011/08/18	8.9		%	20
			Total Antimony (Sb)	2011/08/18	NC		%	20
			Total Arsenic (As)	2011/08/18	0.2		%	20
			Total Beryllium (Be)	2011/08/18	NC		%	20
			Total Chromium (Cr)	2011/08/18	NC		%	20
			Total Cobalt (Co)	2011/08/18	NC		%	20
			Total Copper (Cu)	2011/08/18	3.4		%	20
			Total Lead (Pb)	2011/08/18	NC		%	20
			Total Molybdenum (Mo)	2011/08/18	NC		%	20
			Total Nickel (Ni)	2011/08/18	NC		%	20
			Total Selenium (Se)	2011/08/18	NC		%	20
			Total Silver (Ag)	2011/08/18	NC		%	20
			Total Thallium (Tl)	2011/08/18	NC		%	20
			Total Tin (Sn)	2011/08/18	NC		%	20
			Total Titanium (Ti)	2011/08/18	NC		%	20
			Total Uranium (U)	2011/08/18	NC		%	20

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Client Project #:
P.O. #: Y22101187.001
Site Location: WINDY CAMP

Quality Assurance Report (Continued)

Maxxam Job Number: EB174898

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5100287	EO1	RPD [BG4080-01]	Total Vanadium (V)	2011/08/18	NC		%	20
			Total Zinc (Zn)	2011/08/18	NC		%	20
5100381	NC3	Matrix Spike [BG4080-01]	Total Barium (Ba)	2011/08/17		84	%	80 - 120
			Total Boron (B)	2011/08/17		94	%	80 - 120
			Total Calcium (Ca)	2011/08/17		NC	%	80 - 120
			Total Iron (Fe)	2011/08/17		NC	%	80 - 120
			Total Lithium (Li)	2011/08/17		90	%	80 - 120
			Total Magnesium (Mg)	2011/08/17		90	%	80 - 120
			Total Manganese (Mn)	2011/08/17		92	%	80 - 120
			Total Phosphorus (P)	2011/08/17		94	%	80 - 120
			Total Potassium (K)	2011/08/17		89	%	80 - 120
			Total Silicon (Si)	2011/08/17		94	%	80 - 120
			Total Sodium (Na)	2011/08/17		99	%	80 - 120
			Total Strontium (Sr)	2011/08/17		84	%	80 - 120
		Spiked Blank	Total Barium (Ba)	2011/08/17		84	%	80 - 120
			Total Boron (B)	2011/08/17		93	%	80 - 120
			Total Calcium (Ca)	2011/08/17		91	%	80 - 120
			Total Iron (Fe)	2011/08/17		99	%	80 - 120
			Total Lithium (Li)	2011/08/17		89	%	80 - 120
			Total Magnesium (Mg)	2011/08/17		89	%	80 - 120
			Total Manganese (Mn)	2011/08/17		91	%	80 - 120
			Total Phosphorus (P)	2011/08/17		91	%	80 - 120
			Total Potassium (K)	2011/08/17		89	%	80 - 120
			Total Silicon (Si)	2011/08/17		91	%	80 - 120
			Total Sodium (Na)	2011/08/17		94	%	80 - 120
			Total Strontium (Sr)	2011/08/17		84	%	80 - 120
			Total Sulphur (S)	2011/08/17		100	%	80 - 120
		Method Blank	Total Barium (Ba)	2011/08/17	<0.01		mg/L	
			Total Boron (B)	2011/08/17	<0.02		mg/L	
			Total Calcium (Ca)	2011/08/17	<0.3		mg/L	
			Total Iron (Fe)	2011/08/17	<0.06		mg/L	
			Total Lithium (Li)	2011/08/17	<0.02		mg/L	
			Total Magnesium (Mg)	2011/08/17	<0.2		mg/L	
			Total Manganese (Mn)	2011/08/17	<0.004		mg/L	
			Total Phosphorus (P)	2011/08/17	<0.1		mg/L	
			Total Potassium (K)	2011/08/17	<0.3		mg/L	
			Total Silicon (Si)	2011/08/17	<0.1		mg/L	
			Total Sodium (Na)	2011/08/17	<0.5		mg/L	
			Total Strontium (Sr)	2011/08/17	<0.02		mg/L	
			Total Sulphur (S)	2011/08/17	<0.2		mg/L	
		RPD [BG4080-01]	Total Barium (Ba)	2011/08/17	NC		%	20
			Total Boron (B)	2011/08/17	1.7		%	20
			Total Calcium (Ca)	2011/08/17	0.8		%	20
			Total Iron (Fe)	2011/08/17	0.3		%	20
			Total Lithium (Li)	2011/08/17	NC		%	20
			Total Magnesium (Mg)	2011/08/17	1.2		%	20
			Total Manganese (Mn)	2011/08/17	0.7		%	20
			Total Phosphorus (P)	2011/08/17	NC		%	20
			Total Potassium (K)	2011/08/17	2.1		%	20
			Total Silicon (Si)	2011/08/17	1		%	20
			Total Sodium (Na)	2011/08/17	2.3		%	20
			Total Strontium (Sr)	2011/08/17	NC		%	20
			Total Sulphur (S)	2011/08/17	2.8		%	20
5100406	NC3	Matrix Spike [BG4061-01]	Dissolved Barium (Ba)	2011/08/17		104	%	80 - 120

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: Y22101187.001
Site Location: WINDY CAMP

Quality Assurance Report (Continued)

Maxxam Job Number: EB174898

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5100406	NC3	Matrix Spike [BG4061-01]	Dissolved Boron (B)	2011/08/17		117	%	80 - 120
			Dissolved Calcium (Ca)	2011/08/17		NC	%	80 - 120
			Dissolved Iron (Fe)	2011/08/17		NC	%	80 - 120
			Dissolved Lithium (Li)	2011/08/17		96	%	80 - 120
			Dissolved Magnesium (Mg)	2011/08/17		116	%	80 - 120
			Dissolved Manganese (Mn)	2011/08/17		117	%	80 - 120
			Dissolved Phosphorus (P)	2011/08/17		106	%	80 - 120
			Dissolved Potassium (K)	2011/08/17		108	%	80 - 120
			Dissolved Silicon (Si)	2011/08/17		104	%	80 - 120
			Dissolved Sodium (Na)	2011/08/17		92	%	80 - 120
			Dissolved Strontium (Sr)	2011/08/17		105	%	80 - 120
		Spiked Blank	Dissolved Barium (Ba)	2011/08/17		95	%	80 - 120
			Dissolved Boron (B)	2011/08/17		103	%	80 - 120
			Dissolved Calcium (Ca)	2011/08/17		106	%	80 - 120
			Dissolved Iron (Fe)	2011/08/17		109	%	80 - 120
			Dissolved Lithium (Li)	2011/08/17		85	%	80 - 120
			Dissolved Magnesium (Mg)	2011/08/17		107	%	80 - 120
			Dissolved Manganese (Mn)	2011/08/17		95	%	80 - 120
			Dissolved Phosphorus (P)	2011/08/17		106	%	80 - 120
			Dissolved Potassium (K)	2011/08/17		98	%	80 - 120
			Dissolved Silicon (Si)	2011/08/17		91	%	80 - 120
			Dissolved Sodium (Na)	2011/08/17		88	%	80 - 120
			Dissolved Strontium (Sr)	2011/08/17		93	%	80 - 120
			Dissolved Sulphur (S)	2011/08/17		98	%	80 - 120
		Method Blank	Dissolved Barium (Ba)	2011/08/17	<0.01		mg/L	
			Dissolved Boron (B)	2011/08/17	<0.02		mg/L	
			Dissolved Calcium (Ca)	2011/08/17	<0.3		mg/L	
			Dissolved Iron (Fe)	2011/08/17	<0.06		mg/L	
			Dissolved Lithium (Li)	2011/08/17	<0.02		mg/L	
			Dissolved Magnesium (Mg)	2011/08/17	<0.2		mg/L	
			Dissolved Manganese (Mn)	2011/08/17	<0.004		mg/L	
			Dissolved Phosphorus (P)	2011/08/17	<0.1		mg/L	
			Dissolved Potassium (K)	2011/08/17	<0.3		mg/L	
			Dissolved Silicon (Si)	2011/08/17	<0.1		mg/L	
			Dissolved Sodium (Na)	2011/08/17	<0.5		mg/L	
			Dissolved Strontium (Sr)	2011/08/17	<0.02		mg/L	
			Dissolved Sulphur (S)	2011/08/17	<0.2		mg/L	
		RPD [BG4061-01]	Dissolved Barium (Ba)	2011/08/17	NC		%	20
			Dissolved Boron (B)	2011/08/17	0.8		%	20
			Dissolved Calcium (Ca)	2011/08/17	1.0		%	20
			Dissolved Iron (Fe)	2011/08/17	0.002		%	20
			Dissolved Lithium (Li)	2011/08/17	NC		%	20
			Dissolved Magnesium (Mg)	2011/08/17	0.9		%	20
			Dissolved Manganese (Mn)	2011/08/17	0.2		%	20
			Dissolved Phosphorus (P)	2011/08/17	NC		%	20
			Dissolved Potassium (K)	2011/08/17	0.9		%	20
			Dissolved Silicon (Si)	2011/08/17	0.2		%	20
			Dissolved Sodium (Na)	2011/08/17	2.1		%	20
			Dissolved Strontium (Sr)	2011/08/17	0.9		%	20
			Dissolved Sulphur (S)	2011/08/17	0.3		%	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 to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: Y22101187.001
Site Location: WINDY CAMP

Quality Assurance Report (Continued)

Maxxam Job Number: EB174898

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 spiked amount was not sufficiently significant to permit a reliable recovery calculation.
NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

Maxxam

Calgary: 4000 19st St. NE, T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187. Toll free: (877) 465-8889
www.maxxamanalytics.com

08/567(Z)

Chain of Custody

A050087

Page: 1 of 1

	Invoice To: C/O Report Address ☑	Report To: Same as Invoice ☑	Report Distribution (E-Mail):
Company:	EBA		DFelske@eba.ca
Contact:	Daniela Felske		mhebert@eba.ca
Address:	14940-123 Ave		
	Prov: AB PC: T5V 1B4	Prov: PC:	
Contact #s:	Ph: 780-451-2121 Cell:	Ph: Cell:	

REGULATORY GUIDELINES:
- ☐ AT1
- ☑ CCME
- ☐ Regulated Drinking Water
- ☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #:	V2210 1187.001
Project # / Name:	
Site Location:	Windy camp
Quote #:	
Sampled By:	Michel Hebert

SERVICE REQUESTED: ☐ RUSH (Contact lab to reserve) Date Required: ☑ REGULAR (5 to 7 Days)

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	WATER: ☐VOCs ☐BTEX F1	☑BTEX F1-F2	☑Routine Water ☐Turb ☐F	☐DOC ☐TOC	Regulated Metals (CCME / AT1) Total	Dissolved	☐Total ☐Dissolved Mercury	Other Analysis: Chloride	HOLD - Do not Analyze	# of Containers Submitted
1	11WS-1		GW	11/08/10 10:00								X	X		X	X		X		8
2	11WS-2		W	11/08/10 10:15								X	X		X	X		X		8
3	11WG-1		W	11/08/10 10:45								X	X		X	X		X		8
4	11W1-1		W	11/08/10 12:00								X	X		X	X		X		8
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				

See reverse for package specifics

Please indicate Filtered, Preserved or Both (F, P, F/P) → P F/P ID/RP F P

Relinquished By (Signature/Print): Michel Hebert Michel Hebert	Date (YY/MM/DD): 11/08/11	Time (24:00): 9:00	
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):	
Special Instructions:		# of Jars Used & Not Submitted	

LAB USE ONLY

Received By: AMANDA L'HIRONDELLE	Date: 2011-08-13	Time: 10:00	Maxxam Job #: B174898
Lab Comments:		Custody Seal: ABSENT	Temperature: 10,13,11 / 10,8,11 — Ice: PRESENT

Maxxam

Success Through Science®

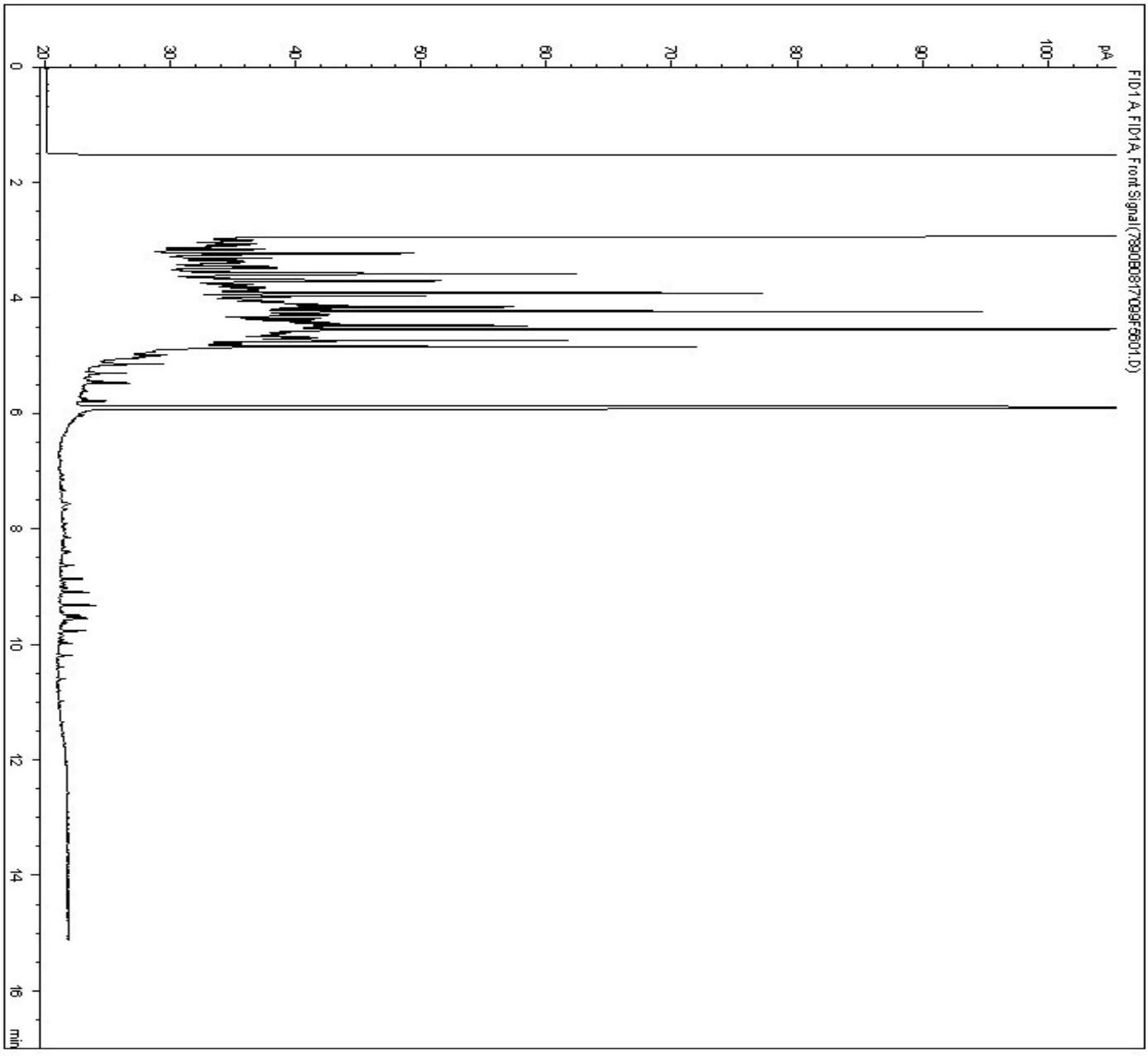
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/22
Maxxam Job #: B174898
Maxxam Sample: BG4061

Site Reference: WINDY CAMP
Client ID: 11W8-1

CCME Hydrocarbons in Water (F2; C10-C16) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0817\099F5601.D
Sample Name: BG4061-02



*** End of Report ***

Instrument 1 2011/08/18 10:08:26 AM RC6

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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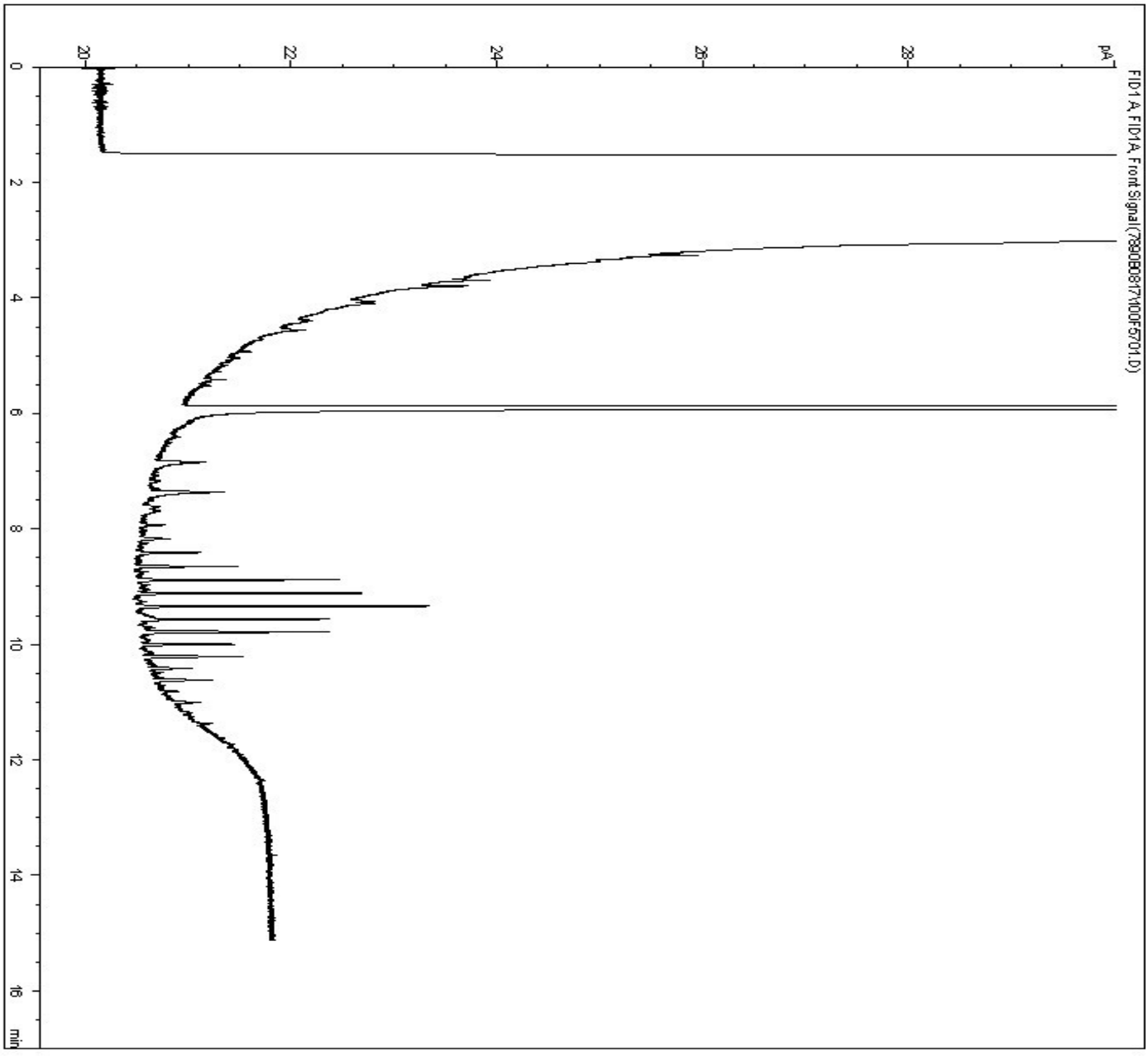
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/22
Maxxam Job #: B174898
Maxxam Sample: BG4080

Site Reference: WINDY CAMP
Client ID: 11W8-2

CCME Hydrocarbons in Water (F2; C10-C16) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0817\100F5701.D
Sample Name: BG4080-02



*** End of Report ***

Instrument 1 2011/08/18 10:08:29 AM RC6

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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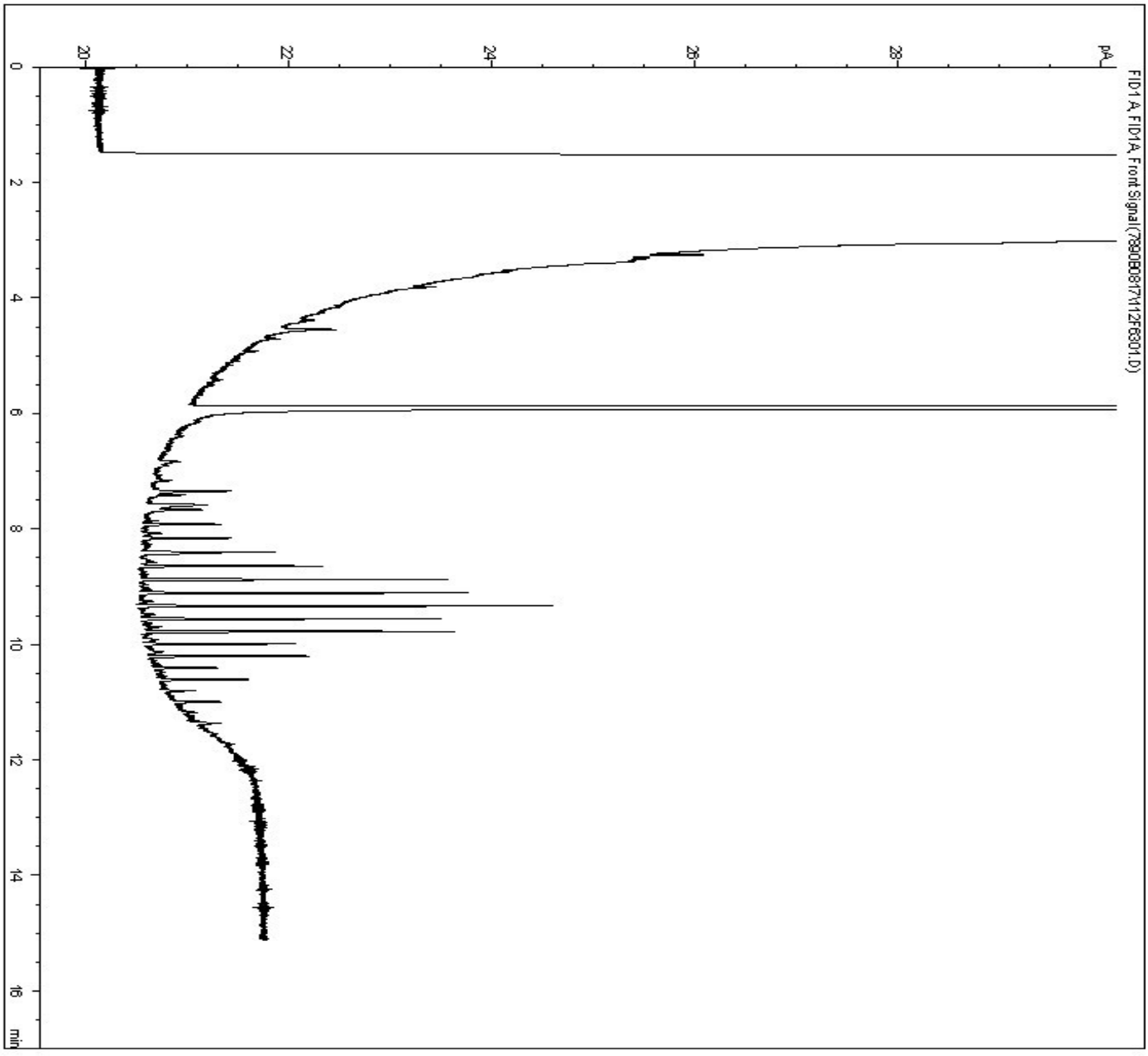
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/22
Maxxam Job #: B174898
Maxxam Sample: BG4081

Site Reference: WINDY CAMP
Client ID: 11W6-1

CCME Hydrocarbons in Water (F2; C10-C16) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0817\112F6301.D
Sample Name: BG4081-02



*** End of Report ***

Instrument 1 2011/08/18 10:08:49 AM RC6

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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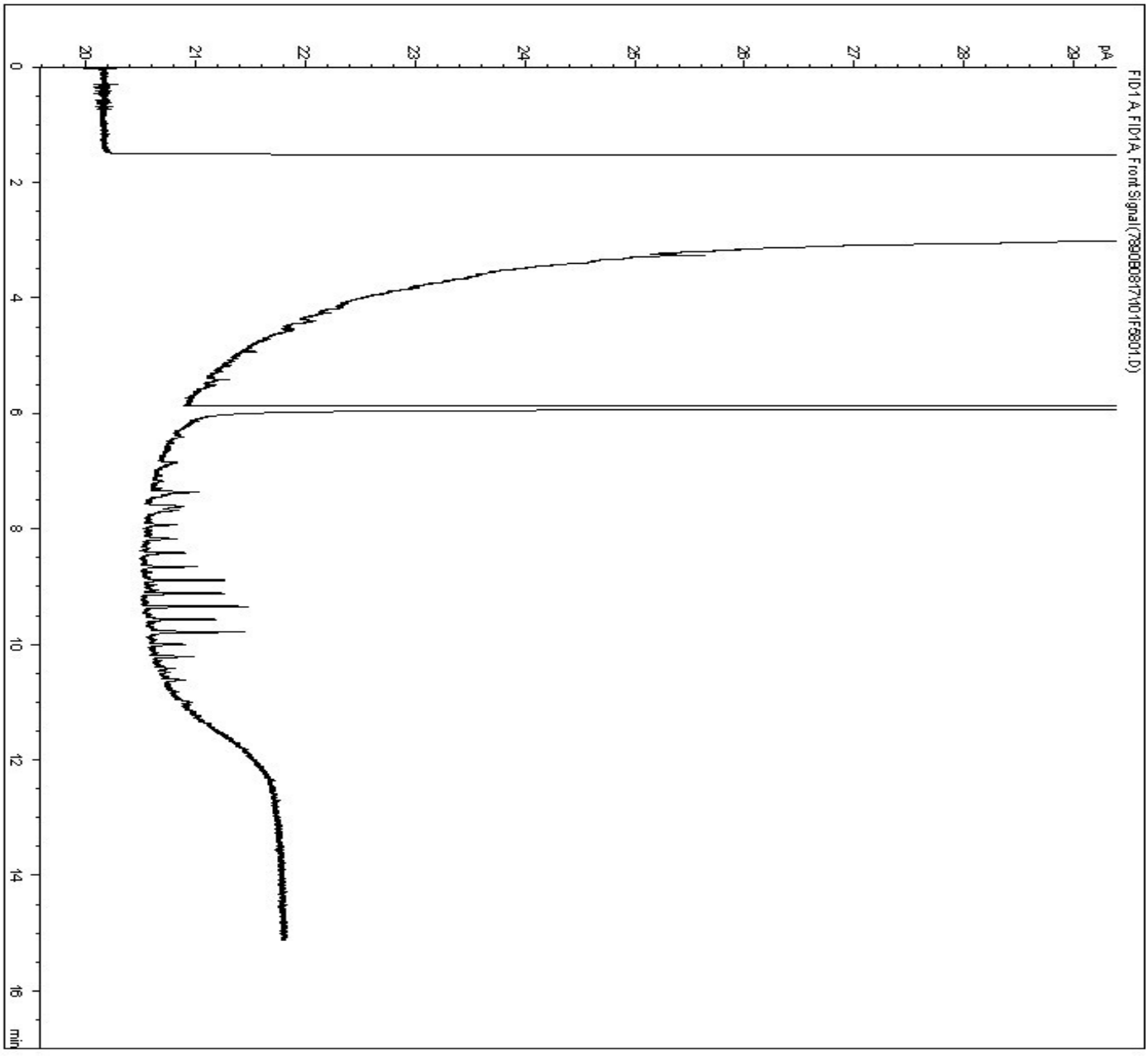
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/22
Maxxam Job #: B174898
Maxxam Sample: BG4082

Site Reference: WINDY CAMP
Client ID: 11W1-1

CCME Hydrocarbons in Water (F2; C10-C16) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0817\101F5801.D
Sample Name: BG4082-02



*** End of Report ***

Instrument 1 2011/08/18 10:08:32 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

APPENDIX B

SIREM BIOTREATABILITY PROPOSAL

SiREM
Site Recovery & Management
130 Research Lane, Suite 2
Guelph, Ontario N1G 5G3
Phone: (519) 822-2265
Fax: (519) 822-3151
www.siremlab.com

1 March 2011 SiREM Ref: Si-1274-030111

Daniela Felske
EBA Engineering
A Tetra Tech Company
Environment Practice
14940 - 123 Avenue
Edmonton, AB T5V 1B4

via email: dfelske@eba.ca

Reference: Proposal for Laboratory Biotreatability Study to Assess Biodegradation of Petroleum Hydrocarbons,

Dear Daniela:

Further to your request, SiREM has prepared this proposal that presents a scope of work and estimate of costs to conduct a laboratory biotreatability study to assess the potential for *in situ* bioremediation of petroleum hydrocarbons (PH) in soil from a site in northern Canada (the Site).

The proposed study will evaluate the natural and enhanced aerobic degradation processes for PH using geologic material (i.e., soil) from two locations (Patch and Windy) at the Site. These materials will be used to construct the treatment and control microcosms. The Patch area target PHs are the F3 fraction and the Windy area target PHs are the F2 fraction.

Aerobic and anaerobic treatments will be constructed to assess the rate and extent of biodegradation that can be achieved at the Site by the indigenous microbial populations under natural aerobic *in situ* conditions (intrinsic controls), through the addition of moisture and nutrients separately.

The remainder of this proposal presents: the study approach and methodology (Section 1); the proposed schedule (Section 2); and a cost estimate for the biotreatability study (Section 3).

1. BIOTREATABILITY STUDY APPROACH & METHODOLOGY

The biotreatability study will consist of the following three tasks:

- Microcosm construction (Task 1);
- Microcosm incubation, sampling and analysis (Task 2); and
- Reporting (Task 3).

Geologic materials (soil) for the microcosms will be provided to SiREM by EBA Engineering (EBA). Sampling protocols, shipping requirements and required sample volumes will be provided by SiREM upon acceptance of this proposal.

Task 1 – Microcosm Construction

Site geologic materials will be homogenized under aerobic conditions in a chemical fume hood for the Patch area and under anaerobic conditions in a disposable anaerobic glove bag for the Windy area prior to microcosm construction. Samples will be collected for preliminary analysis of PH (submitted to Maxxam Analytics, Mississauga, ON), nutrients (nitrogen and phosphorus) (Soil and Nutrient Laboratory, University of Guelph, Guelph, ON), moisture, water holding capacity and soil pH. The homogenized materials will be tightly wrapped and stored at 4°C until required for microcosm construction.

Microcosms will be constructed by filling 250 milliliter (mL) (nominal volume) wide-mouth glass bottles with Site geologic material leaving a nominal headspace for gas production (e.g., carbon dioxide). All treatments will be prepared in duplicate as detailed in Table 1 and sufficient replicate samples will be prepared for up to four sacrificial sample events plus an additional set of replicates for an optional additional sampling event.

All treatments and controls will be amended with water to reach approximately one half of the water holding capacity at the start of the study. The microcosms will be weighed weekly and the microcosms will be amended with water (as required) to maintain consistent moisture content. The nutrient treatment amendments will be amended with standard soil nutrients (nitrogen and phosphorus) at a 100:10:1 carbon: nitrogen: phosphorus ratio (concentrations to be determined based on TP analysis).

Intrinsic control microcosms will be used to measure intrinsic biodegradation activity. The Patch area intrinsic controls will be incubated under aerobic conditions and the Windy area intrinsic controls will be incubated under anaerobic conditions.

For the Patch location microcosms, to maintain aerobic conditions and to mimic tilling action, the microcosms will be stirred with a glass rod two to three times per week. The aerobic treatments will be amended with a commercial oxygen releasing compound (to be selected). The nutrient treatment amendments will be amended with standard soil nutrients (nitrogen and phosphorus) at a 100:10:1 carbon: nitrogen: phosphorus ratio (concentrations to be determined based on TP analysis).

The Windy area microcosms will not be mixed due to the proximity of the Site location to permafrost.

Table 1: **Treatments and Controls for Biotreatability Study**

	Treatment/Control	Description	Patch location	Windy location
1	Intrinsic Control	Unamended	2	2
2	Aerobic Treatment	Amended with oxygen releasing compound	2	2
3	Aerobic Nutrient Amended	Amended with oxygen releasing compound plus nitrogen and phosphorus	2	--
4	Nitrate Treatment	Amended with nitrate as electron acceptor	--	2
5	Wastewater	Amended with wastewater as electron acceptor	--	2
		Number of Microcosms	**6**	**8**

Losses in target compounds and changes in degradation compound concentrations will be compared. Averages from the duplicates of each treatment will be calculated and standard deviations provided.

Task 2 - Microcosm Incubation, Sampling and Analysis

Table 2 summarizes the sampling schedule for this study. Baseline samples of the soil will be taken from the homogenized geologic material and analyzed for the applicable PH fraction, nitrogen, phosphorus, moisture, water holding capacity and soil pH.

Biotreatability study microcosms will be incubated for a period up to twelve weeks. Sacrificial soil samples for analysis of PH will be taken at time zero and three time periods (time 0, weeks 4, 8 and 12). Samples of the geologic material will be analyzed at time 0, weeks 4 and 12 for analysis of nitrogen, phosphorus and soil pH. PH analysis by Maxxam Analytics will include two fractions: the F2 and F3 fractions.

Table 2: Scope of Microcosm Sampling and Analysis

Analyte	Number of Microcosms	Matrix	Number of Sample Events	Total Number of Samples
Moisture and water holding capacity	--	Soil	baseline	2
PH – F2 fraction	8	Soil	3 + 2 baseline	26
PH – F3 fraction	6	Soil	3 + 2 baseline	20
Nitrogen and phosphorus	14	Soil	3 + 2 baseline	44
pH	14	Soil	3 +2 baseline	44

Sampling intervals for individual treatments may be modified (either shorter or longer intervals) during the biotreatability study based on observed microbial activity and degradation rates.

Task 3 – Reporting

SiREM will provide monthly updates to EBA via email. SiREM will tabulate the study data and will prepare a report containing the methodology and all data generated from the microcosm study. A draft report will be provided to EBA for review and comment, and a final report will be provided after receipt of the comments on the draft version.

2. SCHEDULE

SiREM is prepared to commence work upon award of contract. Construction of microcosms will commence within two weeks of receiving the geologic materials. A draft report will be submitted within two weeks of receipt of final analytical data and the final report will be provided within two weeks after receipt of comments from EBA on the draft version.

3. COST ESTIMATE AND ASSUMPTIONS

SiREM is prepared to conduct the proposed scope of work for the biotreatability study for a fixed-fee of $12,196 plus applicable taxes. These costs include set-up and analysis of all microcosms, reporting, all professional time, general laboratory disbursements and associated standard analyses.

This cost estimate is based on the following assumptions:

1. No Workplan, other than this proposal will be required for submittal/approval by regulatory agencies.

2. Geologic materials and groundwater sample collection and shipment to SiREM are paid for by customer (costs not included herein).

3. TPH analyses are paid for by customer (costs not included herein).

The contract terms and conditions applicable to laboratory research studies are unique. To minimize the administrative efforts between our firms and to facilitate this business transaction, SiREM recommends, that this proposal be governed by the attached terms and conditions (Attachment A). Your signature below will confirm your acceptance of SiREM's terms and conditions. If you desire to use your own contract form, please forward it to my attention. As soon as we have reached agreement on the terms, SiREM will proceed with its services.

Please note that SiREM is a division of Geosyntec Consultants, Inc, a corporation organized under the laws of the State of Florida.

If SiREM's proposal is acceptable, please indicate agreement by having an authorized representative sign in the space provided below and returning a complete copy of this proposal and attachments to my attention. Should you have any questions or need additional information regarding this quotation, please contact me at 1-866-251-1747 extension 236.

Sincerely,

Sandra Dworatzek, M.Sc.
Senior Manager

Attachment A: Terms and Conditions for Research Studies

Agreed and Accepted By:

SiREM Proposal: Si-1274-030111		Proposal Amount:$ 12,196
Authorized Signature		Date:
Printed Name		
Email Address		
Purchase Order	PO #	☐ No PO will be issued
Prime Contract	☐ Applies, Copy Attached	☐ No Prime Contract Applies

Attachment A: Research Study Terms and Conditions

Order for Research Study. These Terms and Conditions (T&Cs) apply to any research study ("Research Study") performed by SiREM. Such Research Study is initiated by a purchase order, quote or acceptance of a proposal ("Order").

Invoicing and Payment. SiREM, in order to cover the material cost to set up the Research Study, will invoice Client 50% of the total budget for the Research Study established in the Order upon receipt of the Order. Thereafter, SiREM will invoice Client on a time and materials basis up to the total authorized cost. The balance shall be invoiced upon submission of the Research Study report. Payment is due within 30 days of receipt of SiREM's invoice. In the event the Research Study is pursuant to a prime contract between Client and its client, payment for a Research Study greater than $5,000 shall be made the earlier of Client's receipt of payment from its client or 90 days from receipt of SiREM's invoice. Client shall pay an additional charge of one percent (1%) of the amount of the invoice per month or the maximum percentage allowed by law, whichever is the lesser, for any payment received by SiREM beyond the payment terms set forth herein.

Samples and Reporting. Unless otherwise set forth in the Order, Client will obtain samples and ship to SiREM at Client's expense. At Client's request, SiREM will provide sample containers at no cost. SiREM is responsible for resampling costs while samples are in its care, custody and control only to the extent loss or damage to the samples arises out of SiREM's negligence or willful misconduct. The results of the Research Study will be delivered to Client in SiREM's standard report format. In the event that Client desires a different report format, Client agrees to provide a sample to SiREM prior to the performance of the Research Study. Client understands and agrees that the unit prices in the Order assume standard report format and may be adjusted in the event such special reporting format results in an increased level of effort.

Standard of Care and Indemnity. SiREM will perform the Research Study and will dispose of samples in accordance with the schedule (if any) set forth in the Order, and applicable federal, provincial, state or local laws and regulations. The Research Study will be in accordance with SiREM's general operating quality assurance and control program. SiREM will defend, indemnify and hold harmless Client for losses, claims or causes of action to the extent arising out of SiREM's professional negligence or willful misconduct.

Confidentiality. SiREM will maintain as confidential any documents or information provided by Client and Research Study reports and will not release, distribute or publish the same to any third party without prior permission from Client, unless compelled by law or order of a court or regulatory body of competent jurisdiction. In such event, SiREM will provide advance written notice to Client prior to release.

Force Majeure/Consequential Damages. Neither party will hold the other responsible for damages or delays in performance caused by force majeure, acts of God, or other events beyond the reasonable control of the delayed party. In no event will either party be liable to the other for any incidental or consequential damages arising in connection with the Research Study.

Termination. Client may terminate the Order prior to the commencement of the Research Study by written notice to SiREM.

Assignments. The Order is non-assignable by either party without the prior written consent of the other party.

Validity. These T&Cs will be enforced to the fullest extent permitted by law. If any provision is found to be invalid or unenforceable, the provision will be construed and applied in a way that comes as close as possible to expressing the intention of the parties and that saves the validity and enforceability of the provision.

No Third Party Rights. These T&Cs will not create any rights or benefits to parties other than Client and SiREM, provided, however, that if Client is a prime contractor, then Client's client shall be entitled to rely upon the Research Study reports to the same extent as Client, subject to these T&Cs.

Notices: Any information or notices required or permitted under the Order will be deemed to have been sufficiently given if in writing and delivered either personally or by mail to the representatives of the parties as set forth in the Order or as otherwise designated by the parties. Notice given by mail will also be transmitted by facsimile or email at the time of mailing.

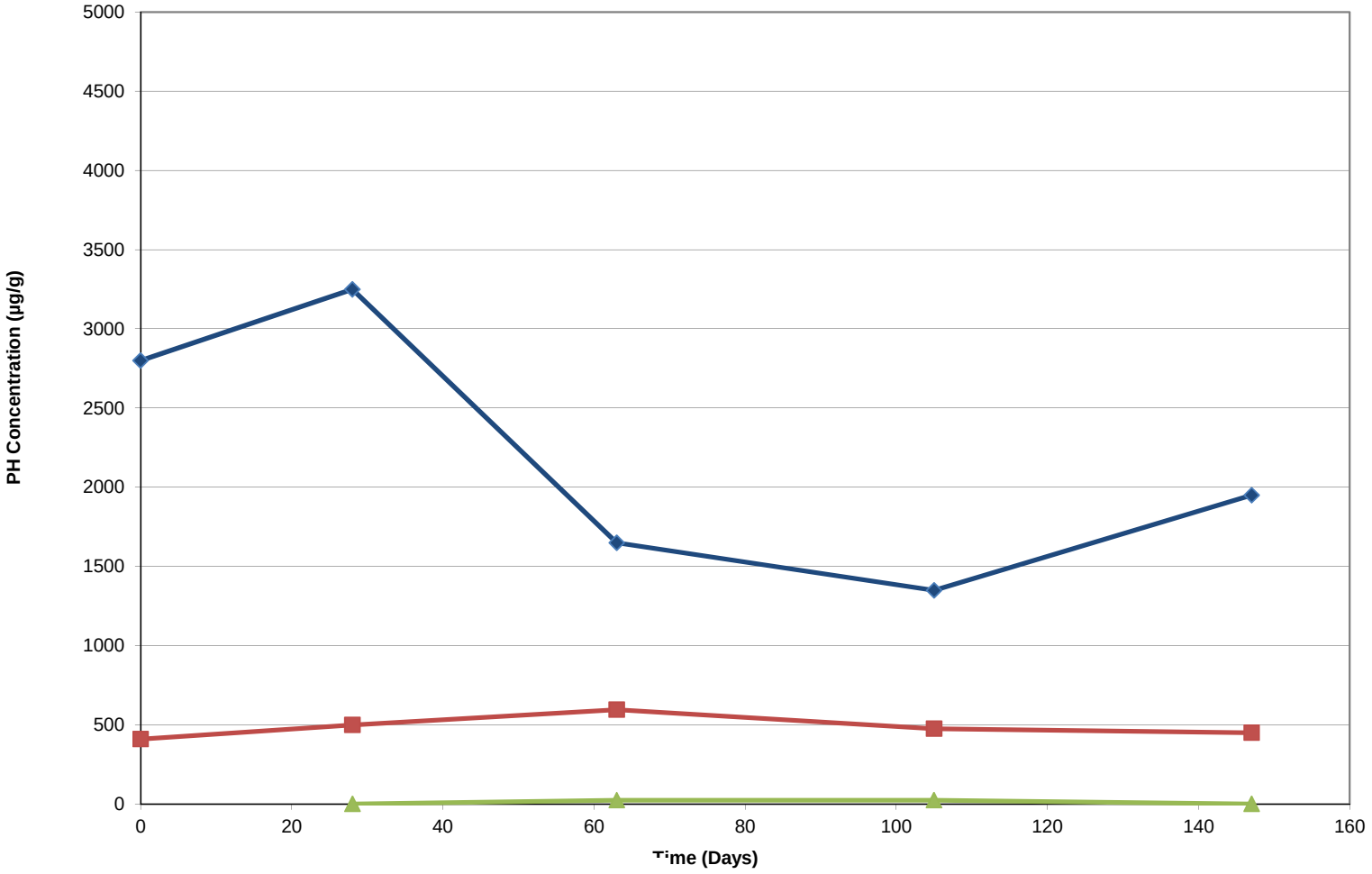
Client's Prime Contract. In the event that Client is obligated to flow down the provisions of its prime contract, Client shall provide a copy to SiREM concurrent with its execution of this document to which these T&Cs are attached. SiREM reserves the right to review and accept the mandatory flow down provisions of the prime contract prior to its performance. SiREM shall be bound to the Terms and conditions of the prime contract only to the extent that they are expressly imposed upon Client's subcontractors. SiREM's signature on the document to which these T&Cs are attached shall evidence its acceptance of the prime contract flow down requirements.

Integrated Writing. The Order and these T&Cs, together with any Supplemental T&Cs attached hereto, constitute a final and complete repository of the agreements between Client and SiREM and supersede all prior or contemporaneous communications, representations, or agreements, whether oral or written and shall only be modified through a mutually acceptable written addendum hereto. It is expressly agreed by the parties that if Client issues a Purchase Order or similar document, it shall be solely for financial authorization purposes and any terms and conditions contained therein shall not modify these T&Cs.

APPENDIX C

SIREM BIOTREATABILITY STUDY GRAPHS

Graph 1

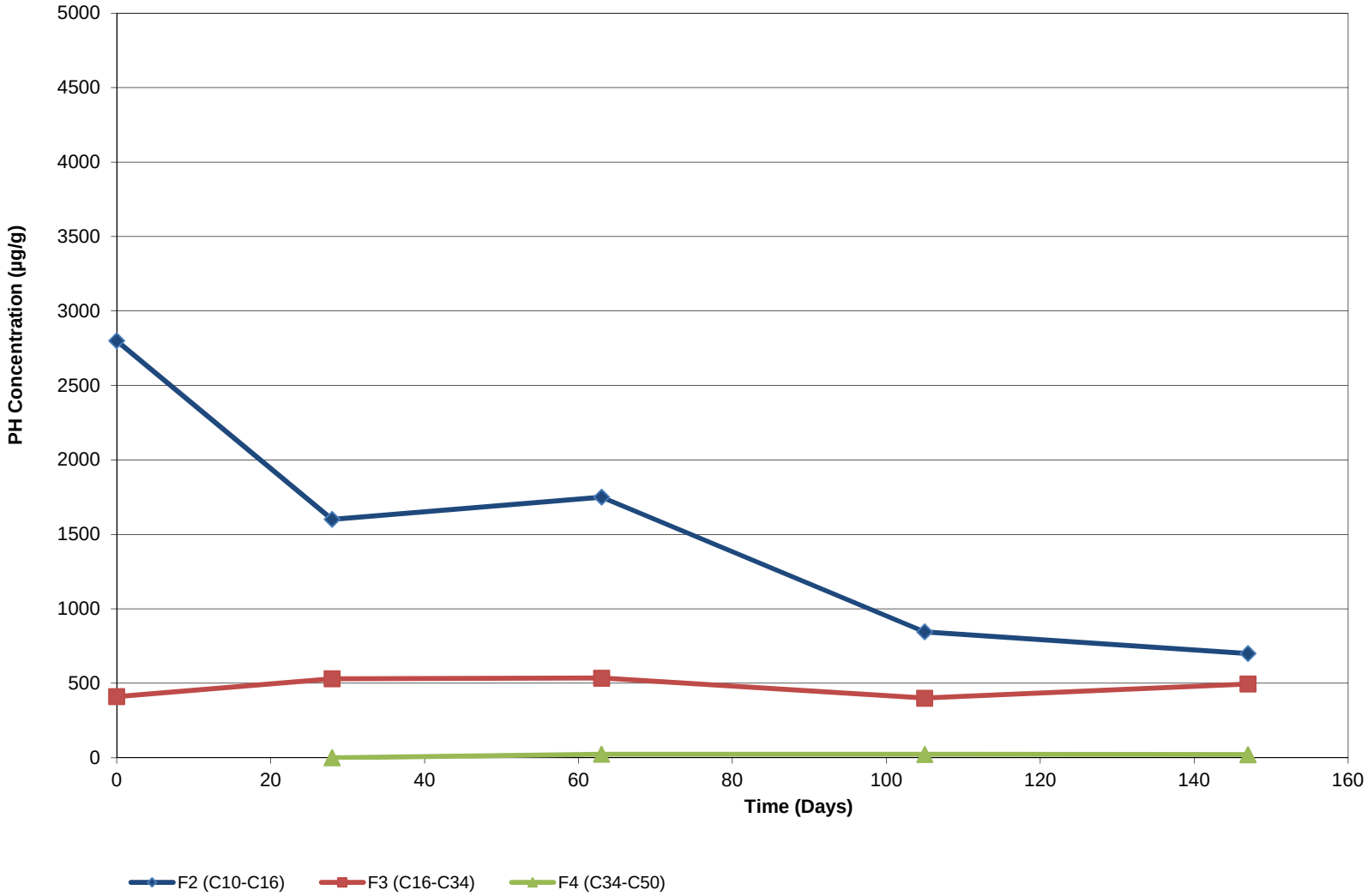


Petroleum Hydrocarbon Compounds Concentration Trends in Active Control Microcosms (Windy Location)

Hope Bay, Northern Canada

4-Jun-12	Figure: **5**	SiREM

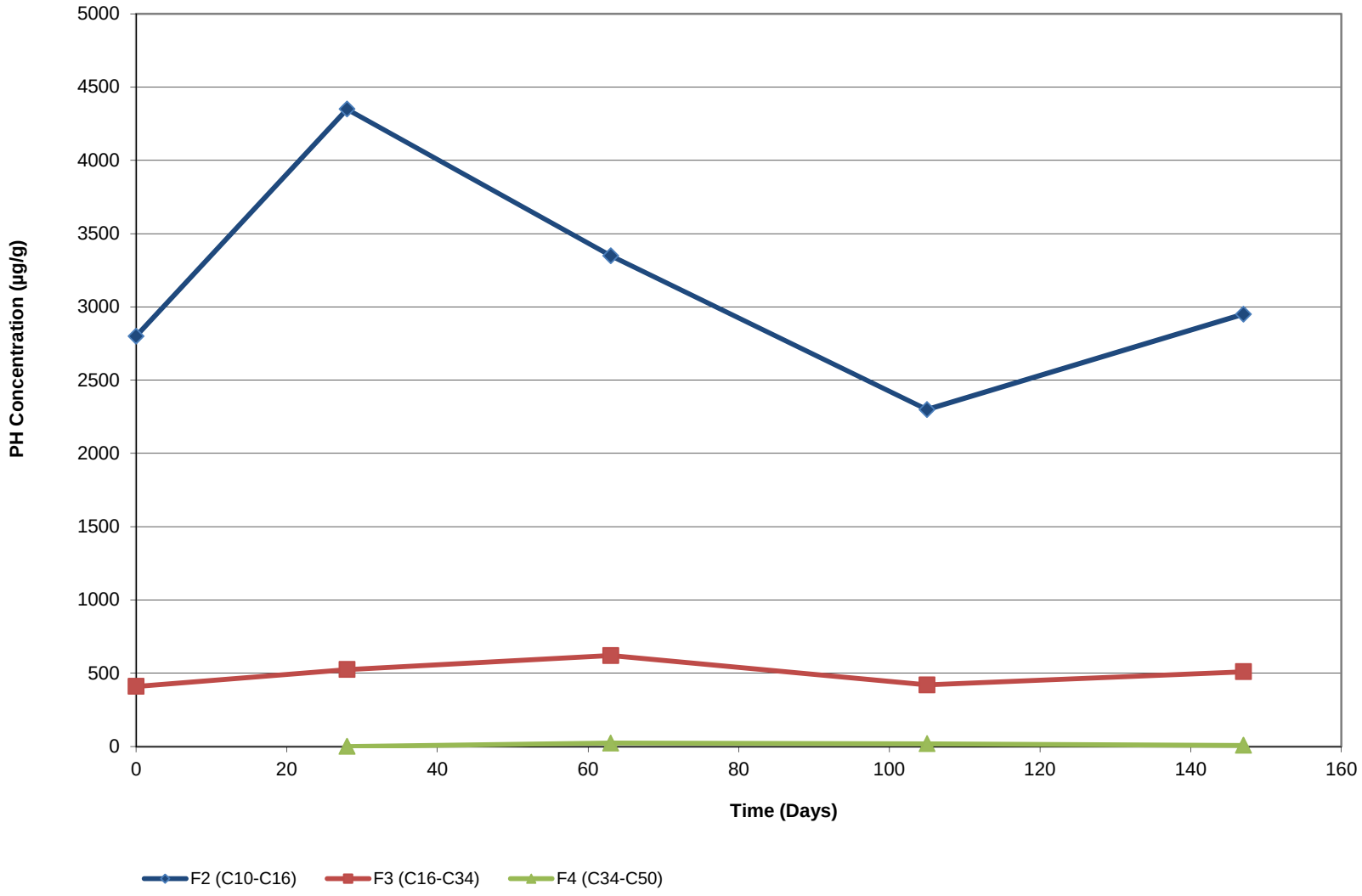
Graph 2



Petroleum Hydrocarbon Compounds Concentration Trends
in Aerobic Treatment EHC-O Amended Microcosms (Windy Location)
Hope Bay, Northern Canada

4-Jun-12	Figure: **6**	SiREM

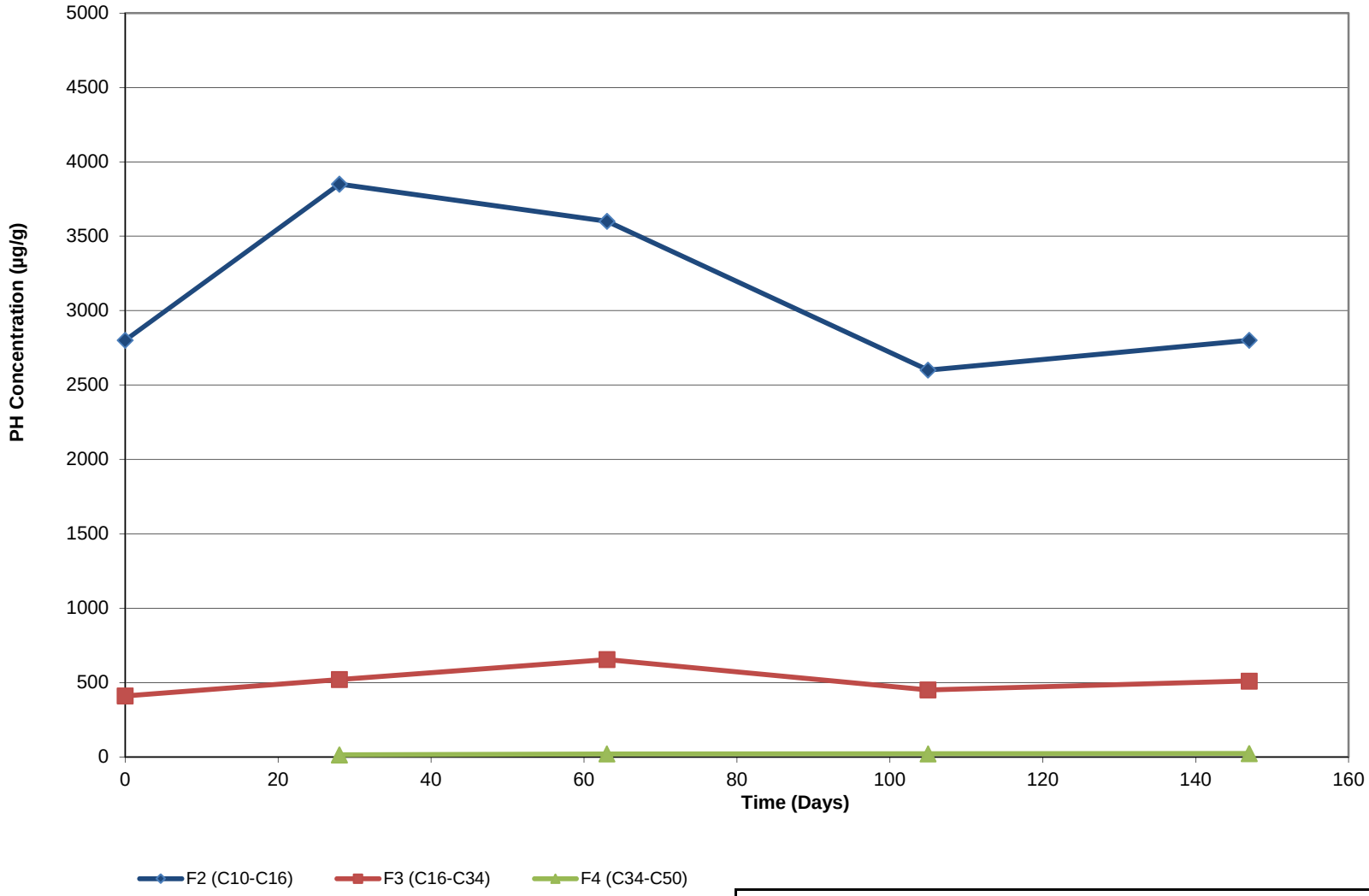
Graph 3



Petroleum Hydrocarbon Compounds Concentration Trends
in Anaerobic Nitrate Amended Microcosms (Windy Location)
Hope Bay, Northern Canada

4-Jun-12	Figure: **7**	SiREM

Graph 4



Petroleum Hydrocarbon Compounds Concentration Trends
in Anaerobic Sulfate Amended Microcosms (Windy Location)
Hope Bay, Northern Canada

4-Jun-12	Figure: **8**	SiREM

APPENDIX D

SIREM BIOTREATABILITY STUDY FINAL REPORT

Prepared for:

EBA Engineering
A Tetra Tech Company
Environment Practice
14940-123 Avenue
Edmonton, AB T5V 1B4

Final Report

LABORATORY BIOTREATABILITY STUDY TO ASSESS AEROBIC AND ANAEROBIC BIODEGRADATION OF PETROLEUM HYDROCARBONS AT TWO SITES IN NUNAVUT

Northern Canada Site

Prepared by:

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SiREM Ref: TL00307B
4 June 2012

TABLE OF CONTENTS

Page

1. INTRODUCTION 1

2. MATERIALS AND METHODS 2

2.1 Microcosm Construction and Incubation 2

2.2 Microcosm Sampling and Analysis 4

2.2.1 Petroleum Hydrocarbon analysis 4

2.2.2 Nitrogen, phosphate, sulfate and pH analysis 5

3. RESULTS 5

LIST OF TABLES

Table 1: Summary of Microcosm Control and Treatments
Table 2: Summary of Microcosm Control, Treatments and Amendments
Table 3: Summary of Microcosm PH, Nitrogen, Phosphorus, Sulfate, pH and Moisture Results
Table 4: Percent Removal of Petroleum Hydrocarbons in Microcosms

LIST OF FIGURES

Figure 1: Petroleum Hydrocarbon Compound Concentration Trends in Aerobic Active Control Microcosms (Patch Location)
Figure 2: Petroleum Hydrocarbon Compound Concentration Trends in Aerobic Treatment EHC-O Amended Microcosms (Patch Location)
Figure 3: Petroleum Hydrocarbon Compound Concentration Trends in Aerobic Nutrient Amended Microcosms (Patch Location)
Figure 4: Petroleum Hydrocarbon Compound Concentration Trends in Aerobic Nutrient and EHC-O Amended Microcosms (Patch Location)
Figure 5: Petroleum Hydrocarbon Compound Concentration Trends in Active Control Microcosms (Windy Location)
Figure 6: Petroleum Hydrocarbon Compound Concentration Trends in Aerobic Treatment EHC-O Amended Microcosms (Windy Location)
Figure 7: Petroleum Hydrocarbon Compound Concentration Trends in Anaerobic Nitrate Amended Microcosms (Windy Location)
Figure 8: Petroleum Hydrocarbon Compound Concentration Trends in Anaerobic Sulfate Amended Microcosms (Windy Location)

APPENDIX A: Chain of Custody Documentation

APPENDIX B: Summary of Percent Moisture and Water Holding Capacity Results

APPENDIX C: Summary of Nutrient and Moisture Amendment Calculations for Treatment Microcosms

APPENDIX D: Maxxam Analytical Reports

APPENDIX E: University of Guelph Analytical Reports

LIST OF ABBREVIATIONS

°C	degrees Celsius
DI	deionized
DAP	diammonium phosphate
EBA	EBA Engineering
g	grams
g/L	gram per liter
µL	microliters
mg/kg	milligram per kilogram
mg/L	milligram per liter
mL	milliliter
mL/g	milliliter per gram
mM	millimolar
$NaNO_3$	sodium nitrate
Na_2SO_4	sodium sulfate
NH_4Cl	ammonium chloride
NO_3	nitrate
%	percent
PHC	petroleum hydrocarbons
SiREM	SiREM Laboratory
SO_4	sulfate
WHC	water holding capacity

1. INTRODUCTION

EBA Engineering (EBA) retained SiREM Laboratories (SiREM) to perform a laboratory biotreatability study to assess the potential for *in situ* degradation of petroleum hydrocarbons (PHC) in soil from a site in northern Canada (the Site). As discussed in SiREM's proposal, Si-1274, the purpose of the study was to evaluate the natural and enhanced aerobic and anaerobic degradation processes for PHC using soils from two Site locations (Patch and Windy).

At each of the two locations, different treatments were applied in order to evaluate their effects on the degradation of PHC. The Patch location microcosms were maintained under aerobic conditions, and the treatments evaluated included amendment with oxygen releasing compound (EHC-O) (Adventus Americas, Illinois), nutrients, and nutrient/EHC-O. The Windy location treatments were maintained under both aerobic and anaerobic conditions. Treatments included amendment with nitrate (NO_3) and sulfate (SO_4) under anaerobic conditions, and amendment with EHC-O under aerobic conditions. The controls and treatments are summarized in Table 1 shown below, with further details on the amendments provided in Table 2.

Table 1: Summary of Microcosm Controls and Treatments

	Treatment/Control	Description	Patch location	Windy location
1	Intrinsic Control	Un-amended	2	2
2	Aerobic Treatment	Amended with oxygen releasing compound	2	2
3	Aerobic Nutrient Amended	Amended with oxygen releasing compound plus nitrogen and phosphorus	2	--
4	Nitrate Amended Treatment	Amended with nitrate as electron acceptor	--	2
5	Sulfate Amended Treatment	Amended with sulfate as electron acceptor	--	2
		Number of Microcosms	**6**	**8**

Soil was collected from the Site on August 22, 2011 by EBA and was received by SiREM on August 23, 2011 and stored at 4 degrees Celsius (^oC) until required for testing. The chain of custody documentation related to these samples is provided in Appendix A.

The remainder of this report is divided into two sections. Section 2 presents the experimental materials and methods and Section 3 presents the results of the biotreatability study.

2. MATERIALS AND METHODS

The following sections summarize the methods for microcosm construction and incubation (Section 2.1); and microcosm sampling and analysis (Section 2.2).

2.1 Microcosm Construction and Incubation

Two Site locations were evaluated (Patch and Windy) in this study; each with three treatments (Table 1). Thirty-four microcosms were constructed for each location to allow for sacrificial sampling of duplicate microcosms for each sampling event. Table 2 summarizes the details of microcosm construction and amendments for the treatment and control microcosms. Microcosms were incubated for 147 days in an incubator at 10°C. On August 30, 2011 sub-samples of the material for each location were collected for PHC analysis to verify the material as received was representative of Site PHC concentrations (Table 2). The remainder of the material was stored in a cold room at 4 ^{O}C until microcosm construction. EBA confirmed that the concentrations were appropriate and to proceed with the study.

On October 5, 2011 (Day 0), the material was removed from the cold room and the material for the aerobic microcosms was transferred to a laboratory fume hood and the material for the anaerobic microcosms was transferred to a temporary anaerobic glove bag filled with nitrogen gas. In both cases the soil was combined and mixed by hand to improve reproducibility between microcosm replicates. The homogenized soil was sub-divided into clean plastic bags for preparation of the treatment and control microcosms. For the treatments 1,800 grams (g) of soil was required and for the controls 2,200 g of soil was required to have sufficient material for the required replicates. The material for the Patch and Windy locations was handled separately to avoid cross contamination.

In order to provide sufficient moisture for biodegradation deionized (DI) water was added to the bulk soil so that it approximated one half of the water holding capacity (WHC) of the soil (this typically avoids free standing water in the microcosms). This dosing rate is based on past experience with similar treatability studies conducted by SiREM. The WHC for the Patch and Windy material was determined to be 0.39 mL/g and 0.47 mL/g respectively and are provided in Appendix B. For the Patch location Aerobic Active control 69 milliliters (mL) of DI water was added to 2,200 g of soil to reach one half of the water holding capacity. The soil for the Patch location Nutrient and Nutrient/EHC-O amended treatments was combined prior to the addition of EHC-O

and 112.5 mL of DI water was added to reach one half of the WHC. For the Windy location active control 121 mL of DI water was added to 2,200 g of soil and to the NO_3 and SO_4 anaerobic treatment soil, 99 mL of DI water was added to 1,800 g of soil to reach one half of the WHC. Calculations for the amount of water added are provided in Appendix C. It is important to note that the Windy location controls were stored under aerobic conditions to 27 November 2011 (Day 53), after which the microcosms were sealed and stored in an anaerobic chamber for the duration of the study.

For the Patch location, nitrogen and phosphorus were evaluated as the nutrient source. Typical nutrient loading rates are based on a carbon:nitrogen:phosphorous ratio of 100:10:1. Based on the PHC concentrations representing the carbon, this would be equivalent to a nitrogen concentration of 294 milligram per kilogram (mg/kg). However, nitrogen levels higher than 200 mg/kg may be toxic to microorganisms (Elizabeth Edwards, Personal Communication, 2010). Therefore, nitrogen was added to achieve a target concentration of 200 mg/kg. Diammonium phosphate (DAP) was used to provide both nitrogen (200 mg/kg) and phosphorus (222 mg/kg). A weight of 3.4 g of DAP was dissolved into the 112.5 mL of DI water and the solution was added to the appropriate homogenized soil to reach the target nutrient concentration. The soil was mixed well and 200 g of this material was added to eighteen sterile 250 mL glass wide-mouth bottles. The nutrient/EHC-O amended individual microcosms and the EHC-O amended individual microcosms were amended with 0.5 g of EHC-O (2.5 g EHC-O/kg of soil) as recommended by Adventus. All microcosms were stirred and capped with foam plugs in order to allow oxygen transfer into the bottles and stored in an incubator at 10^{O}C.

In the Windy location, NO_3 and SO_4 were evaluated as the electron acceptors. The homogenized soil (1,800 g of soil) used for the NO_3-amended microcosms was amended with 270 microliters (µL) of a 200 gram per liter (g/L) sodium nitrate ($NaNO_3$) stock solution to a target concentration of 124 milligram per liter (mg/L) or 2 millimolar (mM) in the pore volume. This concentration of NO_3 was selected to provide sufficient nitrate without exceeding the toxicity limit of 2 mM (Elizabeth Edwards, Personal Communication, 2010). The homogenized soil (1,800 g of soil) used for the SO_4 amended microcosms was amended with 460 microliters (µL) of a 200 g/L sodium sulfate (Na_2SO_4) stock solution to a target of 192 mg/L or 2 mM in the pore volume. This amount was chosen to be equivalent to the nitrate concentration on a molar basis. Both treatments were constructed and sealed with screw caps and anaerobic tape under anaerobic conditions and stored in an incubator at 10^{O}C.

All treatment and control microcosms were weighed after the addition of soil and amendments. The bottles were stirred and weighed once a week for the duration of the study. When a decrease in weight of greater than 10 percent (%) was observed, DI water was added to the bottles to increase the weight back to the original weight in order to maintain the bottles at their original moisture content.

Nitrogen (in the form of Ammonium-N) was detected at lower than expected concentrations in the aerobic nutrient amended microcosms on November 2, 2011 (Day 28). Therefore, on November 24, 2011 (Day 50) the nutrient amended microcosms and the nutrient/EHC-O amended microcosms were re-amended with nitrogen to a target concentration of 200 mg/kg. A weight of 0.15 g of ammonium chloride (NH_4Cl) was dissolved into 10 mL of DI water and 1mL of this solution was added to each bottle to reach the target nitrogen concentration. Phosphorus was detected in the microcosms and therefore additional phosphorus was not added at this time.

In the anaerobic NO_3 microcosms the NO_3-N concentration was also lower than expected on November 2, 2011 (Day 63). Therefore, on December 22, 2011 (Day78) the NO_3 amended microcosms were re-amended with nitrate based on the soil mass in the microcosms instead of the pore volume as was done previously. A volume of 6.1 mL of a 200 g/L $NaNO_3$ stock solution was added to each bottle to reach the target NO_3 concentration of 200 mg/kg as nitrogen.

SO_4 was also detected at lower than expected concentration in the SO_4 amended microcosms on Day 63. Therefore, on December 22, 2011 (Day 78) the SO_4 amended microcosms were re-amended with SO_4 based on the soil mass in the microcosms instead of the pore volume as was done previously. A volume of 4.4 mL of a 200 g/L Na_2SO_4 stock solution was added to each bottle to reach the target SO_4 concentration of 200 mg/kg as sulphur. Also, after discussion with EBA, it was decided to add nutrients in the form of DAP to both the SO_4 and NO_3 amended treatments to achieve the same nitrogen and phosphorus concentration as in the nutrient amended microcosms. Therefore, on December 22, 2011 (Day 78) 189 mg of DAP was dissolved in 2 mL of DI water and was added to the NO_3 and SO_4 amended microcosms.

Data updates were provided to EBA after each sampling event. Due to the slower than expected activity it was decided, in consultation with EBA, to extend the study by one sampling event (42 days). At the start of the study SiREM constructed extra sets of duplicate microcosms for each control and treatment to allow for an additional sampling event if needed.

2.2 Microcosm Sampling and Analysis

2.2.1 Petroleum Hydrocarbon analysis

Analysis of the target PHC (F2-F4 Hydrocarbons) and moisture content analyses were conducted by an external laboratory, Maxxam Analytics Inc. (Maxxam Analytics, Mississauga, ON). On August 30, 2011, a sub-sample of the bulk homogenized soil

(from both locations) was collected in 250 mL (nominal volume) glass wide-mouth jars. The samples were placed on ice packs in a cooler and submitted to Maxxam for PHC (F2-F4 Hydrocarbons) analysis and moisture content analysis. On Day 0, 28, 50, 63, 105 and 147, sacrificial bottles from each control and treatment were placed in a cooler with ice packs and couriered overnight to Maxxam Analytics for PHC and moisture content analysis. It was noted that F4 (C34-C50) data was not provided for the baseline and time zero samples as this was not originally requested by EBA. However, Maxxam could include the F4 analysis for no extra charge upon request, so it was included in the data set for the duration of the study.

2.2.2 Nitrogen, phosphate, sulfate and pH analysis

Analysis of nitrogen and phosphorous was conducted by an external laboratory, University of Guelph Laboratory Services (Guelph, ON, Canada). At the beginning of the study a sub-sample of the bulk homogenized soil from each location was collected in sterile 50 mL centrifuge tubes, placed on ice packs in a cooler and hand delivered to the University of Guelph for nitrogen, phosphorous and soil pH baseline analysis.

On Days 0, 28, 50, 63, 105 and 147, 50 g sub-samples from each of the control and treatment microcosms were removed from the microcosms and placed in sterile 50 mL centrifuge tubes. The samples were placed on ice packs in a cooler and hand delivered to the University of Guelph for nitrogen, phosphorous and pH analysis. Throughout the duration of the study different nitrogen analyses were performed. At the baseline and time zero nitrogen data was reported in the form of NO_3-N. On November 2, 2011 (Day 28) nitrogen was reported in the form of Ammonium-N and NO_3-N. After discussion with EBA it was decided that the nitrogen analyses would be requested in the form of NO_3-N, Nitrite-N and Total Kjeldahl Nitrogen for the duration of the study. Also, on December 7, 2011(Day 63) and January 18, 2012 (Day 105) the sulfate amended treatments were analyzed for sulfate in order to monitor the amount of sulfate present in these treatment bottles.

3. RESULTS

Table 3 provides PHC (F2-F4), pH, moisture content and nutrients results from the control and treatment microcosms for both locations over the incubation period of the study. Table 4 provides a summary of the % PHC removal for each treatment. Figures 1 through 8 present trends in the concentrations of PHC concentrations in the control and treatment microcosms over the incubation period of the study.

Refer to Appendix B for the baseline WHC and moisture content results, Appendix C for amendment calculations, Appendix D for the Maxxam Analytics analytical reports and Appendix E for the University of Guelph analytical reports.

Report Prepared by: _____ **Date:** 27 April 2012
Ximena Druar, Laboratory Technician

Report Reviewed by: _____ **Date:** 27 April 2012
Jeff Roberts, Laboratory Manager

Report Reviewed by: _____ **Date:** 30 April 2012
Sandra Dworatzek, Senior Manager

TABLES

TABLE 2: SUMMARY OF MICROCOSM CONTROLS, TREATMENTS AND AMENDMENTS
Hope Bay, Northern Canada

Location	Microcosm Name	Number of Bottles*	Description
Patch	Aerobic Active Control	10	No amendments added. Amended with DI water throughout the duration of the study to maintain the % moisture (13%) present at the beginning of the study.
	Aerobic Treatment EHC-O Amended	8	Amended with 0.5 g of EHC-O on Day 0 and re-amended with 0.5 g of EHC-O on Day 50. Amended with DI water throughout the duration of the study to maintain the % moisture (13%) present at the beginning of the study.
	Aerobic Nutrient Amended Treatment	8	Amended with 189 mg DAP/200g soil to a target concentration of 200 mg/kg as Nitrogen on Day 0. Re-amended with 1 ml of 153 mg/mL stock solution of NH_4Cl to a target concentration of 200 mg/kg as Nitrogen on Day 50. Amended with DI water throughout the duration of the study to maintain the % moisture (13%) present at the beginning of the study.
	Aerobic Nutrient and EHC-O Amended Treatment	8	Amended with 189 mg DAP/200g soil to a target concentration of 200 mg/kg as Nitrogen and 0.5 g EHC-O on Day 0. Re-amended with 1 mL of 153 mg/mL stock solution of NH_4Cl to a target concentration of 200 mg/kg as Nitrogen and 0.5 g EHC-O on Day 50. Amended with DI water throughout the duration of the study to maintain the % moisture (13%) present at the beginning of the study.
Windy	Active Control	10	No amendments added. Amended with DI water throughout the duration of the study to maintain the % moisture (13%) present at the beginning of the study. On Day 58 bottles were sealed.
	Aerobic Treatment EHC-O Amended	8	Amended with 0.5 g of EHC-O on Day 0 and re-amended with 0.5 g of EHC-O on Day 50. Weighed throughout the duration of the study to verify %moisture remained at 13%.
	Anaerobic Nitrate Amended Treatment	8	Amended with 30 µL of 200 g/L $NaNO_3$ stock solution to a target concentration of 200 mg/kg as Nitrogen. Re-amended with 6.1 mL of 200g/ L $NaNO_3$ stock solution to a target concentration of 200 mg/kg as Nitrogen on Day 50. Weighed throughout the duration of the study to verify %moisture remained at 13%.
	Anaerobic Sulfate Amended Treatment	8	Amended with 51 µL of 200 g/L Na_2SO_4 stock solution to a target concentration of 200 mg/kg as Sulfur. Re-amended with 4.4 mL of 200g/L Na2SO4 stock solution to a target concentration of 200 mg/kg as Sulfur on Day 50. Weighed throughout the duration of the study to verify %moisture remained at 13%.

Notes:

*Number of bottles includes a duplicate used for repetitive sampling and screening by SiREM and sufficient replicates to submit duplicate samples for external lab analysis at the specified sampling points
DAP – diammonium phosphate
DI - deionized
g – gram
g/L – gram per liter
µL - microliter
mL – milliliter
mg - milligram
mg/kg – milligrams per kilogram
mg/L – milligrams per liter
mg/mL – milligrams per milliliter
NH_4Cl – ammonium chloride
Na NO_3 – sodium nitrate
Na_2SO_4 – sodium sulfate
% - percent

TABLE 3: SUMMARY OF MICROCOSM PH, NITROGEN, PHOSPHORUS, SULFATE, pH and % MOISTURE RESULTS
Hope Bay, Northern Canada

SiREM

Contol/Treatment	Date	Day	Treatment Replicate	F2 (C10-C16) µg/g	F3 (C16-C34) µg/g	F4 (C34-C50) µg/g	Ammonium-N mg/kg	Nitrate-N mg/kg	Nitrite-N mg/kg	Nitrogen (TKN) %dry	Phosphorus mg/kg	Sulpahte/Sulfur mg/kg/dry	pH	% Moisture	Comments
Aerobic Active Control Patch Location	30-Aug-11	-36	AAC Patch -1	3600	2100	--	--	<0.05	--	--	4.6	--	7.3	14.0	
			AAC Patch -2			--	--		--	--		--			
			Average Concentration	**3600**	**2100**			**ND**			**4.6**		**7.3**	**14**	
	5-Oct-11	0	AAC Patch -1	4200	3400	--	--	0.060	--	--	8.0	--	7.5	13	
			AAC Patch -2	4600	3500	--	--	0.070	--	--	7.2	--	7.5	15	
			Average Concentration	**4400**	**3450**			**0.065**			**7.6**		**7.5**	**14**	
	2-Nov-11	28	AAC Patch -1	4000	4800	630	1.2	0.31	--	--	7.1	--	--	15	
			AAC Patch -2	4400	4300	510	7.2	0.83	--	--	7.3	--	--	14	
			Average Concentration	**4200**	**4550**	**570**	**4.2**	**0.57**			**7.2**			**15**	
	7-Dec-11	63	AAC Patch -1	2400	3200	480	--	--	--	0.0060	6.1	--	7.5	12	
			AAC Patch -2	2800	4300	650	--	--	--	0.0070	6.4	--	7.6	8.0	
			Average Concentration	**2600**	**3750**	**565**				**0.0065**	**6.2**		**7.6**	**10**	
	18-Jan-12	105	AAC Patch -1	1900	3800	550	--	0.45	0.21	0.060	6.1	--	7.6	6.3	
			AAC Patch -2	1600	3700	520	--		0.15	0.070	9.3	--	7.7	5.3	
			Average Concentration	**1750**	**3750**	**535**		**0.45**	**0.18**	**0.065**	**7.7**		**7.7**	**5.8**	
	29-Feb-12	147	AAC Patch -1	1700	4600	600	--	1.69	0.21	0.070	10	--	7.5	13	
			AAC Patch -2	1400	4600	690	--	0.61	0.22	0.080	8.9	--	7.4	13	
			Average Concentration	**1550**	**4600**	**645**		**1.15**	**0.22**	**0.075**	**9.6**		**7.5**	**13**	
Aerobic Treatment EHC-O Amended Patch Location	5-Oct-11	0	EHC-O -Patch-1	4200	3400	--	--	0.060	--	--	15	--	8.7	13	Amended with 0.5g of EHC-O/200 g soil
			EHC-O Patch -2	4600	3500	--	--	0.060	--	--	12	--	8.6	15	
			Average Concentration	**4400**	**3450**			**0.060**			**13**		**8.7**	**14**	
	2-Nov-11	28	EHC-O -Patch-1	3600	4100	560	1.4	0.22	--	--	12	--	--	10	
			EHC-O Patch -2	5100	5700	750	<0.20	0.57	--	--	12	--	--	7.0	
			Average Concentration	**4350**	**4900**	**655**	**0.69**	**0.39**			**12**			**8.5**	
	24-Nov-11	50													Re-amended with 0.5 g of EHC-O/200 g soil
	7-Dec-11	63	EHC-O -Patch-1	2600	3800	590	--	--	--	0.0070	11	--	8.5	15	
			EHC-O Patch -2	2300	3100	470	--	--	--	0.0060	9.1	--	8.6	13	
			Average Concentration	**2450**	**3450**	**530**				**0.0065**	**10**		**8.6**	**14**	
	18-Jan-12	105	EHC-O -Patch-1	2000	3700	510	--	0.48	0.86	0.080	13	--	8.4	6.6	
			EHC-O Patch -2	1600	3500	490	--	0.38	0.50	0.070	13	--	8.4	13	
			Average Concentration	**1800**	**3600**	**500**		**0.43**	**0.68**	**0.075**	**13**		**8.4**	**9.8**	
	29-Feb-12	147	EHC-O -Patch-1	1400	3900	590	--	0.77	0.80	0.080	11	--	8.4	11	
			EHC-O Patch -2	2200	4600	620	--	0.51	0.44	0.060	7.7	--	8.3	12	
			Average Concentration	**1800**	**4250**	**605**		**0.64**	**0.62**	**0.070**	**9.3**		**8.4**	**12**	
Aerobic Nutrient Amended Patch Location	5-Oct-11	0	Aerobic Nutrient Patch-1	4200	3400	--	--	0.080	--	--	128	--	6.9	13	Amended with 189 mg of DAP/200 g soil
			Aerobic Nutrient Patch-2	4600	3500	--	--	0.080	--	--	140	--	6.9	15	
			Average Concentration	**4400**	**3450**			**0.080**			**134**		**6.9**	**14**	
	2-Nov-11	28	Aerobic Nutrient Patch-1	2200	3000	630	7.1	1.6	--	--	101	--	--	5.0	
			Aerobic Nutrient Patch-2	2400	3900	730	3.6	0.37	--	--	114	--	--	3.0	
			Average Concentration	**2300**	**3450**	**680**	**5.4**	**1.0**			**108**			**4.0**	
	24-Nov-11	50													Re-amended with1 mL of 153 mg/ml NH_4Cl
	7-Dec-11	63	Aerobic Nutrient Patch-1	1000	1900	680	--	--	--	0.11	100	--	6.5	11	
			Aerobic Nutrient Patch-2	1000	1900	590	--	--	--	0.12	103	--	6.6	15	
			Average Concentration	**1000**	**1900**	**635**				**0.12**	**101**		**6.6**	**13**	
	18-Jan-12	105	Aerobic Nutrient Patch-1	650	2300	440	--	0.44	0.088	0.13	110	--	6.5	6.6	
			Aerobic Nutrient Patch-2	720	2000	410	--	0.57	0.072	0.12	113	--	6.4	11	
			Average Concentration	**685**	**2150**	**425**		**0.51**	**0.080**	**0.13**	**112**		**6.5**	**8.8**	
	29-Feb-12	147	Aerobic Nutrient Patch-1	430	2300	470	--	0.56	<0.030	0.13	102	--	6.6	7.4	
			Aerobic Nutrient Patch-2	480	2600	440	--	0.58	<0.030	0.13	95	--	6.6	13	
			Average Concentration	**455**	**2450**	**455**		**0.57**	**ND**	**0.13**	**98**		**6.6**	**10**	
Aerobic Nutrient and EHC-O Amended Patch Location	5-Oct-11	0	Aerobic Nut/EHC-O Patch-1	4200	3400	--	--	0.080	--	--	288	--	8.5	13	
			Aerobic Nut/EHC-O Patch-2	4600	3500	--	--	0.080	--	--	274	--	8.4	15	
			Average Concentration	**4400**	**3450**			**0.080**			**281**		**8.5**	**14**	Amended with 189 mg of DAP/200 g soil, and 0.5 g EHC-O
	2-Nov-11	28	Aerobic Nut/EHC-O Patch-1	3000	4800	780	1.2	0.37	--	--	167	--	--	3.0	
			Aerobic Nut/EHC-O Patch-2	2100	3600	580	1.6	0.58	--	--	224	--	--	8.0	
			Average Concentration	**2550**	**4200**	**680**	**1.4**	**0.48**			**196**			**5.5**	
	24-Nov-11	50													Re-amended with 0.5 g of EHC-O, and 1 mL of 153 mg/ml NH_4Cl
	7-Dec-11	63	Aerobic Nut/EHC-O Patch-1	1800	3300	610	--	--	--	0.10	136	--	7.7	11	
			Aerobic Nut/EHC-O Patch-2	1600	3400	620	--	--	--	0.090	138	--	7.8	5.0	
			Average Concentration	**1700**	**3350**	**615**				**0.10**	**137**		**7.8**	**8.0**	
	18-Jan-12	105	Aerobic Nut/EHC-O Patch-1	920	2100	350	--	0.39	0.61	0.11	178	--	7.7	11	
			Aerobic Nut/EHC-O Patch-2	990	2600	450	--	0.46	0.50	0.10	197	--	7.8	5.4	
			Average Concentration	**955**	**2350**	**400**		**0.42**	**0.55**	**0.11**	**188**		**7.8**	**8.2**	
	29-Feb-12	147	Aerobic Nut/EHC-O Patch-1	780	2600	470	--	0.58	0.35	0.10	174	--	7.6	8.1	
			Aerobic Nut/EHC-O Patch-2	970	3100	560	--	0.64	0.31	0.10	157	--	7.0	5.8	
			Average Concentration	**875**	**2850**	**515**		**0.61**	**0.33**	**0.10**	**166**		**7.3**	**7.0**	
Active Control Windy Location	30-Aug-11	-36	AAC-1 -Windy	3000	460	--	--	0.10	--	--	1.7	--	6.5	15	
			AAC-2 -Windy			--	--	--	--	--		--			
			Average Concentration	**3000**	**460**			**0.10**			**1.7**		**6.5**	**15**	
	5-Oct-11	0	AAC-1 -Windy	3100	450	--	--	0.09	--	--	1.7	--	6.7	18	
			AAC-2 -Windy	2500	370	--	--	0.10	--	--	3.1	--	6.7	18	
			Average Concentration	**2800**	**410**			**0.10**			**2.4**		**6.7**	**18**	
	2-Nov-11	28	AAC-1 -Windy	2800	530	<2.0	<0.20	0.44	--	--	3.6	--	--	8.0	
			AAC-2 -Windy	3700	470	<2.0	3.1	1.9	--	--	4.7	--	--	18	
			Average Concentration	**3250**	**500**	**ND**	**1.5**	**1.2**			**4.2**			**13**	
	2-Dec-11	58													Bottles were sealed and transferred to the anaerobic chamber
	7-Dec-11	63	AAC-1 -Windy	1700	530	24	--	--	--	0.10	2.7	--	7.0	13	
			AAC-2 -Windy	1600	660	26	--	--	--	0.10	4.5	--	6.9	14	
			Average Concentration	**1650**	**595**	**25**				**0.10**	**3.6**		**7.0**	**14**	
	18-Jan-12	105	AAC-1 -Windy	1600	450	27	--	0.35	0.046	0.090	1.3	--	7.0	11	
			AAC-2 -Windy	1100	500	21	--	0.31	0.047	0.10	5.1	--	6.8	13	
			Average Concentration	**1350**	**475**	**24**		**0.33**	**0.046**	**0.10**	**3.2**		**6.9**	**12**	
	29-Feb-12	147	AAC-1 -Windy	1700	470	<2.0	--	0.58	<0.030	0.11	1.8	--	7.0	17	
			AAC-2 -Windy	2200	430	<2.0	--	0.46	<0.030	0.11	2.1	--	6.9	19	
			Average Concentration	**1950**	**450**	**ND**		**0.52**	**ND**	**0.11**	**1.9**		**7.0**	**18**	

TABLE 3: SUMMARY OF MICROCOSM PH, NITROGEN, PHOSPHORUS, SULFATE, pH and % MOISTURE RESULTS
Hope Bay, Northern Canada

Contol/Treatment	Date	Day	Treatment Replicate	F2 (C10-C16) µg/g	F3 (C16-C34) µg/g	F4 (C34-C50) µg/g	Ammonium-N mg/kg	Nitrate-N mg/kg	Nitrite-N mg/kg	Nitrogen (TKN) %dry	Phosphorus mg/kg	Sulpahte/Sulfur mg/kg/dry	pH	% Moisture	Comments
Aerobic Treatment EHC-O Amended Windy Location	5-Oct-11	0	EHC-O-1 -Windy	3100	450	--	--	0.11	--	--	8.8	--	8.4	18	Amended with 0.5 g EHC-O/200 g soil
			EHC-O-2 -Windy	2500	370	--	--	0.10	--	--	11.8	--	8.4	18	
			Average Concentration	**2800**	**410**			**0.11**			**10.3**		**8.4**	**18**	
	2-Nov-11	28	EHC-O-1 -Windy	2900	580	<2.0	<0.20	0.64	--	--	6.0	--	--	8	
			EHC-O-2 -Windy	3000	480	<2.0	<0.20	0.36	--	--	5.7	--	--	18	
			Average Concentration	**2950**	**530**	**ND**	**ND**	**0.50**			**5.8**			**13**	
	24-Nov-11	50													Re-amended with 0.5 g of EHC-O/200 g soil
	7-Dec-11	63	EHC-O-1 -Windy	2000	610	27	--	--	--	0.11	4.3	--	8.3	14	
			EHC-O-2 -Windy	1500	460	20	--	--	--	0.10	10.5	--	8.4	15	
			Average Concentration	**1750**	**535**	**24**				**0.11**	**7.4**		**8.4**	**15**	
	18-Jan-12	105	EHC-O-1 -Windy	760	380	23	--	0.54	0.57	0.09	3.5	--	8.2	11	
			EHC-O-2 -Windy	930	420	23	--	0.36	0.25	0.10	5.2	--	8.2	18	
			Average Concentration	**845**	**400**	**23**		**0.45**	**0.41**	**0.10**	**4.4**		**8.2**	**15**	
	29-Feb-12	147	EHC-O-1 -Windy	650	480	15	--	0.63	0.65	0.11	3.6	--	8.0	15	
			EHC-O-2 -Windy	750	510	26	--	1.09	0.47	0.10	4.1	--	8.1	21	
			Average Concentration	**700**	**495**	**21**		**0.86**	**0.56**	**0.11**	**3.8**		**8.1**	**18**	
Anaerobic Nitrate Amended Windy Location	5-Oct-11	0	NO_3-1 -Windy	3100	450	--	--	0.11	--	--	2.6	--	6.7	18	Amended with 30 µL of 200 g/L $NaNO_3$ stock solution
			NO_3-2-Windy	2500	370	--	--	0.12	--	--	5.4	--	6.7	18	
			Average Concentration	**2800**	**410**			**0.12**			**4.0**		**6.7**	**18**	
	2-Nov-11	28	NO_3-1 -Windy	3800	470	<2.0	<0.20	0.24	--	--	3.4	--	--	19	
			NO_3-2-Windy	4900	580	<2.0	<0.20	0.33	--	--	3.9	--	--	18	
			Average Concentration	**4350**	**525**	**ND**	**ND**	**0.28**			**3.6**			**19**	
	7-Dec-11	63	NO_3-1 -Windy	4100	730	24	--	--	--	0.11	2.4	--	7.1	19	
			NO_3-2-Windy	2600	510	22	--	--	--	0.10	4.3	--	7.1	19	
			Average Concentration	**3350**	**620**	**23**				**0.11**	**3.4**		**7.1**	**19**	
	22-Dec-11	78													Re-amended with 6.1 mL of 200g/L$NaNO_3$ stock solution
	18-Jan-12	105	NO_3-1 -Windy	2500	460	18	--	1740	0.061	0.32	90	--	6.7	20	
			NO_3-2-Windy	2100	380	18	--	1930	0.095	0.26	83	--	6.7	22	
			Average Concentration	**2300**	**420**	**18**		**1835**	**0.078**	**0.29**	**86**		**6.7**	**21**	
	29-Feb-12	147	NO_3-1 -Windy	3100	540	<2.0	--	2700	<0.030	0.26	93	--	6.6	19	
			NO_3-2-Windy	2800	480	14	--	2180	<0.030	0.23	73	--	6.7	21	
			Average Concentration	**2950**	**510**	**7.5**		**2440**	**ND**	**0.25**	**83**		**6.7**	**20**	
Anaerobic Sulfate Amended Windy Location	5-Oct-11	0	SO_4-1 -Windy	3100	450	--	--	0.10	--	--	2.3	--	6.6	18	Amended with 51 µL of 200 g/L Na_2SO_4 stock solution
			SO_4-2 -Windy	2500	370	--	--	0.10	--	--	1.8	--	6.6	18	
			Average Concentration	**2800**	**410**			**0.10**			**2.1**		**6.6**	**18**	
	2-Nov-11	28	SO_4-1 -Windy	3400	480	15	<0.20	0.16	--	--	4.7	--	--	16	
			SO_4-2 -Windy	4300	560	12	<0.20	0.11	--	--	3.3	--	--	18	
			Average Concentration	**3850**	**520**	**14**	**ND**	**0.14**			**4.0**			**17**	
	7-Dec-11	63	SO_4-1 -Windy	3500	640	18	--	--	--	0.10	2.3	120	6.9	17	
			SO_4-2 -Windy	3700	670	23	--	--	--	0.09	1.9	73	6.8	19	
			Average Concentration	**3600**	**655**	**21**				**0.10**	**2.1**	**96**	**6.9**	**18**	
	22-Dec-11	78													Re-amended with 4.4 mL of 200g/L Na_2SO_4 stock solution
	18-Jan-12	105	SO_4-1 -Windy	2700	450	21	--	2.7	0.074	0.12	102	1900	6.8	21	
			SO_4-2 -Windy	2500	450	21	--	0.33	0.065	0.11	106	2260	6.7	19	
			Average Concentration	**2600**	**450**	**21**		**1.5**	**0.069**	**0.12**	**104**	**2080**	**6.8**	**20**	
	29-Feb-12	147	SO_4-1 -Windy	3100	560	34	--	2.1	<0.030	0.11	73	777000	6.7	22	
			SO_4-2 -Windy	2500	460	12	--	1.6	<0.030	0.12	86	327000	6.8	21	
			Average Concentration	**2800**	**510**	**23**		**1.8**	**ND**	**0.12**	**79**	**552000**	**6.8**	**22**	

Notes:

AAC - aerobic active control
DAP - diammonium phosphate
µg/g - micrograms per gram
µL - microliter
mg - milligram
mg/kg - milligrams per kilogram
mg/L - milligram per liter
mL - milliliter
g- gram
g/L - grams per liter
ND - not detected
$NaNO_3$ - sodium nitrate
Na_2SO_4 - sodium sulfate
NH_4Cl - ammonium chloride
NO_3 - nitrate
SO_4 - sulfate
< - compound not detected, the associated value is the detected limit
% - percent
-- - not available/not applicable

TABLE 4: PERCENT REMOVAL OF PETROLEUM HYDROCARBONS IN MICROCOSMS

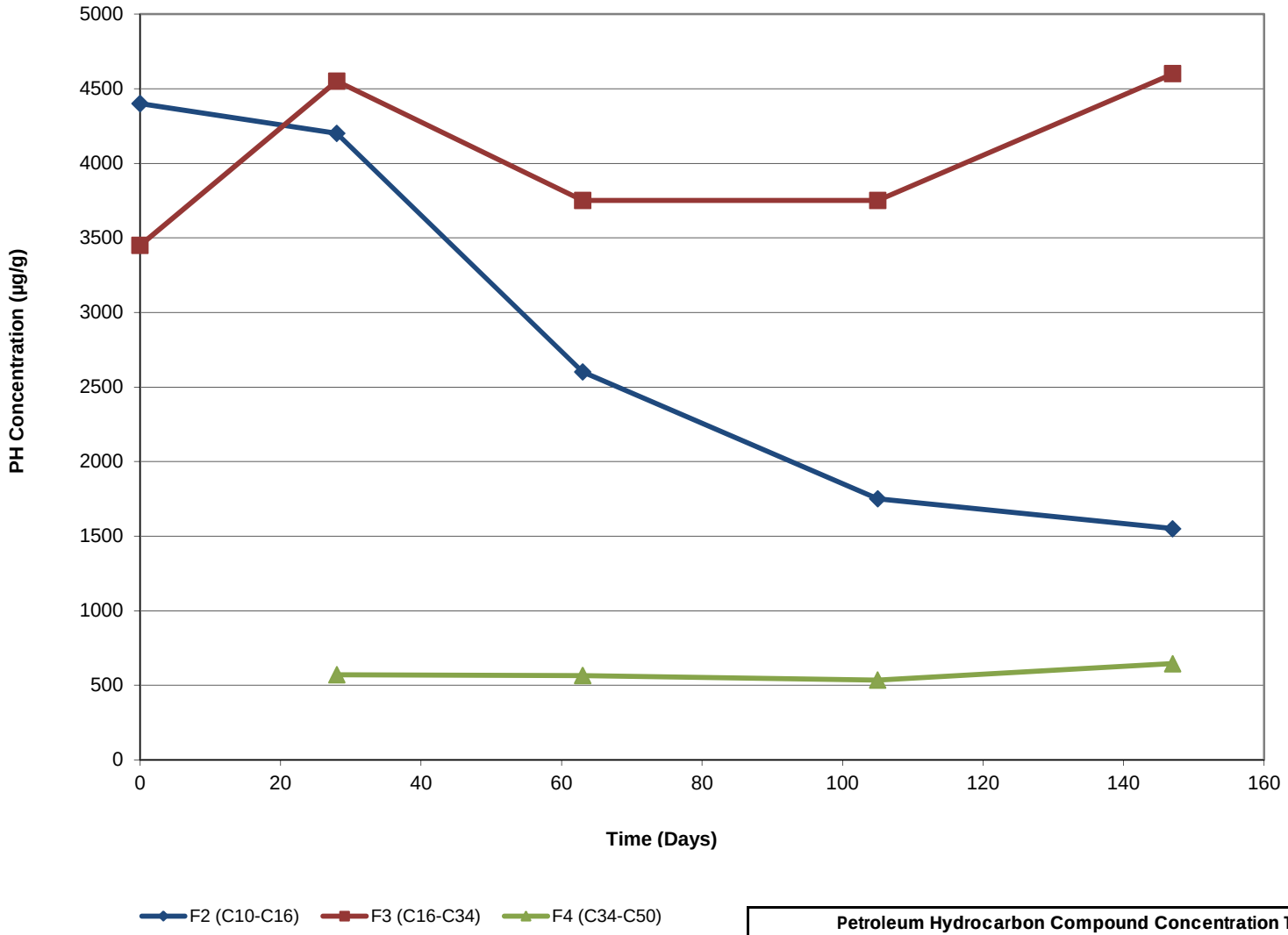
Hope Bay, Northern Canada

SiREM

Treatment	F2 (C10-C16)			F3 (C16-C34)			F4 (C34-C50)		
	% Removal	Initial [ ] (µg/g)	Final [ ] (µg/g)	**% Removal**	Initial [ ] (µg/g)	Final [ ] (µg/g)	**% Removal**	Initial [ ] (µg/g)	Final [ ] (µg/g)
Aerobic Active Control-Patch Location	65	4400	1550	~	3450	4600	~	570	645
Aerobic Treatment EHC-O Amended-Patch Location	59	4400	1800	~	3450	4250	8	655	605
Aerobic Nutrient Amended-Patch Location	90	4400	455	29	3450	2450	33	680	455
Aerobic Nutrient and EHC-O Amended-Patch Location	80	4400	875	17	3450	2850	24	680	515
Active Control-Windy Location	30	2800	1950	~	410	450	92	25	2
Aerobic Treatment EHC-O Amended-Windy Location	75	2800	700	~	410	495	13	24	21
Anaerobic Nitrate Amended-Windy Location	~	2800	2950	~	410	510	65	23	8
Anaerobc Sulfate Amended-Windy Location	~	2800	2800	~	410	510	~	14	23

Notes: % removal = {(initial concentration - final concentration)/initial concentration} * 100
% - percent
~ net degradation of compound was not detected over duration of study
[ ] - concentration
µg/g - microgram per gram

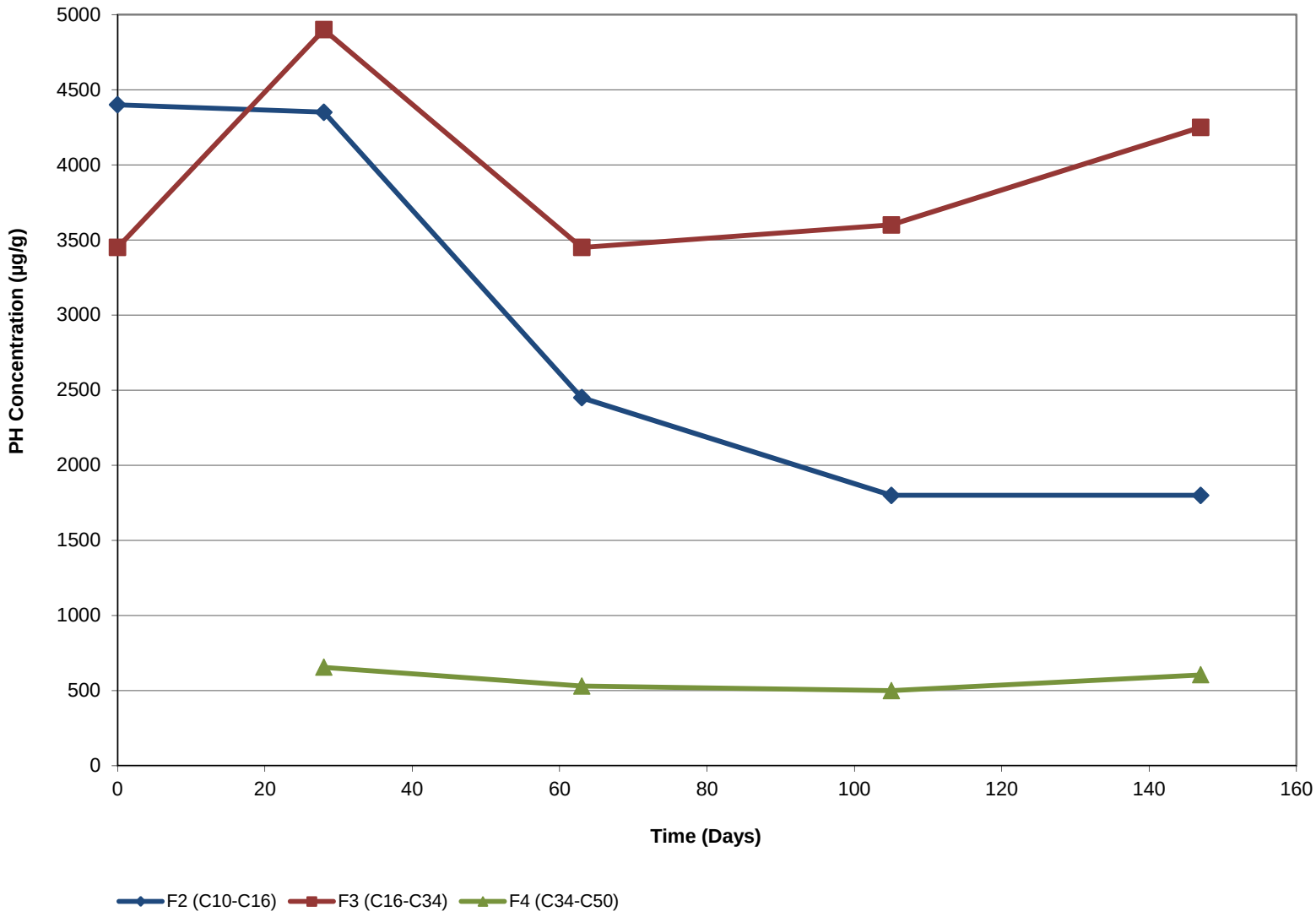
FIGURES



Petroleum Hydrocarbon Compound Concentration Trends in Aerobic Active Control Microcosms (Patch Location)

Hope Bay, Northern Canada

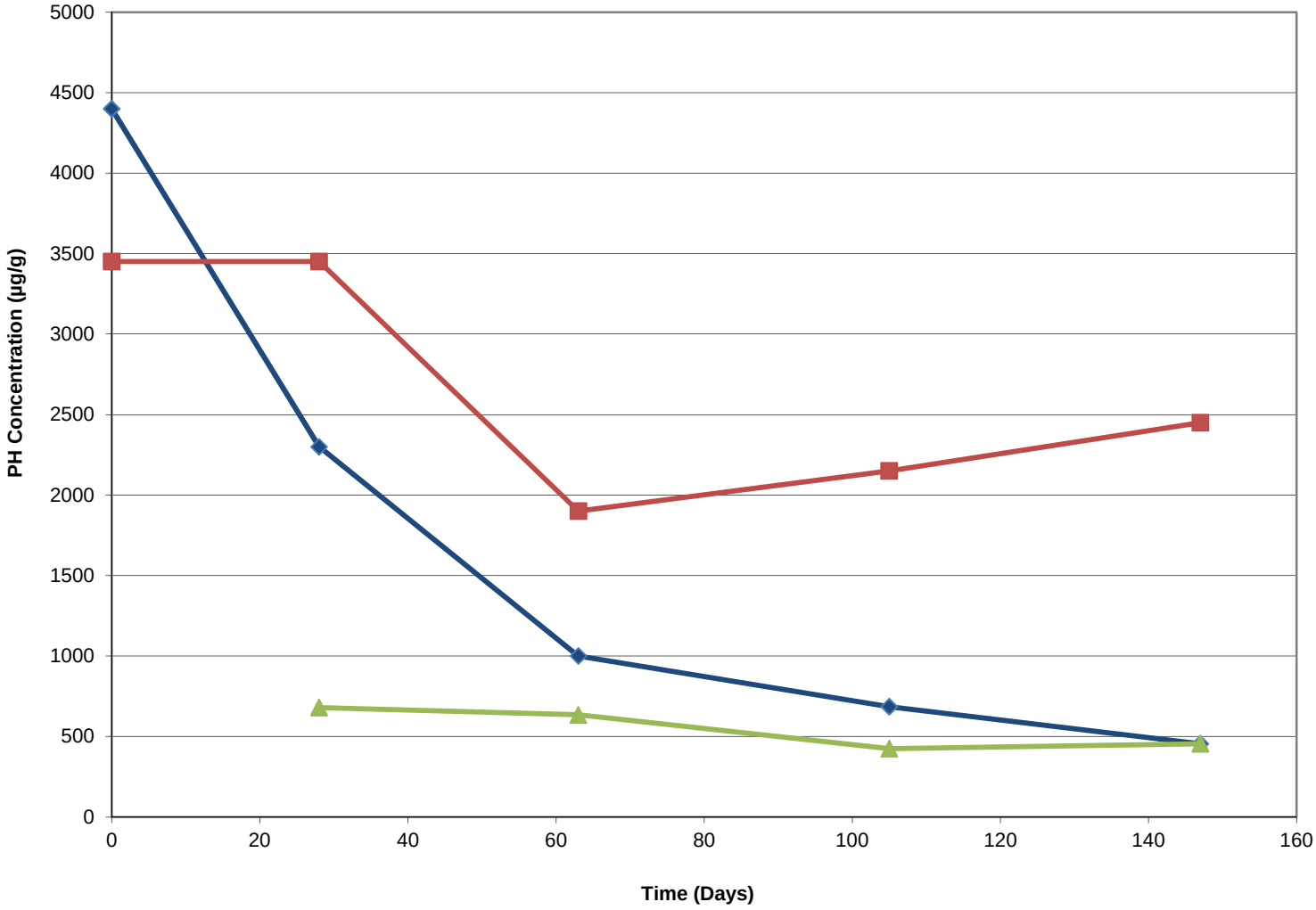
4-Jun-12	Figure: **1**	SiREM



Petroleum Hydrocarbon Compounds Concentration Trends in Aerobic Treatment EHC-O Amended Microcosms (Patch Location)

Hope Bay, Northern Canada

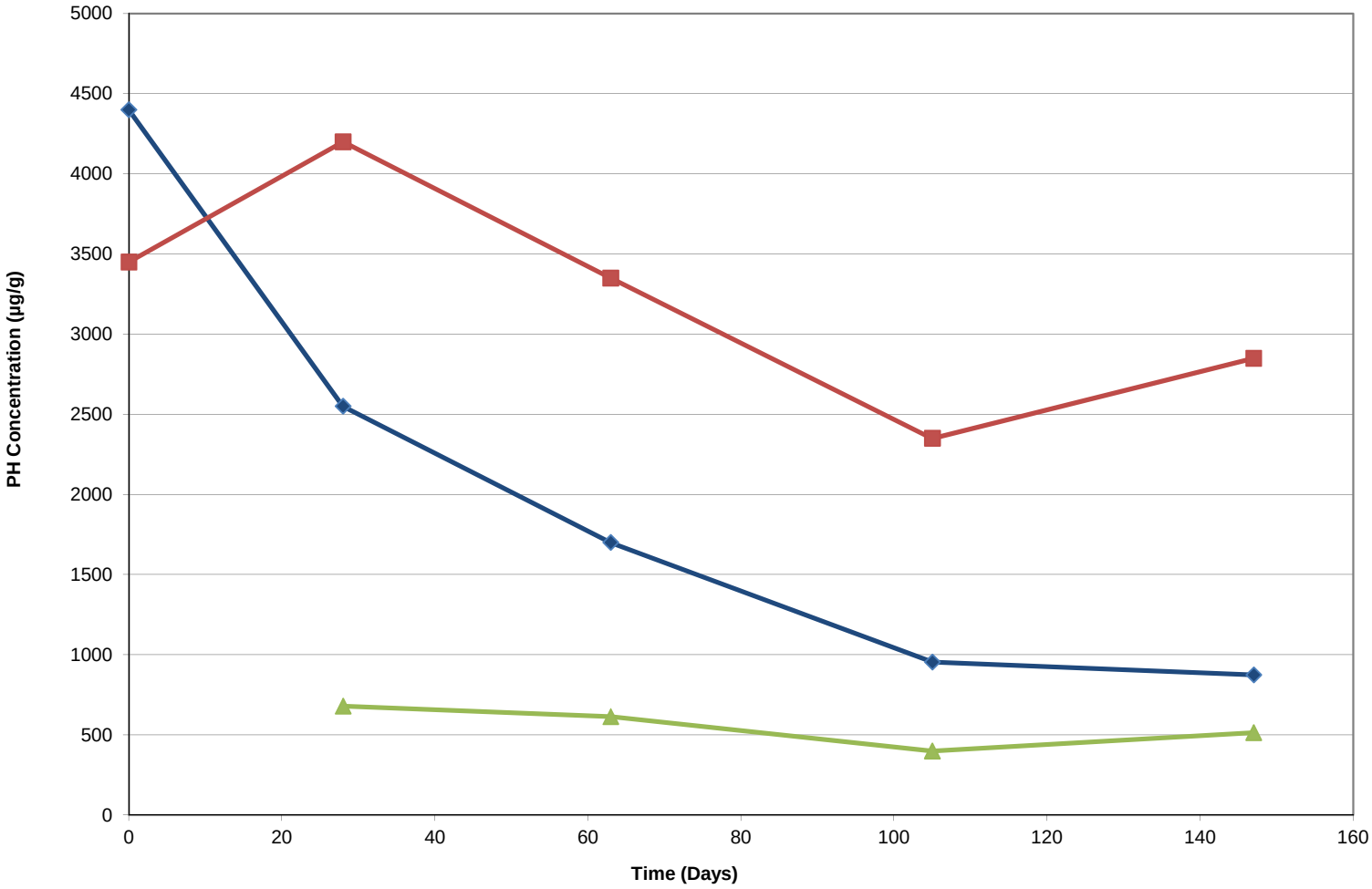
4-Jun-12	Figure: **2**	SiREM



Petroleum Hydrocarbon Compounds Concentration Trends in Aerobic Nutrient Amended Microcosms (Patch Location)

Hope Bay, Northern Canada

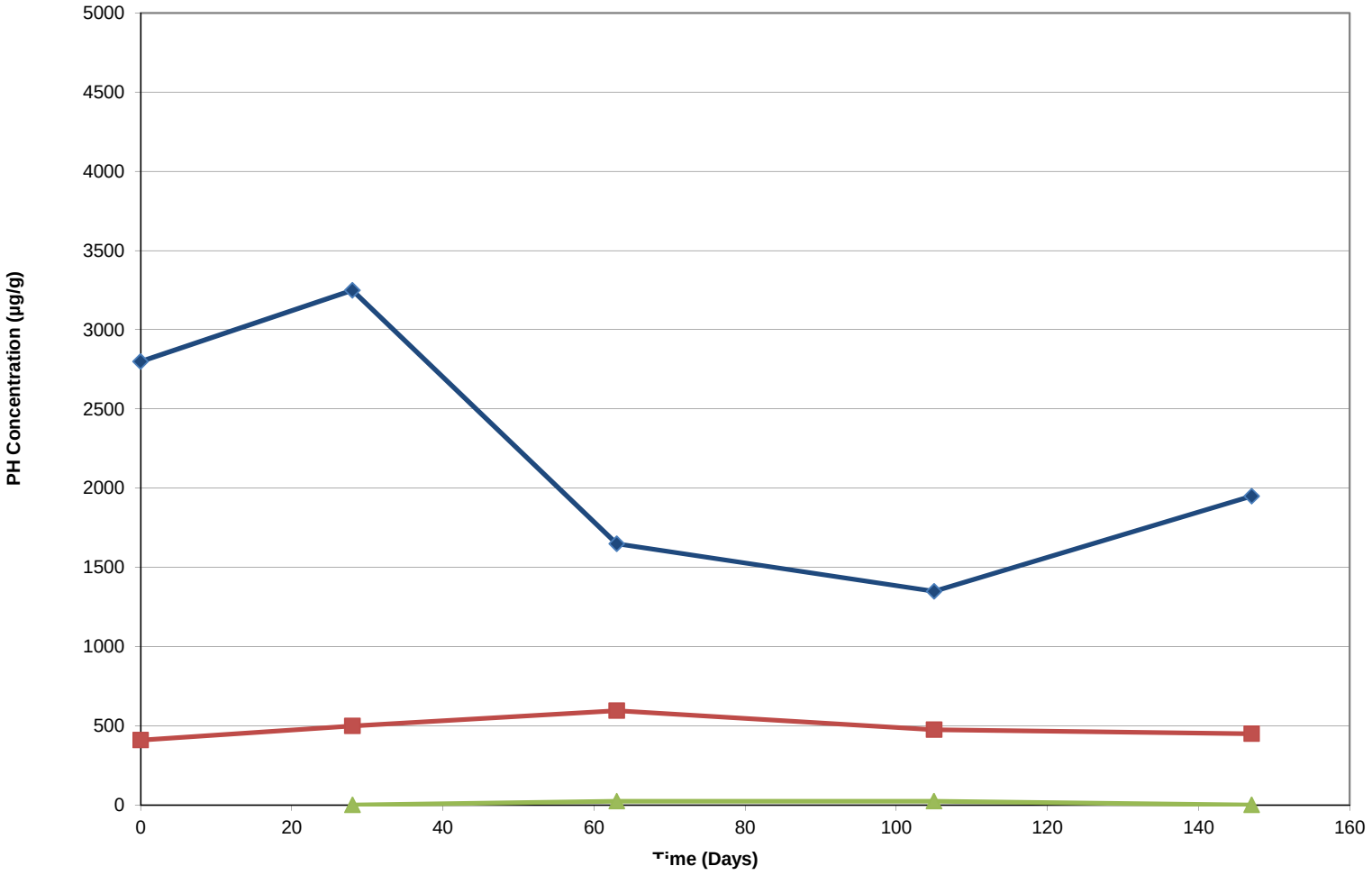
4-Jun-12	Figure: **3**	SiREM



Petroleum Hydrocarbon Compounds Concentration Trends in Aerobic Nutrient and EHC-O Amended Microcosms (Patch Location)

Hope Bay, Northern Canada

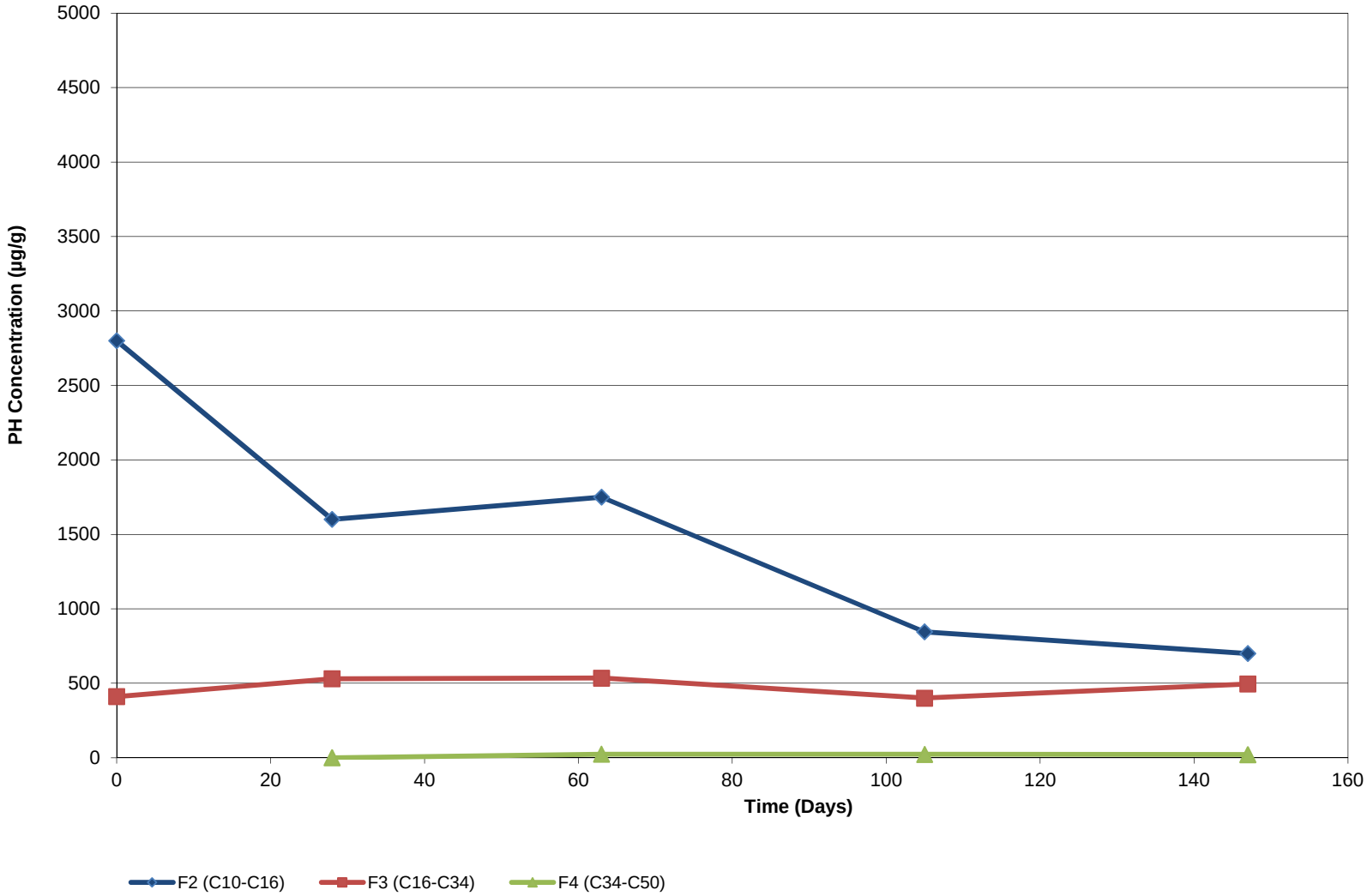
4-Jun-12	Figure: **4**	SiREM



Petroleum Hydrocarbon Compounds Concentration Trends in Active Control Microcosms (Windy Location)

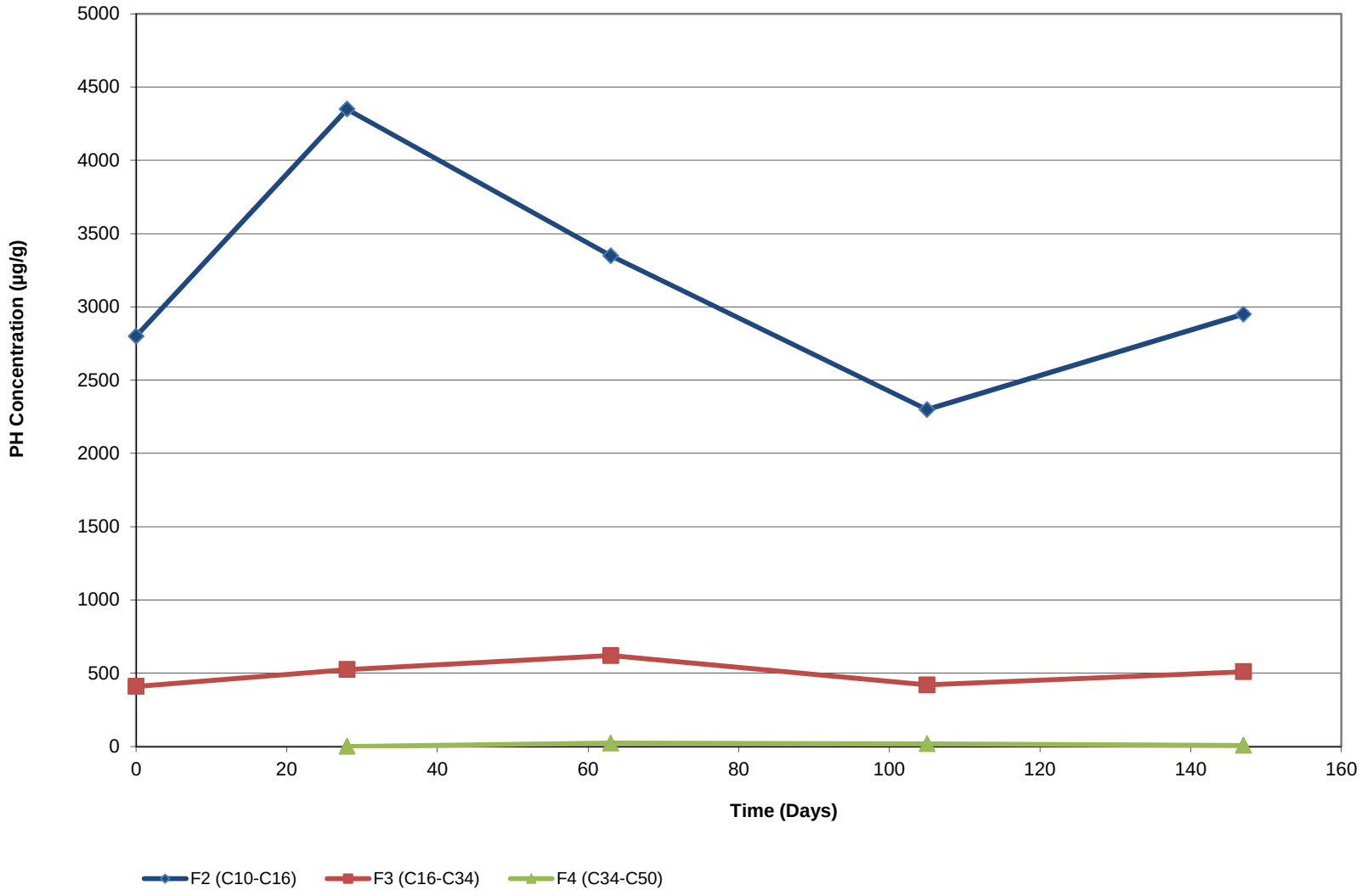
Hope Bay, Northern Canada

4-Jun-12	Figure: **5**	SiREM



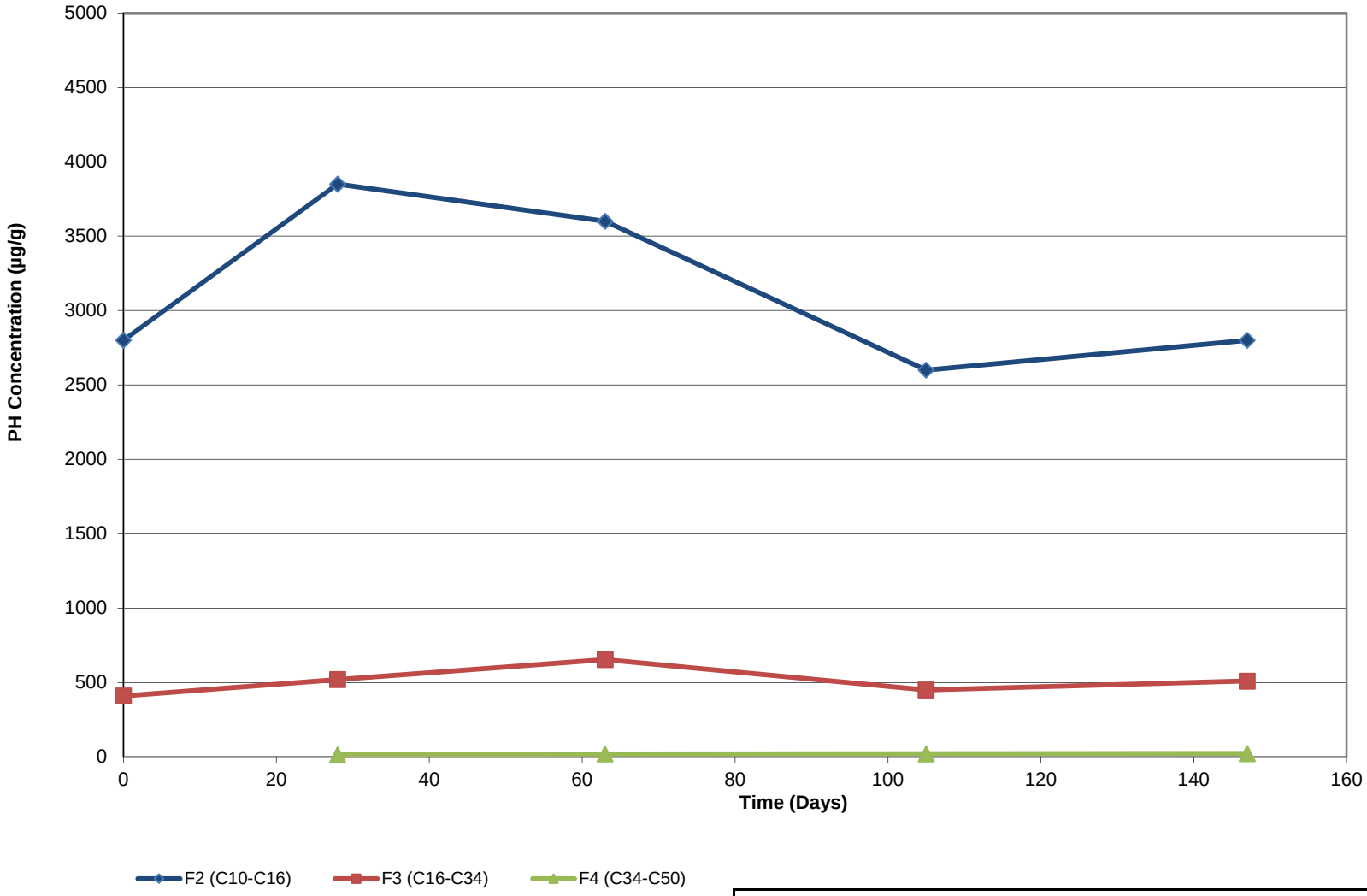
Petroleum Hydrocarbon Compounds Concentration Trends
in Aerobic Treatment EHC-O Amended Microcosms (Windy Location)
Hope Bay, Northern Canada

4-Jun-12	Figure: **6**	SiREM



Petroleum Hydrocarbon Compounds Concentration Trends
in Anaerobic Nitrate Amended Microcosms (Windy Location)
Hope Bay, Northern Canada

4-Jun-12	Figure: **7**	SiREM



Petroleum Hydrocarbon Compounds Concentration Trends
in Anaerobic Sulfate Amended Microcosms (Windy Location)
Hope Bay, Northern Canada

4-Jun-12	Figure: **8**	SiREM

APPENDIX A: Chain of Custody Documentation

Maxxam

Calgary: 4000 19st St. NE, T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-8889
www.maxxamanalytics.com

S-2306

Chain of Custody A050098

Page: 1 of 1

	Invoice To: C/O Report Address ☐	Report To: Same as Invoice ☒
Company:	EBA ENGINEERING	
Contact:	DANIELA FELSKE	
Address:	14940-123 AVE	
	Prov: EDMONTON PC: AB T5V 1B4	PC:
Contact #s:	Ph: 780-451-2121 Cell:	Ph: Cell:

Report Distribution (E-Mail):
dfelske@eba.ca
mhebert@eba.ca
bhorne@eba.ca

REGULATORY GUIDELINES:
☐ AT1
☐ CCME
☐ Regulated Drinking Water
☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #:	Y22101187.001
Project # / Name:	
Site Location:	ST-P274-01011
Quote #:	
Sampled By:	D. FELSKE

SERVICE REQUESTED: ☐ **RUSH** (Contact lab to reserve) **Date Required:** ☐ REGULAR (5 to 7 Days)

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00
#1	WINDY COMPOSITE			
2	W2-20			
3	W4-10			See Quote
4	W2-8			
#2	PATCH P5-3			BIOTREATABILITY
6	COMPOSITE P3-7			
7	P1-3			
8				
9				
10				
11				
12				

SOIL: BTEX F1-F4; Sieve (75 micron); Regulated Metals (CCME / AT1); Salinity 4; Assessment ICP Metals; Basic Class II Landfill

WATER: ☐BTEX F1; ☐BTEX F1-F2; ☐VOCs; ☐BTEX F1-F4; ☐ Routine Water ☐ Turb ☐ F; ☐ TOC ☐ DOC; Regulated Metals (CCME / AT1) Total / Dissolved; Mercury ☐ Total ☐ Dissolved

Other Analysis

HOLD - Do not Analyze

# of Containers Submitted

Please indicate Filtered, Preserved or Both (F, P, F/P) → F/P

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
DFELSKE	AUG 22, 2011	9:00
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions:

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #:		
N. Ward	23/Aug/11	10:45	Custody Seal	Temperature	Ice

Lab Comments:

Maxxam Analytics International Corporation o/a Maxxam Analytics

APPENDIX B: Summary of Percent Moisture and Water Holding Capacity Results

APPENDIX B: SUMMARY OF BASELINE MOISTURE CONTENT AND SOIL WATER HOLDING CAPACITY

Sample	Dish Weight (g)	Dish + Wet Sample (g)	Dish + Sample Dried @ 100C 16hr (g)	% Dry Matter	% Moisture	average
Windy-1	2.05	13.00	11.70	88.13%	11.87%	
Windy-2	2.05	13.35	11.80	86.28%	13.72%	12.79%
Windy-3	2.05	13.00	11.60	87.21%	12.79%	
Patch-1	2.10	16.40	14.55	87.06%	12.94%	
Patch-2	2.10	16.60	14.65	86.55%	13.45%	13.25%
Patch-3	2.10	18.95	16.70	86.65%	13.35%	

Sample	Sample Weight (g)	Buret Reading Start (ml)	Buret Reading Finish (ml)	Total Water Used (ml)	Total Water Holding Capacity (ml/g)	Percent Water Holding Capacity per gram (%)	Average Water Holding Capacity (ml/g)
Windy-1	10.00	3.50	7.30	3.80	0.38	38.00%	
Windy-2	10.00	7.30	12.50	5.20	0.52	52.00%	0.47
Windy-3	10.00	12.60	17.60	5.00	0.50	50.00%	
Patch-1	10.00	17.60	21.90	4.30	0.43	43.00%	
Patch-2	10.00	21.90	25.70	3.80	0.38	38.00%	0.39
Patch-3	10.00	25.70	29.30	3.60	0.36	36.00%	

APPENDIX C: Summary of Nutrient and Moisture Amendment Calculations for Treatment Microcosms

APPENDIX C: SUMMARY OF NUTRIENT AND MOISTURE AMENDMENT CALCULATIONS FOR TREATMENT MICROCOSMS

%Moisture = 13.25%
water holding capacity (WHC) = 0.39 ml/g

In 200g of soil (each treatment contains 200 g of soil)
(200 g) * (13.25%)
= 26.5 g of water in 200 g of soil

0.39 ml/g * 200 g soil
= 78 ml of water, but we want to use 50% WHC (as per proposal)
=78/2 = 39 mL
39 ml -26.5ml = 12.5 ml of water/treatment
Therefore we added 12.5mL of water per bottle to reach 50% of the WHC

N Calculation

N is the limiting factor as beyond 200 mg/kg it can be toxic
200mg/14mg/mmol (M.W of N)
=14.3 mmol of N

Used Diammonium Phosphate (NH4)2 HPO4
2 N in each mole of DAP
therefore 14.3/2= 7.15 mmol of DAP needed

7.15 mmol * 132 mg/mmol (MW of DAP)
= 943 mg/kg of DAP needed
943mg/kg / 5
= 189 mg of DAP/200 g soil

P Calculation

How much P was added in the 189 mg of DAP?
7.15 mmol of DAP * 31 mg/mmol (MW of P)
= 222 mg of P added.

Therefore, in 189 mg of DAP added to each bottle there was 200 mg/kg of N and 222 mg/kg of P added

APPENDIX C: SUMMARY OF NUTRIENT AND MOISTURE AMENDMENT CALCULATIONS FOR TREATMENT MICROCOSMS

Initial amendment was based on the estimated amount of water in each bottle.

NO3

Volume of water in each 200 g of soil= % Moisture

%Moisture of Windy Soil is 12.79% (measured. Re
WHC of Windy soil 0.47 ml/g (measured. Refer to 2nd sheet)

12.79% * 200g of soil = 25.6 ml of water in 200 g soil

WHC of 200 g of soil
0.47 ml/g * 200 g of soil = 94 ml of water
but we want to use 50% of WHC (as per proposal)
94/2= 47 ml

47 ml - 25.6 ml= 21.4 ml of water/treatment
We only added 10.7 ml because beyond this we found it would saturate the soil

Volume of water in 200 g of soil 25.6 ml + 10.7 ml = 36 ml

NO3 Target is 2mM (2mmol/L) as beyond this may be toxic

1mM NO3 = 62 mg/L
2mM NO3 = 124 mg/L

How many mmoles of NO3 in 2mM target
x mmol NO3 = 0.036 L water * 2mmol/L
x= 0.072 mmol NO3/200 g of soil

Calculation is based on the amount of water in the treatment bottles as the amount in the water is available to microorganisms.
Please see below for the calculation for how muchwas added per 200g of soil

We made a 200 g/L stock of NaNO3 which has a molecular weight of 84.99 g/mol

mmols in NaNO3 stock
= 1L* (200g/L)* (1mmol/84.99)*(1000mg/g)
= 2400 mmol/L

How much of this stock is needed to get 0.072 mmol of NO3 in 200 g of soil
=0.072mmol* (1L/2400mmol) * (1000 ml/1 L)
= 0.03 ml
= 30 uL
Therefore added 30 ul of a 200g/L NaNO3 stock to each NO3 bottle

How much N was added per 200g soil

We know that we need 0.072 mmol of NO3 per 200 g of soil to have 2mM (124 mg/L) NO3 target

MW of N = 14mg/mmol
0.072 mmol NO3 * 14 mg/mmol = 1.01 mg N added per 200g
or
1.01mg/200g * 1000g/1kg = 5.1 mg N/kg soil

How much NO3 was added per 200g soil
MW of NO3 = 62 mg/mol
therefore , 0.072 mmol NO3 * 62 mg/mmol
= 4.5 mg NO3 added per 200 g
4.5mg *5
= 22.5 mg NO3/kg

APPENDIX C: SUMMARY OF NUTRIENT AND MOISTURE AMENDMENT CALCULATIONS FOR TREATMENT MICROCOSMS

SO4
Know there's 36 ml of water/ 200g of soil

Calculation is based on the amount of water in the treatment bottles as the amount in the water is available to microorganisms.
Please see below for the calculation for how muchwas added per 200g of soil

Target 2mM of SO4
1mM= 96.1 mg/L
2mM= 192.2 mg/L

Howm many mmoles of SO4 in 2mM target?
xmmol SO4=0.036L water * 2mmol/L
=0.072 mmol SO4/200g of soil

Made 200g/L Na2 SO4 stock with MW of 142.1mg/mmol
How much SO4 is in this stock
=200g/L *(1mmol/142.1mg)(1000mg/1g)
= 1407 mmol SO4 in stock

How much of this stock is needed to get 0.072 mmol of SO4 in 200 g of soil
= 0.072 mmol * (1L/1407 mmol) *(1000 ml/1L)
= 0.051 ml
= 51 µL
Therefore added 51 ul of a 200g/L Na2SO4 stock to each SO4 bottle

How much SO4 was added per 200g soil
MW of SO = 96 mg/mmol
0.072 mmol SO4 * 96 mg/mmol = 6.91 mg of SO4/ 200 g of soil
6.91*5
= 34.6 mg SO4/kg soil

APPENDIX D: Maxxam Analytics Analytical Reports

Your Project #: S-2306
Your C.O.C. #: 3251

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2011/09/06

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B1D3370
Received: 2011/08/31, 10:10

Sample Matrix: SOLID
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Petroleum Hydrocarbons F2-F4 in Soil	2	2011/09/02	2011/09/03	CAM SOP-00316	CCME CWS
Moisture	2	N/A	2011/09/02	CAM SOP-00445	McKeague 2nd ed 1978

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act.

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 the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

../2

Your Project #: S-2306
Your C.O.C. #: 3251

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2011/09/06

CERTIFICATE OF ANALYSIS

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

JOLANTA GORALCZYK, Project Manager
Email: JGoralczyk@maxxam.ca
Phone# (905) 817-5700

==========

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Total cover pages: 2

Maxxam Job #: B1D3370
Report Date: 2011/09/06

SiREM - Site Recovery & Management
Client Project #: S-2306

RESULTS OF ANALYSES OF SOLID

Maxxam ID		KS7364	KS7365		
Sampling Date		2011/08/30	2011/08/30		
COC Number		3251	3251		
	Units	**WINDY-083011-A-BASELINE**	**PATCH-083011-A-BASELINE**	**RDL**	**QC Batch**
Inorganics					
Moisture	%	14	15	1	2602990

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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 #: B1D3370
Report Date: 2011/09/06

SiREM - Site Recovery & Management
Client Project #: S-2306

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		KS7364	KS7365		
Sampling Date		2011/08/30	2011/08/30		
COC Number		3251	3251		
	Units	**WINDY-083011-A-BASELINE**	**PATCH-083011-A-BASELINE**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons					
F2 (C10-C16 Hydrocarbons)	ug/g	3000	3600	10	2602748
F3 (C16-C34 Hydrocarbons)	ug/g	460	2100	10	2602748
Reached Baseline at C50	ug/g	Yes	Yes		2602748
Surrogate Recovery (%)					
o-Terphenyl	%	105	110		2602748

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B1D3370
Report Date: 2011/09/06

SiREM - Site Recovery & Management
Client Project #: S-2306

Test Summary

Maxxam ID	KS7364	**Collected**	2011/08/30
Sample ID	WINDY-083011-A-BASELINE	**Shipped**	
Matrix	SOLID	**Received**	2011/08/31

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2602748	2011/09/02	2011/09/03	JOLANTA KAWZOWICZ
Moisture	BAL	2602990	N/A	2011/09/02	LAKHVIR KALER

Maxxam ID	KS7365	**Collected**	2011/08/30
Sample ID	PATCH-083011-A-BASELINE	**Shipped**	
Matrix	SOLID	**Received**	2011/08/31

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2602748	2011/09/02	2011/09/03	JOLANTA KAWZOWICZ
Moisture	BAL	2602990	N/A	2011/09/02	LAKHVIR KALER

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Maxxam Job #: B1D3370
Report Date: 2011/09/06

SiREM - Site Recovery & Management
Client Project #: S-2306

GENERAL COMMENTS

Results relate only to the items tested.

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SiREM - Site Recovery & Management
Attention: Ximena Druar
Client Project #: S-2306
P.O. #:
Site Location:

Quality Assurance Report

Maxxam Job Number: MB1D3370

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
2602748	JKA	Matrix Spike	o-Terphenyl	2011/09/03		98	%	30 - 130
			F2 (C10-C16 Hydrocarbons)	2011/09/03		92	%	60 - 130
			F3 (C16-C34 Hydrocarbons)	2011/09/03		86	%	60 - 130
		Spiked Blank	o-Terphenyl	2011/09/03		99	%	30 - 130
			F2 (C10-C16 Hydrocarbons)	2011/09/03		87	%	60 - 130
			F3 (C16-C34 Hydrocarbons)	2011/09/03		86	%	60 - 130
		Method Blank	o-Terphenyl	2011/09/02		103	%	30 - 130
			F2 (C10-C16 Hydrocarbons)	2011/09/02	2 U, MDL=2		ug/g	
			F3 (C16-C34 Hydrocarbons)	2011/09/02	2 U, MDL=2		ug/g	
		RPD	F2 (C10-C16 Hydrocarbons)	2011/09/03	NC		%	50
			F3 (C16-C34 Hydrocarbons)	2011/09/03	NC		%	50
2602990	BOP	RPD	Moisture	2011/09/02	4.0		%	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 to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
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 (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

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Validation Signature Page

Maxxam Job #: B1D3370

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

CRISTINA CARRIERE, Scientific Services

MEDHAT RISKALLAH, Manager, Hydrocarbon Department

==========

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Your Project #: EBA STUDY
Your C.O.C. #: NA

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2011/10/13

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B1F6082
Received: 2011/10/06, 12:45

Sample Matrix: Soil
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Petroleum Hydrocarbons F2-F4 in Soil	4	2011/10/08	2011/10/12	CAM SOP-00316	CCME CWS
Moisture	4	N/A	2011/10/12	CAM SOP-00445	McKeague 2nd ed 1978

Remarks:

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* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

../2

Your Project #: EBA STUDY
Your C.O.C. #: NA

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2011/10/13

CERTIFICATE OF ANALYSIS

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Please direct all questions regarding this Certificate of Analysis to your Project Manager.

JOLANTA GORALCZYK, Project Manager
Email: JGoralczyk@maxxam.ca
Phone# (905) 817-5700

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Total cover pages: 2

Maxxam Job #: B1F6082
Report Date: 2011/10/13

SiREM - Site Recovery & Management
Client Project #: EBA STUDY

RESULTS OF ANALYSES OF SOIL

Maxxam ID		LE3089	LE3090	LE3091	LE3092		
Sampling Date		2011/10/05	2011/10/05	2011/10/05	2011/10/05		
COC Number		NA	NA	NA	NA		
	Units	**EBA-PATCH-1 (T=O)**	**EBA-PATCH-2 (T=O)**	**EBA-WINDY-9 (T=O)**	**EBA-WINDY-10 (T=O)**	**RDL**	**QC Batch**
Inorganics							
Moisture	%	13	15	18	18	1	2645297

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B1F6082
Report Date: 2011/10/13

SiREM - Site Recovery & Management
Client Project #: EBA STUDY

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		LE3089	LE3090	LE3091	LE3092		
Sampling Date		2011/10/05	2011/10/05	2011/10/05	2011/10/05		
COC Number		NA	NA	NA	NA		
	Units	**EBA-PATCH-1 (T=O)**	**EBA-PATCH-2 (T=O)**	**EBA-WINDY-9 (T=O)**	**EBA-WINDY-10 (T=O)**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	4200	4600	3100	2500	10	2642136
F3 (C16-C34 Hydrocarbons)	ug/g	3400	3500	450	370	10	2642136
Surrogate Recovery (%)							
o-Terphenyl	%	113	112	108	106		2642136

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B1F6082
Report Date: 2011/10/13

SiREM - Site Recovery & Management
Client Project #: EBA STUDY

Test Summary

Maxxam ID LE3089 **Collected** 2011/10/05
Sample ID EBA-PATCH-1 (T=O) **Shipped**
Matrix Soil **Received** 2011/10/06

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2642136	2011/10/08	2011/10/12	DORINA POPA
Moisture	BAL	2645297	N/A	2011/10/12	LAKHVIR KALER

Maxxam ID LE3090 **Collected** 2011/10/05
Sample ID EBA-PATCH-2 (T=O) **Shipped**
Matrix Soil **Received** 2011/10/06

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2642136	2011/10/08	2011/10/12	DORINA POPA
Moisture	BAL	2645297	N/A	2011/10/12	LAKHVIR KALER

Maxxam ID LE3091 **Collected** 2011/10/05
Sample ID EBA-WINDY-9 (T=O) **Shipped**
Matrix Soil **Received** 2011/10/06

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2642136	2011/10/08	2011/10/12	DORINA POPA
Moisture	BAL	2645297	N/A	2011/10/12	LAKHVIR KALER

Maxxam ID LE3092 **Collected** 2011/10/05
Sample ID EBA-WINDY-10 (T=O) **Shipped**
Matrix Soil **Received** 2011/10/06

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2642136	2011/10/08	2011/10/12	DORINA POPA
Moisture	BAL	2645297	N/A	2011/10/12	LAKHVIR KALER

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Maxxam Job #: B1F6082
Report Date: 2011/10/13

SiREM - Site Recovery & Management
Client Project #: EBA STUDY

GENERAL COMMENTS

Results relate only to the items tested.

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SiREM - Site Recovery & Management
Attention: Ximena Druar
Client Project #: EBA STUDY
P.O. #:
Site Location:

Quality Assurance Report

Maxxam Job Number: MB1F6082

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
2642136	DPO	Matrix Spike	o-Terphenyl	2011/10/12		111	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/10/12		100	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2011/10/12		95	%	50 - 130
		Spiked Blank	o-Terphenyl	2011/10/12		101	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/10/12		86	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2011/10/12		81	%	70 - 130
		Method Blank	o-Terphenyl	2011/10/12		105	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/10/12	2 U, MDL=2		ug/g	
			F3 (C16-C34 Hydrocarbons)	2011/10/12	2 J, MDL=2		ug/g	
		RPD	F2 (C10-C16 Hydrocarbons)	2011/10/12	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2011/10/12	NC		%	30
2645297	PHM	RPD	Moisture	2011/10/12	0		%	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 to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
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 (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

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Validation Signature Page

Maxxam Job #: B1F6082

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

CRISTINA CARRIERE, Scientific Services

MEDHAT RISKALLAH, Manager, Hydrocarbon Department

==========

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Your Project #: EBA
Your C.O.C. #: NA

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2011/11/09

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B1H2500
Received: 2011/11/03, 10:01

Sample Matrix: Soil
Samples Received: 16

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Petroleum Hydrocarbons F2-F4 in Soil	16	2011/11/08	2011/11/09	CAM SOP-00316	CCME CWS
Moisture	16	N/A	2011/11/08	CAM SOP-00445	McKeague 2nd ed 1978

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act.

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 the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

../2

Your Project #: EBA
Your C.O.C. #: NA

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2011/11/09

CERTIFICATE OF ANALYSIS

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

JOLANTA GORALCZYK, Project Manager
Email: JGoralczyk@maxxam.ca
Phone# (905) 817-5700

==========

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Total cover pages: 2

Maxxam Job #: B1H2500
Report Date: 2011/11/09

SiREM - Site Recovery & Management
Client Project #: EBA

RESULTS OF ANALYSES OF SOIL

Maxxam ID		LM4253	LM4254	LM4255	LM4256	LM4257		
Sampling Date		2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25		
COC Number		NA	NA	NA	NA	NA		
	Units	**PATCH-021111-1**	**PATCH-021111-2**	**PATCH-021111-3**	**PATCH-021111-4**	**PATCH-021111-5**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	15	14	10	7	5	1	2675242

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		LM4258	LM4259	LM4260	LM4261	LM4262		
Sampling Date		2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25		
COC Number		NA	NA	NA	NA	NA		
	Units	**PATCH-021111-6**	**PATCH-021111-7**	**PATCH-021111-8**	**WINDY-021111-9**	**WINDY-021111-10**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	3	3	8	8	18	1	2675242

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		LM4263	LM4264	LM4265	LM4266	LM4267		
Sampling Date		2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25		
COC Number		NA	NA	NA	NA	NA		
	Units	**WINDY-021111-11**	**WINDY-021111-12**	**WINDY-021111-13**	**WINDY-021111-14**	**WINDY-021111-15**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	8	18	19	18	16	1	2675242

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B1H2500
Report Date: 2011/11/09

SiREM - Site Recovery & Management
Client Project #: EBA

RESULTS OF ANALYSES OF SOIL

Maxxam ID		LM4268		
Sampling Date		2011/11/02 15:25		
COC Number		NA		
	Units	**WINDY-021111-16**	**RDL**	**QC Batch**
Inorganics				
Moisture	%	18	1	2675242

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B1H2500
Report Date: 2011/11/09

SiREM - Site Recovery & Management
Client Project #: EBA

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		LM4253	LM4254	LM4255	LM4256		
Sampling Date		2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25		
COC Number		NA	NA	NA	NA		
	Units	**PATCH-021111-1**	**PATCH-021111-2**	**PATCH-021111-3**	**PATCH-021111-4**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	4000	4400	3600	5100	10	2674767
F3 (C16-C34 Hydrocarbons)	ug/g	4800	4300	4100	5700	10	2674767
F4 (C34-C50 Hydrocarbons)	ug/g	630	510	560	750	10	2674767
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2674767
Surrogate Recovery (%)							
o-Terphenyl	%	126	127	120	127		2674767

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		LM4257	LM4258	LM4259	LM4260		
Sampling Date		2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25		
COC Number		NA	NA	NA	NA		
	Units	**PATCH-021111-5**	**PATCH-021111-6**	**PATCH-021111-7**	**PATCH-021111-8**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	2200	2400	3000	2100	10	2674767
F3 (C16-C34 Hydrocarbons)	ug/g	3000	3900	4800	3600	10	2674767
F4 (C34-C50 Hydrocarbons)	ug/g	630	730	780	580	10	2674767
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2674767
Surrogate Recovery (%)							
o-Terphenyl	%	122	128	127	120		2674767

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B1H2500
Report Date: 2011/11/09

SiREM - Site Recovery & Management
Client Project #: EBA

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		LM4261	LM4262	LM4263	LM4264		
Sampling Date		2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25		
COC Number		NA	NA	NA	NA		
	Units	**WINDY-021111-9**	**WINDY-021111-10**	**WINDY-021111-11**	**WINDY-021111-12**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	2800	3700	2900	3000	10	2674767
F3 (C16-C34 Hydrocarbons)	ug/g	530	550	580	480	10	2674767
F4 (C34-C50 Hydrocarbons)	ug/g	2 U	2 U	2 U	11	10	2674767
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2674767
Surrogate Recovery (%)							
o-Terphenyl	%	126	120	127	126		2674767

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		LM4265	LM4266	LM4267	LM4268		
Sampling Date		2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25		
COC Number		NA	NA	NA	NA		
	Units	**WINDY-021111-13**	**WINDY-021111-14**	**WINDY-021111-15**	**WINDY-021111-16**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	3800	4900	3400	4300	10	2674767
F3 (C16-C34 Hydrocarbons)	ug/g	470	580	480	560	10	2674767
F4 (C34-C50 Hydrocarbons)	ug/g	2 U	2 U	15	12	10	2674767
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2674767
Surrogate Recovery (%)							
o-Terphenyl	%	129	127	126	128		2674767

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B1H2500
Report Date: 2011/11/09

SiREM - Site Recovery & Management
Client Project #: EBA

Test Summary

Maxxam ID LM4253 **Collected** 2011/11/02
Sample ID PATCH-021111- 1 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4254 **Collected** 2011/11/02
Sample ID PATCH-021111- 2 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4255 **Collected** 2011/11/02
Sample ID PATCH-021111- 3 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4256 **Collected** 2011/11/02
Sample ID PATCH-021111- 4 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4257 **Collected** 2011/11/02
Sample ID PATCH-021111- 5 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4258 **Collected** 2011/11/02
Sample ID PATCH-021111- 6 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam Job #: B1H2500
Report Date: 2011/11/09

SiREM - Site Recovery & Management
Client Project #: EBA

Test Summary

Maxxam ID LM4259 **Collected** 2011/11/02
Sample ID PATCH-021111- 7 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4260 **Collected** 2011/11/02
Sample ID PATCH-021111- 8 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4261 **Collected** 2011/11/02
Sample ID WINDY-021111- 9 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4262 **Collected** 2011/11/02
Sample ID WINDY-021111- 10 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4263 **Collected** 2011/11/02
Sample ID WINDY-021111- 11 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4264 **Collected** 2011/11/02
Sample ID WINDY-021111- 12 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam Job #: B1H2500
Report Date: 2011/11/09

SiREM - Site Recovery & Management
Client Project #: EBA

Test Summary

Maxxam ID LM4265 **Collected** 2011/11/02
Sample ID WINDY-021111- 13 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4266 **Collected** 2011/11/02
Sample ID WINDY-021111- 14 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4267 **Collected** 2011/11/02
Sample ID WINDY-021111- 15 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4268 **Collected** 2011/11/02
Sample ID WINDY-021111- 16 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

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Maxxam Job #: B1H2500
Report Date: 2011/11/09

SiREM - Site Recovery & Management
Client Project #: EBA

GENERAL COMMENTS

Results relate only to the items tested.

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SiREM - Site Recovery & Management
Attention: Ximena Druar
Client Project #: EBA
P.O. #:
Site Location:

Quality Assurance Report

Maxxam Job Number: MB1H2500

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
2674767	BWW	Matrix Spike	o-Terphenyl	2011/11/09		125	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/11/09		118	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2011/11/09		123	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2011/11/09		125	%	50 - 130
		Spiked Blank	o-Terphenyl	2011/11/08		120	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/11/08		101	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2011/11/08		106	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2011/11/08		109	%	70 - 130
		Method Blank	o-Terphenyl	2011/11/08		109	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/11/08	2 U, MDL=2		ug/g	
			F3 (C16-C34 Hydrocarbons)	2011/11/08	6 J, MDL=2		ug/g	
			F4 (C34-C50 Hydrocarbons)	2011/11/08	2 U, MDL=2		ug/g	
		RPD	F2 (C10-C16 Hydrocarbons)	2011/11/09	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2011/11/09	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2011/11/09	NC		%	30
2675242	VK	RPD	Moisture	2011/11/08	4.1		%	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 to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
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 (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

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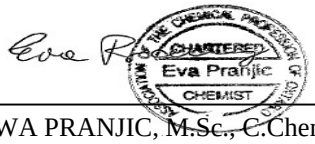
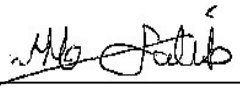
Validation Signature Page

Maxxam Job #: B1H2500

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



MAMDOUH SALIB, Analyst, Hydrocarbons

==========

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Your Project #: EBA STUDY
Your C.O.C. #: 2102

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2011/12/14

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B1J3468
Received: 2011/12/08, 08:47

Sample Matrix: Soil
Samples Received: 16

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Petroleum Hydrocarbons F2-F4 in Soil	16	2011/12/12	2011/12/13	CAM SOP-00316	CCME CWS
Moisture	16	N/A	2011/12/13	CAM SOP-00445	McKeague 2nd ed 1978

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act.

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 the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

../2

Your Project #: EBA STUDY
Your C.O.C. #: 2102

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2011/12/14

CERTIFICATE OF ANALYSIS

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

JOLANTA GORALCZYK, Project Manager
Email: JGoralczyk@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.

Total cover pages: 2

Maxxam Job #: B1J3468
Report Date: 2011/12/14

SiREM - Site Recovery & Management
Client Project #: EBA STUDY

RESULTS OF ANALYSES OF SOIL

Maxxam ID		LX3359	LX3360	LX3361	LX3362	LX3363		
Sampling Date		2011/12/07	2011/12/07	2011/12/07	2011/12/07	2011/12/07		
COC Number		2102	2102	2102	2102	2102		
	Units	**PATCH-071211-1**	**PATCH-071211-2**	**PATCH-071211-3**	**PATCH-071211-4**	**PATCH-071211-5**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	12	8	15	13	11	1	2712156

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		LX3364	LX3365	LX3366	LX3367	LX3368		
Sampling Date		2011/12/07	2011/12/07	2011/12/07	2011/12/07	2011/12/07		
COC Number		2102	2102	2102	2102	2102		
	Units	**PATCH-071211-6**	**PATCH-071211-7**	**PATCH-071211-8**	**WINDY-071211-9**	**WINDY-071211-10**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	15	11	5	13	14	1	2712156

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		LX3369	LX3370	LX3371	LX3372	LX3373		
Sampling Date		2011/12/07	2011/12/07	2011/12/07	2011/12/07	2011/12/07		
COC Number		2102	2102	2102	2102	2102		
	Units	**WINDY-071211-11**	**WINDY-071211-12**	**WINDY-071211-13**	**WINDY-071211-14**	**WINDY-071211-15**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	14	15	19	19	17	1	2712156

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		LX3374		
Sampling Date		2011/12/07		
COC Number		2102		
	Units	**WINDY-071211-16**	**RDL**	**QC Batch**
Inorganics				
Moisture	%	19	1	2712156

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B1J3468
Report Date: 2011/12/14

SiREM - Site Recovery & Management
Client Project #: EBA STUDY

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		LX3359	LX3360	LX3361	LX3362		
Sampling Date		2011/12/07	2011/12/07	2011/12/07	2011/12/07		
COC Number		2102	2102	2102	2102		
	Units	**PATCH-071211-1**	**PATCH-071211-2**	**PATCH-071211-3**	**PATCH-071211-4**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	2400	2800	2600	2300	10	2710899
F3 (C16-C34 Hydrocarbons)	ug/g	3200	4300	3800	3100	10	2710899
F4 (C34-C50 Hydrocarbons)	ug/g	480	650	590	470	10	2710899
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2710899
Surrogate Recovery (%)							
o-Terphenyl	%	102	104	106	100		2710899

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		LX3363	LX3364	LX3365	LX3366		
Sampling Date		2011/12/07	2011/12/07	2011/12/07	2011/12/07		
COC Number		2102	2102	2102	2102		
	Units	**PATCH-071211-5**	**PATCH-071211-6**	**PATCH-071211-7**	**PATCH-071211-8**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	1000	1000	1800	1600	10	2710899
F3 (C16-C34 Hydrocarbons)	ug/g	1900	1900	3300	3400	10	2710899
F4 (C34-C50 Hydrocarbons)	ug/g	410	380	610	620	10	2710899
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2710899
Surrogate Recovery (%)							
o-Terphenyl	%	98	102	106	100		2710899

RDL = Reportable Detection Limit
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Maxxam Job #: B1J3468
Report Date: 2011/12/14

SiREM - Site Recovery & Management
Client Project #: EBA STUDY

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		LX3367	LX3368	LX3369	LX3370		
Sampling Date		2011/12/07	2011/12/07	2011/12/07	2011/12/07		
COC Number		2102	2102	2102	2102		
	Units	**WINDY-071211-9**	**WINDY-071211-10**	**WINDY-071211-11**	**WINDY-071211-12**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	1700	1600	2000	1500	10	2710899
F3 (C16-C34 Hydrocarbons)	ug/g	530	660	610	460	10	2710899
F4 (C34-C50 Hydrocarbons)	ug/g	24	26	27	20	10	2710899
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2710899
Surrogate Recovery (%)							
o-Terphenyl	%	94	96	95	93		2710899

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		LX3371	LX3372	LX3373	LX3374		
Sampling Date		2011/12/07	2011/12/07	2011/12/07	2011/12/07		
COC Number		2102	2102	2102	2102		
	Units	**WINDY-071211-13**	**WINDY-071211-14**	**WINDY-071211-15**	**WINDY-071211-16**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	4100	2600	3500	3700	10	2710899
F3 (C16-C34 Hydrocarbons)	ug/g	730	510	640	670	10	2710899
F4 (C34-C50 Hydrocarbons)	ug/g	24	22	18	23	10	2710899
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2710899
Surrogate Recovery (%)							
o-Terphenyl	%	96	95	95	93		2710899

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B1J3468
Report Date: 2011/12/14

SiREM - Site Recovery & Management
Client Project #: EBA STUDY

Test Summary

Maxxam ID LX3359 **Collected** 2011/12/07
Sample ID PATCH-071211-1 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3360 **Collected** 2011/12/07
Sample ID PATCH-071211-2 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3361 **Collected** 2011/12/07
Sample ID PATCH-071211-3 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3362 **Collected** 2011/12/07
Sample ID PATCH-071211-4 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3363 **Collected** 2011/12/07
Sample ID PATCH-071211-5 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3364 **Collected** 2011/12/07
Sample ID PATCH-071211-6 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

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Report Date: 2011/12/14

SiREM - Site Recovery & Management
Client Project #: EBA STUDY

Test Summary

Maxxam ID LX3365 **Collected** 2011/12/07
Sample ID PATCH-071211-7 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3366 **Collected** 2011/12/07
Sample ID PATCH-071211-8 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3367 **Collected** 2011/12/07
Sample ID WINDY-071211-9 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3368 **Collected** 2011/12/07
Sample ID WINDY-071211-10 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3369 **Collected** 2011/12/07
Sample ID WINDY-071211-11 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3370 **Collected** 2011/12/07
Sample ID WINDY-071211-12 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

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Maxxam Job #: B1J3468
Report Date: 2011/12/14

SiREM - Site Recovery & Management
Client Project #: EBA STUDY

Test Summary

Maxxam ID LX3371 **Collected** 2011/12/07
Sample ID WINDY-071211-13 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3372 **Collected** 2011/12/07
Sample ID WINDY-071211-14 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3373 **Collected** 2011/12/07
Sample ID WINDY-071211-15 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3374 **Collected** 2011/12/07
Sample ID WINDY-071211-16 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

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Maxxam Job #: B1J3468
Report Date: 2011/12/14

SiREM - Site Recovery & Management
Client Project #: EBA STUDY

GENERAL COMMENTS

Results relate only to the items tested.

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SiREM - Site Recovery & Management
Attention: Ximena Druar
Client Project #: EBA STUDY
P.O. #:
Site Location:

Quality Assurance Report

Maxxam Job Number: MB1J3468

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
2710899	ZZ	Matrix Spike	o-Terphenyl	2011/12/13		100	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/12/13		113	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2011/12/13		105	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2011/12/13		116	%	50 - 130
		Spiked Blank	o-Terphenyl	2011/12/13		91	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/12/13		101	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2011/12/13		96	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2011/12/13		106	%	70 - 130
		Method Blank	o-Terphenyl	2011/12/13		92	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/12/13	2.0 U, MDL=2.0		ug/g	
			F3 (C16-C34 Hydrocarbons)	2011/12/13	3.8 J, MDL=2.0		ug/g	
			F4 (C34-C50 Hydrocarbons)	2011/12/13	2.0 U, MDL=2.0		ug/g	
		RPD	F2 (C10-C16 Hydrocarbons)	2011/12/13	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2011/12/13	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2011/12/13	NC		%	30
2712156	PHM	RPD	Moisture	2011/12/13	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 to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
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 (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

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Validation Signature Page

Maxxam Job #: B1J3468

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

CRISTINA CARRIERE, Scientific Services

MEDHAT RISKALLAH, Manager, Hydrocarbon Department

==========

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Your Project #: EBA DTUDY
Your C.O.C. #: 2119

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2012/01/25

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B208557
Received: 2012/01/19, 09:15

Sample Matrix: Soil
Samples Received: 16

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Petroleum Hydrocarbons F2-F4 in Soil	16	2012/01/23	2012/01/24	CAM SOP-00316	CCME CWS
Moisture	16	N/A	2012/01/23	CAM SOP-00445	R.Carter,1993

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

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 the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

../2

Your Project #: EBA DTUDY
Your C.O.C. #: 2119

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2012/01/25

CERTIFICATE OF ANALYSIS

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

JOLANTA GORALCZYK, Project Manager
Email: JGoralczyk@maxxam.ca
Phone# (905) 817-5700

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Total cover pages: 2

Maxxam Job #: B208557
Report Date: 2012/01/25

SiREM - Site Recovery & Management
Client Project #: EBA DTUDY

RESULTS OF ANALYSES OF SOIL

Maxxam ID		MH1219	MH1220	MH1221	MH1222	MH1223		
Sampling Date		2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40		
COC Number		2119	2119	2119	2119	2119		
	Units	**PATCH-18112-1**	**PATCH-18112-2**	**PATCH-18112-3**	**PATCH-18112-4**	**PATCH-18112-5**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	6.3	5.3	6.6	13	6.6	1.0	2743915

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MH1224	MH1225	MH1226	MH1227	MH1228		
Sampling Date		2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40		
COC Number		2119	2119	2119	2119	2119		
	Units	**PATCH-18112-6**	**PATCH-18112-7**	**PATCH-18112-8**	**WINDY-18112-9**	**WINDY-18112-10**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	11	11	5.4	11	13	1.0	2743915

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MH1229	MH1230	MH1231	MH1232	MH1233		
Sampling Date		2012/01/18	2012/01/18	2012/01/18	2012/01/18	2012/01/18		
COC Number		2119	2119	2119	2119	2119		
	Units	**WINDY-18112-11**	**WINDY-18112-12**	**WINDY-18112-13**	**WINDY-18112-14**	**WINDY-18112-15**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	11	18	20	22	21	1.0	2743915

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MH1234		
Sampling Date		2012/01/18		
COC Number		2119		
	Units	**WINDY-18112-16**	**RDL**	**QC Batch**
Inorganics				
Moisture	%	19	1.0	2743915

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B208557
Report Date: 2012/01/25

SiREM - Site Recovery & Management
Client Project #: EBA DTUDY

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		MH1219	MH1220	MH1221	MH1222		
Sampling Date		2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40		
COC Number		2119	2119	2119	2119		
	Units	**PATCH-18112-1**	**PATCH-18112-2**	**PATCH-18112-3**	**PATCH-18112-4**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	1900	1600	2000	1600	10	2743578
F3 (C16-C34 Hydrocarbons)	ug/g	3900	3800	3700	3500	10	2743578
F4 (C34-C50 Hydrocarbons)	ug/g	550	520	510	490	10	2743578
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2743578
Surrogate Recovery (%)							
o-Terphenyl	%	94	98	95	93		2743578

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MH1223	MH1224	MH1225	MH1226		
Sampling Date		2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40		
COC Number		2119	2119	2119	2119		
	Units	**PATCH-18112-5**	**PATCH-18112-6**	**PATCH-18112-7**	**PATCH-18112-8**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	650	720	920	990	10	2743578
F3 (C16-C34 Hydrocarbons)	ug/g	2300	2000	2100	2600	10	2743578
F4 (C34-C50 Hydrocarbons)	ug/g	440	410	350	450	10	2743578
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2743578
Surrogate Recovery (%)							
o-Terphenyl	%	87	87	89	90		2743578

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B208557
Report Date: 2012/01/25

SiREM - Site Recovery & Management
Client Project #: EBA DTUDY

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		MH1227	MH1228	MH1229	MH1230		
Sampling Date		2012/01/18 02:40	2012/01/18 02:40	2012/01/18	2012/01/18		
COC Number		2119	2119	2119	2119		
	Units	**WINDY-18112-9**	**WINDY-18112-10**	**WINDY-18112-11**	**WINDY-18112-12**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	1600	1100	760	930	10	2743578
F3 (C16-C34 Hydrocarbons)	ug/g	450	500	380	420	10	2743578
F4 (C34-C50 Hydrocarbons)	ug/g	27	21	23	23	10	2743578
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2743578
Surrogate Recovery (%)							
o-Terphenyl	%	87	89	97	90		2743578

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MH1231	MH1232	MH1233	MH1234		
Sampling Date		2012/01/18	2012/01/18	2012/01/18	2012/01/18		
COC Number		2119	2119	2119	2119		
	Units	**WINDY-18112-13**	**WINDY-18112-14**	**WINDY-18112-15**	**WINDY-18112-16**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	2500	2100	2700	2500	10	2743578
F3 (C16-C34 Hydrocarbons)	ug/g	460	380	450	450	10	2743578
F4 (C34-C50 Hydrocarbons)	ug/g	18	18	21	21	10	2743578
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2743578
Surrogate Recovery (%)							
o-Terphenyl	%	89	87	88	91		2743578

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B208557
Report Date: 2012/01/25

SiREM - Site Recovery & Management
Client Project #: EBA DTUDY

RESULTS OF ANALYSES OF SOIL

Maxxam ID		MH1219	MH1220	MH1221	MH1222	MH1223		
Sampling Date		2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40		
COC Number		2119	2119	2119	2119	2119		
	Units	**PATCH-18112-1**	**PATCH-18112-2**	**PATCH-18112-3**	**PATCH-18112-4**	**PATCH-18112-5**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	6.3	5.3	6.6	13	6.6	1.0	2743915

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MH1224	MH1225	MH1226	MH1227	MH1228		
Sampling Date		2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40		
COC Number		2119	2119	2119	2119	2119		
	Units	**PATCH-18112-6**	**PATCH-18112-7**	**PATCH-18112-8**	**WINDY-18112-9**	**WINDY-18112-10**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	11	11	5.4	11	13	1.0	2743915

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MH1229	MH1230	MH1231	MH1232	MH1233		
Sampling Date		2012/01/18	2012/01/18	2012/01/18	2012/01/18	2012/01/18		
COC Number		2119	2119	2119	2119	2119		
	Units	**WINDY-18112-11**	**WINDY-18112-12**	**WINDY-18112-13**	**WINDY-18112-14**	**WINDY-18112-15**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	11	18	20	22	21	1.0	2743915

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MH1234		
Sampling Date		2012/01/18		
COC Number		2119		
	Units	**WINDY-18112-16**	**RDL**	**QC Batch**
Inorganics				
Moisture	%	19	1.0	2743915

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B208557
Report Date: 2012/01/25

SiREM - Site Recovery & Management
Client Project #: EBA DTUDY

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		MH1219	MH1220	MH1221	MH1222		
Sampling Date		2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40		
COC Number		2119	2119	2119	2119		
	Units	**PATCH-18112-1**	**PATCH-18112-2**	**PATCH-18112-3**	**PATCH-18112-4**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	1900	1600	2000	1600	10	2743578
F3 (C16-C34 Hydrocarbons)	ug/g	3900	3800	3700	3500	10	2743578
F4 (C34-C50 Hydrocarbons)	ug/g	550	520	510	490	10	2743578
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2743578
Surrogate Recovery (%)							
o-Terphenyl	%	94	98	95	93		2743578

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MH1223	MH1224	MH1225	MH1226		
Sampling Date		2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40		
COC Number		2119	2119	2119	2119		
	Units	**PATCH-18112-5**	**PATCH-18112-6**	**PATCH-18112-7**	**PATCH-18112-8**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	650	720	920	990	10	2743578
F3 (C16-C34 Hydrocarbons)	ug/g	2300	2000	2100	2600	10	2743578
F4 (C34-C50 Hydrocarbons)	ug/g	440	410	350	450	10	2743578
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2743578
Surrogate Recovery (%)							
o-Terphenyl	%	87	87	89	90		2743578

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B208557
Report Date: 2012/01/25

SiREM - Site Recovery & Management
Client Project #: EBA DTUDY

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		MH1227	MH1228	MH1229	MH1230		
Sampling Date		2012/01/18 02:40	2012/01/18 02:40	2012/01/18	2012/01/18		
COC Number		2119	2119	2119	2119		
	Units	**WINDY-18112-9**	**WINDY-18112-10**	**WINDY-18112-11**	**WINDY-18112-12**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	1600	1100	760	930	10	2743578
F3 (C16-C34 Hydrocarbons)	ug/g	450	500	380	420	10	2743578
F4 (C34-C50 Hydrocarbons)	ug/g	27	21	23	23	10	2743578
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2743578
Surrogate Recovery (%)							
o-Terphenyl	%	87	89	97	90		2743578

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MH1231	MH1232	MH1233	MH1234		
Sampling Date		2012/01/18	2012/01/18	2012/01/18	2012/01/18		
COC Number		2119	2119	2119	2119		
	Units	**WINDY-18112-13**	**WINDY-18112-14**	**WINDY-18112-15**	**WINDY-18112-16**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	2500	2100	2700	2500	10	2743578
F3 (C16-C34 Hydrocarbons)	ug/g	460	380	450	450	10	2743578
F4 (C34-C50 Hydrocarbons)	ug/g	18	18	21	21	10	2743578
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2743578
Surrogate Recovery (%)							
o-Terphenyl	%	89	87	88	91		2743578

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B208557
Report Date: 2012/01/25

SiREM - Site Recovery & Management
Client Project #: EBA DTUDY

Test Summary

Maxxam ID MH1219 **Collected** 2012/01/18
Sample ID PATCH-18112-1 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1220 **Collected** 2012/01/18
Sample ID PATCH-18112-2 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1221 **Collected** 2012/01/18
Sample ID PATCH-18112-3 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1222 **Collected** 2012/01/18
Sample ID PATCH-18112-4 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1223 **Collected** 2012/01/18
Sample ID PATCH-18112-5 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1224 **Collected** 2012/01/18
Sample ID PATCH-18112-6 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

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Maxxam Job #: B208557
Report Date: 2012/01/25

SiREM - Site Recovery & Management
Client Project #: EBA DTUDY

Test Summary

Maxxam ID MH1219 **Collected** 2012/01/18
Sample ID PATCH-18112-1 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1220 **Collected** 2012/01/18
Sample ID PATCH-18112-2 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1221 **Collected** 2012/01/18
Sample ID PATCH-18112-3 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1222 **Collected** 2012/01/18
Sample ID PATCH-18112-4 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1223 **Collected** 2012/01/18
Sample ID PATCH-18112-5 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1224 **Collected** 2012/01/18
Sample ID PATCH-18112-6 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

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Maxxam Job #: B208557
Report Date: 2012/01/25

SiREM - Site Recovery & Management
Client Project #: EBA DTUDY

Test Summary

Maxxam ID MH1225 **Collected** 2012/01/18
Sample ID PATCH-18112-7 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1226 **Collected** 2012/01/18
Sample ID PATCH-18112-8 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1227 **Collected** 2012/01/18
Sample ID WINDY-18112-9 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1228 **Collected** 2012/01/18
Sample ID WINDY-18112-10 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1229 **Collected** 2012/01/18
Sample ID WINDY-18112-11 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1230 **Collected** 2012/01/18
Sample ID WINDY-18112-12 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

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Maxxam Job #: B208557
Report Date: 2012/01/25

SiREM - Site Recovery & Management
Client Project #: EBA DTUDY

Test Summary

Maxxam ID MH1231 **Collected** 2012/01/18
Sample ID WINDY-18112-13 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1232 **Collected** 2012/01/18
Sample ID WINDY-18112-14 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1233 **Collected** 2012/01/18
Sample ID WINDY-18112-15 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1234 **Collected** 2012/01/18
Sample ID WINDY-18112-16 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

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Maxxam Job #: B208557
Report Date: 2012/01/25

SiREM - Site Recovery & Management
Client Project #: EBA DTUDY

GENERAL COMMENTS

Results relate only to the items tested.

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SiREM - Site Recovery & Management
Attention: Ximena Druar
Client Project #: EBA DTUDY
P.O. #:
Site Location:

Quality Assurance Report

Maxxam Job Number: MB208557

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
2743578	RGA	Matrix Spike	o-Terphenyl	2012/01/24		81	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2012/01/24		83	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2012/01/24		85	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2012/01/24		82	%	50 - 130
		Spiked Blank	o-Terphenyl	2012/01/24		80	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2012/01/24		81	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2012/01/24		82	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2012/01/24		78 (1)	%	70 - 130
		Method Blank	o-Terphenyl	2012/01/24		79	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2012/01/24	2.0 U, MDL=2.0		ug/g	
			F3 (C16-C34 Hydrocarbons)	2012/01/24	3.0 J, MDL=2.0		ug/g	
			F4 (C34-C50 Hydrocarbons)	2012/01/24	2.0 U, MDL=2.0		ug/g	
		RPD	F2 (C10-C16 Hydrocarbons)	2012/01/24	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2012/01/24	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2012/01/24	NC		%	30
2743915	LKA	RPD	Moisture	2012/01/23	1.1		%	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 to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
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 (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.
(1) Recovery in Spiked Blank is below the recommended acceptable limits.

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Validation Signature Page

Maxxam Job #: B208557

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

CRISTINA CARRIERE, Scientific Services

MEDHAT RISKALLAH, Manager, Hydrocarbon Department

==========

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Your Project #: EBA#1
Your C.O.C. #: 2171

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2012/03/06

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B229452
Received: 2012/03/01, 10:35

Sample Matrix: Soil
Samples Received: 16

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Petroleum Hydrocarbons F2-F4 in Soil	10	2012/03/05	2012/03/05	CAM SOP-00316	CCME CWS
Petroleum Hydrocarbons F2-F4 in Soil	6	2012/03/05	2012/03/06	CAM SOP-00316	CCME CWS
Moisture	16	N/A	2012/03/05	CAM SOP-00445	R.Carter,1993

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

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 the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

../2

Your Project #: EBA#1
Your C.O.C. #: 2171

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2012/03/06

CERTIFICATE OF ANALYSIS

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

JOLANTA GORALCZYK, Project Manager
Email: JGoralczyk@maxxam.ca
Phone# (905) 817-5700

==========

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Total cover pages: 2

Maxxam Job #: B229452
Report Date: 2012/03/06

SiREM - Site Recovery & Management
Client Project #: EBA#1

Sampler Initials: XD

RESULTS OF ANALYSES OF SOIL

Maxxam ID		MR4236	MR4237	MR4238	MR4239	MR4240	MR4241		
Sampling Date		2012/02/29	2012/02/29	2012/02/29	2012/02/29	2012/02/29	2012/02/29		
COC Number		2171	2171	2171	2171	2171	2171		
	Units	**PATCH-22912-1**	**PATCH-22912-2**	**PATCH-22912-3**	**PATCH-22912-4**	**PATCH-22912-5**	**PATCH-22912-6**	**RDL**	**QC Batch**
Inorganics									
Moisture	%	13	13	11	12	7.4	13	1.0	2780806

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MR4242	MR4243	MR4244	MR4245	MR4246		
Sampling Date		2012/02/29	2012/02/29	2012/02/29	2012/02/29	2012/02/29		
COC Number		2171	2171	2171	2171	2171		
	Units	**PATCH-22912-7**	**PATCH-22912-8**	**WINDY-22912-9**	**WINDY-22912-10**	**PATCH-22912-11**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	8.1	5.8	17	19	15	1.0	2780806

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MR4247	MR4248	MR4249	MR4249	MR4250		
Sampling Date		2012/02/29	2012/02/29	2012/02/29	2012/02/29	2012/02/29		
COC Number		2171	2171	2171	2171	2171		
	Units	**PATCH-22912-12**	**PATCH-22912-13**	**PATCH-22912-14**	**PATCH-22912-14 Lab-Dup**	**PATCH-22912-15**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	21	19	21	21	22	1.0	2780806

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MR4251		
Sampling Date		2012/02/29		
COC Number		2171		
	Units	**PATCH-22912-16**	**RDL**	**QC Batch**
Inorganics				
Moisture	%	21	1.0	2780806

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B229452
Report Date: 2012/03/06

SiREM - Site Recovery & Management
Client Project #: EBA#1

Sampler Initials: XD

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		MR4236	MR4236	MR4237	MR4238	MR4239		
Sampling Date		2012/02/29	2012/02/29	2012/02/29	2012/02/29	2012/02/29		
COC Number		2171	2171	2171	2171	2171		
	Units	**PATCH-22912-1**	**PATCH-22912-1 Lab-Dup**	**PATCH-22912-2**	**PATCH-22912-3**	**PATCH-22912-4**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/g	1700	1400	1400	1400	2200	10	2780391
F3 (C16-C34 Hydrocarbons)	ug/g	4600	3900	4600	3900	4600	10	2780391
F4 (C34-C50 Hydrocarbons)	ug/g	600	580	690	590	620	10	2780391
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes	Yes		2780391
Surrogate Recovery (%)								
o-Terphenyl	%	95	86	101	91	90		2780391

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MR4240	MR4241	MR4242	MR4243	MR4244		
Sampling Date		2012/02/29	2012/02/29	2012/02/29	2012/02/29	2012/02/29		
COC Number		2171	2171	2171	2171	2171		
	Units	**PATCH-22912-5**	**PATCH-22912-6**	**PATCH-22912-7**	**PATCH-22912-8**	**WINDY-22912-9**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/g	430	480	780	970	1700	10	2780391
F3 (C16-C34 Hydrocarbons)	ug/g	2300	2600	2600	3100	470	10	2780391
F4 (C34-C50 Hydrocarbons)	ug/g	470	440	470	560	2.0 U	10	2780391
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes	Yes		2780391
Surrogate Recovery (%)								
o-Terphenyl	%	89	106	92	92	82		2780391

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		MR4245	MR4246	MR4247	MR4248		
Sampling Date		2012/02/29	2012/02/29	2012/02/29	2012/02/29		
COC Number		2171	2171	2171	2171		
	Units	**WINDY-22912-10**	**PATCH-22912-11**	**PATCH-22912-12**	**PATCH-22912-13**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	2200	650	750	3100	10	2780391
F3 (C16-C34 Hydrocarbons)	ug/g	430	480	510	540	10	2780391
F4 (C34-C50 Hydrocarbons)	ug/g	2.0 U	15	26	2.0 U	10	2780391
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2780391
Surrogate Recovery (%)							
o-Terphenyl	%	97	97	94	91		2780391

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MR4249	MR4250	MR4251		
Sampling Date		2012/02/29	2012/02/29	2012/02/29		
COC Number		2171	2171	2171		
	Units	**PATCH-22912-14**	**PATCH-22912-15**	**PATCH-22912-16**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons						
F2 (C10-C16 Hydrocarbons)	ug/g	2800	3100	2500	10	2780391
F3 (C16-C34 Hydrocarbons)	ug/g	480	560	460	10	2780391
F4 (C34-C50 Hydrocarbons)	ug/g	14	34	12	10	2780391
Reached Baseline at C50	ug/g	Yes	Yes	Yes		2780391
Surrogate Recovery (%)						
o-Terphenyl	%	85	87	85		2780391

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B229452
Report Date: 2012/03/06

SiREM - Site Recovery & Management
Client Project #: EBA#1

Sampler Initials: XD

Test Summary

Maxxam ID MR4236 **Collected** 2012/02/29
Sample ID PATCH-22912-1 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/05	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4236 Dup **Collected** 2012/02/29
Sample ID PATCH-22912-1 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/05	BARBARA WOWK

Maxxam ID MR4237 **Collected** 2012/02/29
Sample ID PATCH-22912-2 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/05	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4238 **Collected** 2012/02/29
Sample ID PATCH-22912-3 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/05	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4239 **Collected** 2012/02/29
Sample ID PATCH-22912-4 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/05	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4240 **Collected** 2012/02/29
Sample ID PATCH-22912-5 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/05	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

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Sampler Initials: XD

Test Summary

Maxxam ID MR4241 **Collected** 2012/02/29
Sample ID PATCH-22912-6 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/05	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4242 **Collected** 2012/02/29
Sample ID PATCH-22912-7 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/05	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4243 **Collected** 2012/02/29
Sample ID PATCH-22912-8 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/05	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4244 **Collected** 2012/02/29
Sample ID WINDY-22912-9 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/05	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4245 **Collected** 2012/02/29
Sample ID WINDY-22912-10 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/05	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4246 **Collected** 2012/02/29
Sample ID PATCH-22912-11 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/06	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

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Maxxam Job #: B229452
Report Date: 2012/03/06

SiREM - Site Recovery & Management
Client Project #: EBA#1

Sampler Initials: XD

Test Summary

Maxxam ID MR4247 **Collected** 2012/02/29
Sample ID PATCH-22912-12 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/06	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4248 **Collected** 2012/02/29
Sample ID PATCH-22912-13 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/06	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4249 **Collected** 2012/02/29
Sample ID PATCH-22912-14 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/06	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4249 Dup **Collected** 2012/02/29
Sample ID PATCH-22912-14 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4250 **Collected** 2012/02/29
Sample ID PATCH-22912-15 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/06	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4251 **Collected** 2012/02/29
Sample ID PATCH-22912-16 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/06	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

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Maxxam Job #: B229452
Report Date: 2012/03/06

SiREM - Site Recovery & Management
Client Project #: EBA#1

Sampler Initials: XD

GENERAL COMMENTS

Results relate only to the items tested.

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SiREM - Site Recovery & Management
Attention: Ximena Druar
Client Project #: EBA#1
P.O. #:
Site Location:

Quality Assurance Report

Maxxam Job Number: MB229452

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
2780391	BWW	Matrix Spike						
		[MR4236-01]	o-Terphenyl	2012/03/05		95	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2012/03/05		NC	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2012/03/05		NC	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2012/03/05		NC	%	50 - 130
		Spiked Blank	o-Terphenyl	2012/03/05		79	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2012/03/05		87	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2012/03/05		100	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2012/03/05		101	%	70 - 130
		Method Blank	o-Terphenyl	2012/03/05		79	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2012/03/05	2.0 U, MDL=2.0		ug/g	
			F3 (C16-C34 Hydrocarbons)	2012/03/05	2.0 U, MDL=2.0		ug/g	
			F4 (C34-C50 Hydrocarbons)	2012/03/05	2.0 U, MDL=2.0		ug/g	
		RPD [MR4236-01]	F2 (C10-C16 Hydrocarbons)	2012/03/05	19.4		%	30
			F3 (C16-C34 Hydrocarbons)	2012/03/05	18.3		%	30
			F4 (C34-C50 Hydrocarbons)	2012/03/05	2.4		%	30
2780806	LKA	RPD [MR4249-01]	Moisture	2012/03/05	1.4		%	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 to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
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 spiked amount was not sufficiently significant to permit a reliable recovery calculation.

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Validation Signature Page

Maxxam Job #: B229452

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

CRISTINA CARRIERE, Scientific Services

MAMDOUH SALIB, Analyst, Hydrocarbons

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APPENDIX D: University of Guelph Analytical Reports

UNIVERSITY of GUELPH
LABORATORY SERVICES
Agriculture and Food Laboratory

FINAL Report
Submission# **11-077733**
Reported: 2011-Sep-21

Submitted By:

SIREM LABORATORIES
XIMENA DRUAR
130 RESEARCH LANE
SUITE 2
GUELPH, ON N1G 5G3
Phone: 519 822-2230
Fax: 519 822-3151

Sampling Date: Not given
Received Date: 2011-Aug-30

Owner:
XIMENA DRUAR

pH (sat paste), Soil

Date Authorized: 2011-Sep-21 12:13

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	WINDY-083011-B-BASELINE	Soil		pH	6.5		
0002	PATCH-083011-B-BASELINE	Soil		pH	7.3		

Phosphorus, Soil (mass)

Date Authorized: 2011-Sep-21 12:13

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	WINDY-083011-B-BASELINE	Soil		Phosphorus, Extractable	1.70	mg/kg dry	
0002	PATCH-083011-B-BASELINE	Soil		Phosphorus, Extractable	4.63	mg/kg dry	

Total Nitrogen

Date Authorized: 2011-Sep-21 12:13

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	WINDY-083011-B-BASELINE	Soil		Nitrogen	0.10	% dry	
0002	PATCH-083011-B-BASELINE	Soil		Nitrogen	<0.05	% dry	

Test method(s): SNL-006 SNL-026 SNL-021

Supervisor: Nicolaas Schrier MSc 519 823 1268 ext. 57215 nschrier@uoguelph.ca

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These test results pertain only to the specimens tested.

UNIVERSITY of GUELPH
LABORATORY SERVICES
Agriculture and Food Laboratory

FINAL Report
Submission# **11-090565**
Reported: 2011-Oct-21

Submitted By:

SIREM LABORATORIES
XIMENA DRUAR
130 RESEARCH LANE
SUITE 2
GUELPH, ON N1G 5G3
Phone: 519 822-2230
Fax: 519 822-3151

Owner:
XIMENA DRUAR

Sampling Date: 2011-Oct-06

Received Date: 2011-Oct-07

pH (sat paste), Soil

Date Authorized: 2011-Oct-21 15:30

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result	Note
0001	1-PATCH-061011-1	Soil	11-Oct-06	pH	7.5	
0002	2-PATCH-061011-2	Soil	11-Oct-06	pH	7.5	
0003	3-PATCH-061011-3	Soil	11-Oct-06	pH	8.7	
0004	4-PATCH-061011-4	Soil	11-Oct-06	pH	8.6	
0005	5-PATCH-061011-5	Soil	11-Oct-06	pH	6.9	
0006	6-PATCH-061011-6	Soil	11-Oct-06	pH	6.9	
0007	7-PATCH-061011-7	Soil	11-Oct-06	pH	8.5	
0008	8-PATCH-061011-8	Soil	11-Oct-06	pH	8.4	
0009	9-WINDY-061011-9	Soil	11-Oct-06	pH	6.7	
0010	10-WINDY-061011-10	Soil	11-Oct-06	pH	6.7	
0011	11-WINDY-061011-11	Soil	11-Oct-06	pH	8.4	
0012	12-WINDY-061011-12	Soil	11-Oct-06	pH	8.4	
0013	13-WINDY-061011-13	Soil	11-Oct-06	pH	6.7	
0014	14-WINDY-061011-14	Soil	11-Oct-06	pH	6.7	
0015	15-WINDY-061011-15	Soil	11-Oct-06	pH	6.6	
0016	16-WINDY-061011-16	Soil	11-Oct-06	pH	6.6	

Phosphorus, Soil (mass)

Date Authorized: 2011-Oct-21 15:30

Phosphorus, Soil (mass) ....Continued

Date Authorized: 2011-Oct-21 15:30

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	1-PATCH-061011-1	Soil	11-Oct-06	Phosphorus, Extractable	7.97	mg/kg dry	
0002	2-PATCH-061011-2	Soil	11-Oct-06	Phosphorus, Extractable	7.23	mg/kg dry	
0003	3-PATCH-061011-3	Soil	11-Oct-06	Phosphorus, Extractable	14.5	mg/kg dry	
0004	4-PATCH-061011-4	Soil	11-Oct-06	Phosphorus, Extractable	12.0	mg/kg dry	
0005	5-PATCH-061011-5	Soil	11-Oct-06	Phosphorus, Extractable	128	mg/kg dry	
0006	6-PATCH-061011-6	Soil	11-Oct-06	Phosphorus, Extractable	140	mg/kg dry	
0007	7-PATCH-061011-7	Soil	11-Oct-06	Phosphorus, Extractable	288	mg/kg dry	
0008	8-PATCH-061011-8	Soil	11-Oct-06	Phosphorus, Extractable	274	mg/kg dry	
0009	9-WINDY-061011-9	Soil	11-Oct-06	Phosphorus, Extractable	1.71	mg/kg dry	
0010	10-WINDY-061011-10	Soil	11-Oct-06	Phosphorus, Extractable	3.13	mg/kg dry	
0011	11-WINDY-061011-11	Soil	11-Oct-06	Phosphorus, Extractable	8.79	mg/kg dry	
0012	12-WINDY-061011-12	Soil	11-Oct-06	Phosphorus, Extractable	11.8	mg/kg dry	
0013	13-WINDY-061011-13	Soil	11-Oct-06	Phosphorus, Extractable	2.64	mg/kg dry	
0014	14-WINDY-061011-14	Soil	11-Oct-06	Phosphorus, Extractable	5.38	mg/kg dry	
0015	15-WINDY-061011-15	Soil	11-Oct-06	Phosphorus, Extractable	2.32	mg/kg dry	
0016	16-WINDY-061011-16	Soil	11-Oct-06	Phosphorus, Extractable	1.78	mg/kg dry	

Total Nitrogen

Date Authorized: 2011-Oct-21 15:31

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	1-PATCH-061011-1	Soil	11-Oct-06	Nitrogen	0.06	% dry	
0002	2-PATCH-061011-2	Soil	11-Oct-06	Nitrogen	0.07	% dry	
0003	3-PATCH-061011-3	Soil	11-Oct-06	Nitrogen	0.06	% dry	
0004	4-PATCH-061011-4	Soil	11-Oct-06	Nitrogen	0.06	% dry	

Total Nitrogen ....Continued

Date Authorized: 2011-Oct-21 15:31

0005	5-PATCH-061011-5	Soil	11-Oct-06	Nitrogen	0.08	% dry
0006	6-PATCH-061011-6	Soil	11-Oct-06	Nitrogen	0.08	% dry
0007	7-PATCH-061011-7	Soil	11-Oct-06	Nitrogen	0.08	% dry
0008	8-PATCH-061011-8	Soil	11-Oct-06	Nitrogen	0.08	% dry
0009	9-WINDY-061011-9	Soil	11-Oct-06	Nitrogen	0.09	% dry
0010	10-WINDY-061011-10	Soil	11-Oct-06	Nitrogen	0.10	% dry
0011	11-WINDY-061011-11	Soil	11-Oct-06	Nitrogen	0.11	% dry
0012	12-WINDY-061011-12	Soil	11-Oct-06	Nitrogen	0.10	% dry
0013	13-WINDY-061011-13	Soil	11-Oct-06	Nitrogen	0.11	% dry
0014	14-WINDY-061011-14	Soil	11-Oct-06	Nitrogen	0.12	% dry
0015	15-WINDY-061011-15	Soil	11-Oct-06	Nitrogen	0.10	% dry
0016	16-WINDY-061011-16	Soil	11-Oct-06	Nitrogen	0.10	% dry

Test method(s): SNL-006 SNL-021 SNL-026

Supervisor: Nicolaas Schrier MSc 519 823 1268 ext. 57215 nschrier@uoguelph.ca

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These test results pertain only to the specimens tested.

UNIVERSITY of GUELPH
LABORATORY SERVICES
Agriculture and Food Laboratory

FINAL Report
Submission# **11-098901**
Reported: 2011-Nov-10

Submitted By:

SIREM LABORATORIES
XIMENA DRUAR
130 RESEARCH LANE
SUITE 2
GUELPH, ON N1G 5G3

Phone: 519 822-2230
Fax: 519 822-3151
Sampling Date: 2011-Nov-02

Received Date: 2011-Nov-03

Owner:
GEOSYNTEC CONSULTANTS
130 RESEARCH LANE
SUITE 2
GUELPH, ON N1G 5G3

519 822-2230

Ammonium Nitrate, Soil

Date Authorized: 2011-Nov-10 13:37

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	PATCH-021111-1	Soil	11-Nov-02	%Soil Moisture	15.83	% dry	
0001	PATCH-021111-1	Soil	11-Nov-02	Ammonium-N	1.21	mg/kg dry	
0001	PATCH-021111-1	Soil	11-Nov-02	Nitrate-N	0.305	mg/kg dry	
0002	PATCH-021111-2	Soil	11-Nov-02	%Soil Moisture	16.18	% dry	
0002	PATCH-021111-2	Soil	11-Nov-02	Ammonium-N	7.22	mg/kg dry	
0002	PATCH-021111-2	Soil	11-Nov-02	Nitrate-N	0.834	mg/kg dry	
0003	PATCH-021111-3	Soil	11-Nov-02	%Soil Moisture	11.46	% dry	
0003	PATCH-021111-3	Soil	11-Nov-02	Ammonium-N	1.37	mg/kg dry	
0003	PATCH-021111-3	Soil	11-Nov-02	Nitrate-N	0.221	mg/kg dry	
0004	PATCH-021111-4	Soil	11-Nov-02	%Soil Moisture	4.93	% dry	
0004	PATCH-021111-4	Soil	11-Nov-02	Ammonium-N	0.00	mg/kg dry	
0004	PATCH-021111-4	Soil	11-Nov-02	Nitrate-N	0.565	mg/kg dry	
0005	PATCH-021111-5	Soil	11-Nov-02	%Soil Moisture	3.62	% dry	
0005	PATCH-021111-5	Soil	11-Nov-02	Ammonium-N	7.11	mg/kg dry	
0005	PATCH-021111-5	Soil	11-Nov-02	Nitrate-N	1.55	mg/kg dry	
0006	PATCH-021111-6	Soil	11-Nov-02	%Soil Moisture	2.33	% dry	
0006	PATCH-021111-6	Soil	11-Nov-02	Ammonium-N	3.63	mg/kg dry	
0006	PATCH-021111-6	Soil	11-Nov-02	Nitrate-N	0.368	mg/kg dry	
0007	PATCH-021111-7	Soil	11-Nov-02	%Soil Moisture	2.12	% dry	
0007	PATCH-021111-7	Soil	11-Nov-02	Ammonium-N	1.23	mg/kg dry	
0007	PATCH-021111-7	Soil	11-Nov-02	Nitrate-N	0.372	mg/kg dry	
0008	PATCH-021111-8	Soil	11-Nov-02	%Soil Moisture	7.45	% dry	

Ammonium Nitrate, Soil ....Continued

Date Authorized: 2011-Nov-10 13:37

0008	PATCH-021111-8	Soil	11-Nov-02	Ammonium-N	1.58	mg/kg dry
0008	PATCH-021111-8	Soil	11-Nov-02	Nitrate-N	0.584	mg/kg dry
0009	WINDY-021111-9	Soil	11-Nov-02	%Soil Moisture	5.93	% dry
0009	WINDY-021111-9	Soil	11-Nov-02	Ammonium-N	0.00	mg/kg dry
0009	WINDY-021111-9	Soil	11-Nov-02	Nitrate-N	0.435	mg/kg dry
0010	WINDY-021111-10	Soil	11-Nov-02	%Soil Moisture	17.16	% dry
0010	WINDY-021111-10	Soil	11-Nov-02	Ammonium-N	3.08	mg/kg dry
0010	WINDY-021111-10	Soil	11-Nov-02	Nitrate-N	1.88	mg/kg dry
0011	WINDY-021111-11	Soil	11-Nov-02	%Soil Moisture	8.20	% dry
0011	WINDY-021111-11	Soil	11-Nov-02	Ammonium-N	0.00	mg/kg dry
0011	WINDY-021111-11	Soil	11-Nov-02	Nitrate-N	0.636	mg/kg dry
0012	WINDY-021111-12	Soil	11-Nov-02	%Soil Moisture	19.86	% dry
0012	WINDY-021111-12	Soil	11-Nov-02	Ammonium-N	0.00	mg/kg dry
0012	WINDY-021111-12	Soil	11-Nov-02	Nitrate-N	0.361	mg/kg dry
0013	WINDY-021111-13	Soil	11-Nov-02	%Soil Moisture	20.92	% dry
0013	WINDY-021111-13	Soil	11-Nov-02	Ammonium-N	0.00	mg/kg dry
0013	WINDY-021111-13	Soil	11-Nov-02	Nitrate-N	0.236	mg/kg dry
0014	WINDY-021111-14	Soil	11-Nov-02	%Soil Moisture	21.93	% dry
0014	WINDY-021111-14	Soil	11-Nov-02	Ammonium-N	0.00	mg/kg dry
0014	WINDY-021111-14	Soil	11-Nov-02	Nitrate-N	0.329	mg/kg dry
0015	WINDY-021111-15	Soil	11-Nov-02	%Soil Moisture	21.30	% dry
0015	WINDY-021111-15	Soil	11-Nov-02	Ammonium-N	0.00	mg/kg dry
0015	WINDY-021111-15	Soil	11-Nov-02	Nitrate-N	0.158	mg/kg dry
0016	WINDY-021111-16	Soil	11-Nov-02	%Soil Moisture	19.35	% dry
0016	WINDY-021111-16	Soil	11-Nov-02	Ammonium-N	0.00	mg/kg dry
0016	WINDY-021111-16	Soil	11-Nov-02	Nitrate-N	0.113	mg/kg dry

Comments:

Ammonium-N in Soil: Samples reported as zero are < 0.20 mg/kg dry.

Phosphorus, Soil (mass)

Date Authorized: 2011-Nov-10 13:37

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result	Note

Phosphorus, Soil (mass) ....Continued

Date Authorized: 2011-Nov-10 13:37

0001	PATCH-021111-1	Soil	11-Nov-02	Phosphorus, Extractable	7.12	mg/kg dry
0002	PATCH-021111-2	Soil	11-Nov-02	Phosphorus, Extractable	7.32	mg/kg dry
0003	PATCH-021111-3	Soil	11-Nov-02	Phosphorus, Extractable	12.3	mg/kg dry
0004	PATCH-021111-4	Soil	11-Nov-02	Phosphorus, Extractable	12.1	mg/kg dry
0005	PATCH-021111-5	Soil	11-Nov-02	Phosphorus, Extractable	101	mg/kg dry
0006	PATCH-021111-6	Soil	11-Nov-02	Phosphorus, Extractable	114	mg/kg dry
0007	PATCH-021111-7	Soil	11-Nov-02	Phosphorus, Extractable	167	mg/kg dry
0008	PATCH-021111-8	Soil	11-Nov-02	Phosphorus, Extractable	224	mg/kg dry
0009	WINDY-021111-9	Soil	11-Nov-02	Phosphorus, Extractable	3.61	mg/kg dry
0010	WINDY-021111-10	Soil	11-Nov-02	Phosphorus, Extractable	4.71	mg/kg dry
0011	WINDY-021111-11	Soil	11-Nov-02	Phosphorus, Extractable	5.98	mg/kg dry
0012	WINDY-021111-12	Soil	11-Nov-02	Phosphorus, Extractable	5.71	mg/kg dry
0013	WINDY-021111-13	Soil	11-Nov-02	Phosphorus, Extractable	3.36	mg/kg dry
0014	WINDY-021111-14	Soil	11-Nov-02	Phosphorus, Extractable	3.90	mg/kg dry
0015	WINDY-021111-15	Soil	11-Nov-02	Phosphorus, Extractable	4.70	mg/kg dry
0016	WINDY-021111-16	Soil	11-Nov-02	Phosphorus, Extractable	3.32	mg/kg dry

Test method(s): CHEM-185 SNL-026

Supervisor: Nicolaas Schrier MSc 519 823 1268 ext. 57215 nschrier@uoguelph.ca

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UNIVERSITY of GUELPH
LABORATORY SERVICES
Agriculture and Food Laboratory

FINAL Report
Submission# **11-109729**
Reported: 2011-Dec-21

Submitted By:

SIREM LABORATORIES
XIMENA DRUAR
130 RESEARCH LANE
SUITE 2
GUELPH, ON N1G 5G3
Phone: 519 822-2230
Fax: 519 822-3151

Sampling Date: 2011-Dec-07

Received Date: 2011-Dec-07

Owner:
XIMENA DRUAR

Other

Date Authorized: 2011-Dec-21 16:37

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result	Note
0015	WINDY-071211-15	Soil	11-Dec-07	Other	120	
0016	WINDY-071211-16	Soil	11-Dec-07	Other	72.9	

Comments:

SN-Other is Extractable Soil Sulphate-Sulphur (mg/kg dry).

pH (sat paste), Soil

Date Authorized: 2011-Dec-21 16:14

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result	Note
0001	PATCH-071211-1	Soil	11-Dec-07	pH	7.5	
0002	PATCH-071211-2	Soil	11-Dec-07	pH	7.6	
0003	PATCH-071211-3	Soil	11-Dec-07	pH	8.5	
0004	PATCH-071211-4	Soil	11-Dec-07	pH	8.6	
0005	PATCH-071211-5	Soil	11-Dec-07	pH	6.5	
0006	PATCH-071211-6	Soil	11-Dec-07	pH	6.6	
0007	PATCH-071211-7	Soil	11-Dec-07	pH	7.7	
0008	PATCH-071211-8	Soil	11-Dec-07	pH	7.8	
0009	WINDY-071211-9	Soil	11-Dec-07	pH	7.0	
0010	WINDY-071211-10	Soil	11-Dec-07	pH	6.9	
0011	WINDY-071211-11	Soil	11-Dec-07	pH	8.3	
0012	WINDY-071211-12	Soil	11-Dec-07	pH	8.4	
0013	WINDY-071211-13	Soil	11-Dec-07	pH	7.1	
0014	WINDY-071211-14	Soil	11-Dec-07	pH	7.1	

pH (sat paste), Soil ....Continued

Date Authorized: 2011-Dec-21 16:14

0015	WINDY-071211-15	Soil	11-Dec-07	pH	6.9
0016	WINDY-071211-16	Soil	11-Dec-07	pH	6.8

Phosphorus, Soil (mass)

Date Authorized: 2011-Dec-21 16:14

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	PATCH-071211-1	Soil	11-Dec-07	Phosphorus, Extractable	6.05	mg/kg dry	
0002	PATCH-071211-2	Soil	11-Dec-07	Phosphorus, Extractable	6.35	mg/kg dry	
0003	PATCH-071211-3	Soil	11-Dec-07	Phosphorus, Extractable	11.1	mg/kg dry	
0004	PATCH-071211-4	Soil	11-Dec-07	Phosphorus, Extractable	9.07	mg/kg dry	
0005	PATCH-071211-5	Soil	11-Dec-07	Phosphorus, Extractable	99.7	mg/kg dry	
0006	PATCH-071211-6	Soil	11-Dec-07	Phosphorus, Extractable	103	mg/kg dry	
0007	PATCH-071211-7	Soil	11-Dec-07	Phosphorus, Extractable	136	mg/kg dry	
0008	PATCH-071211-8	Soil	11-Dec-07	Phosphorus, Extractable	138	mg/kg dry	
0009	WINDY-071211-9	Soil	11-Dec-07	Phosphorus, Extractable	2.70	mg/kg dry	
0010	WINDY-071211-10	Soil	11-Dec-07	Phosphorus, Extractable	4.45	mg/kg dry	
0011	WINDY-071211-11	Soil	11-Dec-07	Phosphorus, Extractable	4.30	mg/kg dry	
0012	WINDY-071211-12	Soil	11-Dec-07	Phosphorus, Extractable	10.5	mg/kg dry	
0013	WINDY-071211-13	Soil	11-Dec-07	Phosphorus, Extractable	2.37	mg/kg dry	
0014	WINDY-071211-14	Soil	11-Dec-07	Phosphorus, Extractable	4.33	mg/kg dry	
0015	WINDY-071211-15	Soil	11-Dec-07	Phosphorus, Extractable	2.25	mg/kg dry	
0016	WINDY-071211-16	Soil	11-Dec-07	Phosphorus, Extractable	1.85	mg/kg dry	

Total Nitrogen

Date Authorized: 2011-Dec-21 16:14

Total Nitrogen ....Continued

Date Authorized: 2011-Dec-21 16:14

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	PATCH-071211-1	Soil	11-Dec-07	Nitrogen	0.06	% dry	
0002	PATCH-071211-2	Soil	11-Dec-07	Nitrogen	0.07	% dry	
0003	PATCH-071211-3	Soil	11-Dec-07	Nitrogen	0.07	% dry	
0004	PATCH-071211-4	Soil	11-Dec-07	Nitrogen	0.06	% dry	
0005	PATCH-071211-5	Soil	11-Dec-07	Nitrogen	0.11	% dry	
0006	PATCH-071211-6	Soil	11-Dec-07	Nitrogen	0.12	% dry	
0007	PATCH-071211-7	Soil	11-Dec-07	Nitrogen	0.10	% dry	
0008	PATCH-071211-8	Soil	11-Dec-07	Nitrogen	0.09	% dry	
0009	WINDY-071211-9	Soil	11-Dec-07	Nitrogen	0.10	% dry	
0010	WINDY-071211-10	Soil	11-Dec-07	Nitrogen	0.10	% dry	
0011	WINDY-071211-11	Soil	11-Dec-07	Nitrogen	0.11	% dry	
0012	WINDY-071211-12	Soil	11-Dec-07	Nitrogen	0.10	% dry	
0013	WINDY-071211-13	Soil	11-Dec-07	Nitrogen	0.11	% dry	
0014	WINDY-071211-14	Soil	11-Dec-07	Nitrogen	0.10	% dry	
0015	WINDY-071211-15	Soil	11-Dec-07	Nitrogen	0.10	% dry	
0016	WINDY-071211-16	Soil	11-Dec-07	Nitrogen	0.09	% dry	

Test method(s): SNL-021 SNL-006 Non-routine SNL-026

Supervisor: Nicolaas Schrier MSc 519 823 1268 ext. 57215 nschrier@uoguelph.ca

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UNIVERSITY of GUELPH
LABORATORY SERVICES
Agriculture and Food Laboratory

FINAL Report
Submission# **12-006102**
Reported: 2012-Jan-27

Submitted By:

SIREM LABORATORIES
XIMENA DRUAR
130 RESEARCH LANE
SUITE 2
GUELPH, ON N1G 5G3

Phone: 519 822-2230
Fax: 519 822-3151
Sampling Date: 2012-Jan-18
Received Date: 2012-Jan-19

Owner:
XIMENA DRUAR

Nitrate, Soil

Date Authorized: 2012-Jan-27 15:07

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	1-PATCH-18112	Soil	12-Jan-18	Nitrate-N	0.445	mg/kg	
0002	2-PATCH-18112	Soil	12-Jan-18	Nitrate-N	0.405	mg/kg	
0003	3-PATCH-18112	Soil	12-Jan-18	Nitrate-N	0.479	mg/kg	
0004	4-PATCH-18112	Soil	12-Jan-18	Nitrate-N	0.377	mg/kg	
0005	5-PATCH-18112	Soil	12-Jan-18	Nitrate-N	0.443	mg/kg	
0006	6-PATCH-18112	Soil	12-Jan-18	Nitrate-N	0.572	mg/kg	
0007	7-PATCH-18112	Soil	12-Jan-18	Nitrate-N	0.393	mg/kg	
0008	8-PATCH-18112	Soil	12-Jan-18	Nitrate-N	0.456	mg/kg	
0009	9-WINDY-18112	Soil	12-Jan-18	Nitrate-N	0.346	mg/kg	
0010	10-WINDY-18112	Soil	12-Jan-18	Nitrate-N	0.306	mg/kg	
0011	11-WINDY-18112	Soil	12-Jan-18	Nitrate-N	0.542	mg/kg	
0012	12-WINDY-18112	Soil	12-Jan-18	Nitrate-N	0.360	mg/kg	
0013	13-WINDY-18112	Soil	12-Jan-18	Nitrate-N	1740	mg/kg	
0014	14-WINDY-18112	Soil	12-Jan-18	Nitrate-N	1930	mg/kg	
0015	15-WINDY-18112	Soil	12-Jan-18	Nitrate-N	2.66	mg/kg	
0016	16-WINDY-18112	Soil	12-Jan-18	Nitrate-N	0.633	mg/kg	

Nitrite, Soil

Date Authorized: 2012-Jan-27 15:07

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	1-PATCH-18112	Soil	12-Jan-18	Nitrite-N	0.206	mg/kg dry	
0002	2-PATCH-18112	Soil	12-Jan-18	Nitrite-N	0.153	mg/kg dry	
0003	3-PATCH-18112	Soil	12-Jan-18	Nitrite-N	0.855	mg/kg dry	

Nitrite, Soil ....Continued

Date Authorized: 2012-Jan-27 15:07

0004	4-PATCH-18112	Soil	12-Jan-18	Nitrite-N	0.496	mg/kg dry
0005	5-PATCH-18112	Soil	12-Jan-18	Nitrite-N	0.0875	mg/kg dry
0006	6-PATCH-18112	Soil	12-Jan-18	Nitrite-N	0.0720	mg/kg dry
0007	7-PATCH-18112	Soil	12-Jan-18	Nitrite-N	0.606	mg/kg dry
0008	8-PATCH-18112	Soil	12-Jan-18	Nitrite-N	0.502	mg/kg dry
0009	9-WINDY-18112	Soil	12-Jan-18	Nitrite-N	0.0455	mg/kg dry
0010	10-WINDY-18112	Soil	12-Jan-18	Nitrite-N	0.0470	mg/kg dry
0011	11-WINDY-18112	Soil	12-Jan-18	Nitrite-N	0.567	mg/kg dry
0012	12-WINDY-18112	Soil	12-Jan-18	Nitrite-N	0.250	mg/kg dry
0013	13-WINDY-18112	Soil	12-Jan-18	Nitrite-N	0.0610	mg/kg dry
0014	14-WINDY-18112	Soil	12-Jan-18	Nitrite-N	0.0945	mg/kg dry
0015	15-WINDY-18112	Soil	12-Jan-18	Nitrite-N	0.0740	mg/kg dry
0016	16-WINDY-18112	Soil	12-Jan-18	Nitrite-N	0.0645	mg/kg dry

Other

Date Authorized: 2012-Jan-27 15:09

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result	Note
0015	15-WINDY-18112	Soil	12-Jan-18	Other	1900	
0016	16-WINDY-18112	Soil	12-Jan-18	Other	2260	

Comments:

SN-Other is Extractable Soil Sulphate-Sulphur (mg/kg dry).

pH (sat paste), Soil

Date Authorized: 2012-Jan-27 15:08

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result	Note
0001	1-PATCH-18112	Soil	12-Jan-18	pH	7.6	
0002	2-PATCH-18112	Soil	12-Jan-18	pH	7.7	
0003	3-PATCH-18112	Soil	12-Jan-18	pH	8.4	
0004	4-PATCH-18112	Soil	12-Jan-18	pH	8.4	
0005	5-PATCH-18112	Soil	12-Jan-18	pH	6.5	
0006	6-PATCH-18112	Soil	12-Jan-18	pH	6.4	
0007	7-PATCH-18112	Soil	12-Jan-18	pH	7.7	
0008	8-PATCH-18112	Soil	12-Jan-18	pH	7.8	

pH (sat paste), Soil ....Continued

Date Authorized: 2012-Jan-27 15:08

0009	9-WINDY-18112	Soil	12-Jan-18	pH	7.0
0010	10-WINDY-18112	Soil	12-Jan-18	pH	6.8
0011	11-WINDY-18112	Soil	12-Jan-18	pH	8.2
0012	12-WINDY-18112	Soil	12-Jan-18	pH	8.2
0013	13-WINDY-18112	Soil	12-Jan-18	pH	6.7
0014	14-WINDY-18112	Soil	12-Jan-18	pH	6.7
0015	15-WINDY-18112	Soil	12-Jan-18	pH	6.8
0016	16-WINDY-18112	Soil	12-Jan-18	pH	6.7

Phosphorus, Soil (mass)

Date Authorized: 2012-Jan-27 15:08

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	1-PATCH-18112	Soil	12-Jan-18	Phosphorus, Extractable	6.11	mg/kg dry	
0002	2-PATCH-18112	Soil	12-Jan-18	Phosphorus, Extractable	9.30	mg/kg dry	
0003	3-PATCH-18112	Soil	12-Jan-18	Phosphorus, Extractable	13.3	mg/kg dry	
0004	4-PATCH-18112	Soil	12-Jan-18	Phosphorus, Extractable	13.3	mg/kg dry	
0005	5-PATCH-18112	Soil	12-Jan-18	Phosphorus, Extractable	110	mg/kg dry	
0006	6-PATCH-18112	Soil	12-Jan-18	Phosphorus, Extractable	113	mg/kg dry	
0007	7-PATCH-18112	Soil	12-Jan-18	Phosphorus, Extractable	178	mg/kg dry	
0008	8-PATCH-18112	Soil	12-Jan-18	Phosphorus, Extractable	197	mg/kg dry	
0009	9-WINDY-18112	Soil	12-Jan-18	Phosphorus, Extractable	1.32	mg/kg dry	
0010	10-WINDY-18112	Soil	12-Jan-18	Phosphorus, Extractable	5.12	mg/kg dry	
0011	11-WINDY-18112	Soil	12-Jan-18	Phosphorus, Extractable	3.52	mg/kg dry	
0012	12-WINDY-18112	Soil	12-Jan-18	Phosphorus, Extractable	5.18	mg/kg dry	
0013	13-WINDY-18112	Soil	12-Jan-18	Phosphorus, Extractable	89.6	mg/kg dry	
0014	14-WINDY-18112	Soil	12-Jan-18	Phosphorus, Extractable	83.2	mg/kg dry	

Phosphorus, Soil (mass) ....Continued

Date Authorized: 2012-Jan-27 15:08

0015	15-WINDY-18112	Soil	12-Jan-18	Phosphorus, Extractable	102	mg/kg dry
0016	16-WINDY-18112	Soil	12-Jan-18	Phosphorus, Extractable	106	mg/kg dry

Total Nitrogen

Date Authorized: 2012-Jan-27 15:08

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	1-PATCH-18112	Soil	12-Jan-18	Nitrogen	0.06	% dry	
0002	2-PATCH-18112	Soil	12-Jan-18	Nitrogen	0.07	% dry	
0003	3-PATCH-18112	Soil	12-Jan-18	Nitrogen	0.08	% dry	
0004	4-PATCH-18112	Soil	12-Jan-18	Nitrogen	0.07	% dry	
0005	5-PATCH-18112	Soil	12-Jan-18	Nitrogen	0.13	% dry	
0006	6-PATCH-18112	Soil	12-Jan-18	Nitrogen	0.12	% dry	
0007	7-PATCH-18112	Soil	12-Jan-18	Nitrogen	0.11	% dry	
0008	8-PATCH-18112	Soil	12-Jan-18	Nitrogen	0.10	% dry	
0009	9-WINDY-18112	Soil	12-Jan-18	Nitrogen	0.09	% dry	
0010	10-WINDY-18112	Soil	12-Jan-18	Nitrogen	0.10	% dry	
0011	11-WINDY-18112	Soil	12-Jan-18	Nitrogen	0.09	% dry	
0012	12-WINDY-18112	Soil	12-Jan-18	Nitrogen	0.10	% dry	
0013	13-WINDY-18112	Soil	12-Jan-18	Nitrogen	0.32	% dry	
0014	14-WINDY-18112	Soil	12-Jan-18	Nitrogen	0.26	% dry	
0015	15-WINDY-18112	Soil	12-Jan-18	Nitrogen	0.12	% dry	
0016	16-WINDY-18112	Soil	12-Jan-18	Nitrogen	0.11	% dry	

Test method(s): SNL-036 SNL-026 SNL-006 Non-routine SNL-021

Supervisor: Nicolaas Schrier MSc 519 823 1268 ext. 57215 nschrier@uoguelph.ca

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These test results pertain only to the specimens tested.

UNIVERSITY of GUELPH
LABORATORY SERVICES
Agriculture and Food Laboratory

FINAL Report
Submission# **12-019294**
Reported: 2012-Mar-16

Submitted By:

SIREM LABORATORIES
XIMENA DRUAR
130 RESEARCH LANE
SUITE 2
GUELPH, ON N1G 5G3

Phone: 519 822-2230
Fax: 519 822-3151

Owner:
XIMENA DRUAR

Sampling Date: Not given Received Date: 2012-Feb-29

Nitrate, Soil

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	PATCH-22912-1	Soil		Nitrate-N	1.69	mg/kg	
0002	PATCH-22912-2	Soil		Nitrate-N	0.614	mg/kg	
0003	PATCH-22912-3	Soil		Nitrate-N	0.773	mg/kg	
0004	PATCH-22912-4	Soil		Nitrate-N	0.509	mg/kg	
0005	PATCH-22912-5	Soil		Nitrate-N	0.558	mg/kg	
0006	PATCH-22912-6	Soil		Nitrate-N	0.574	mg/kg	
0007	PATCH-22912-7	Soil		Nitrate-N	0.580	mg/kg	
0008	PATCH-22912-8	Soil		Nitrate-N	0.642	mg/kg	
0009	WINDY-22912-9	Soil		Nitrate-N	0.577	mg/kg	
0010	WINDY-22912-10	Soil		Nitrate-N	0.458	mg/kg	
0011	WINDY-22912-11	Soil		Nitrate-N	0.631	mg/kg	
0012	WINDY-22912-12	Soil		Nitrate-N	1.09	mg/kg	
0013	WINDY-22912-13	Soil		Nitrate-N	2700	mg/kg	
0014	WINDY-22912-14	Soil		Nitrate-N	2180	mg/kg	
0015	WINDY-22912-15	Soil		Nitrate-N	2.05	mg/kg	
0016	WINDY-22912-16	Soil		Nitrate-N	1.57	mg/kg	

Nitrite, Soil

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	PATCH-22912-1	Soil		Nitrite-N	0.208	mg/kg dry	
0002	PATCH-22912-2	Soil		Nitrite-N	0.223	mg/kg dry	
0003	PATCH-22912-3	Soil		Nitrite-N	0.802	mg/kg dry	
0004	PATCH-22912-4	Soil		Nitrite-N	0.439	mg/kg dry	

Nitrite, Soil ....Continued

Date Authorized: 2012-Mar-16 18:15

0005	PATCH-22912-5	Soil	Nitrite-N	<0.0300	mg/kg dry
0006	PATCH-22912-6	Soil	Nitrite-N	<0.0300	mg/kg dry
0007	PATCH-22912-7	Soil	Nitrite-N	0.353	mg/kg dry
0008	PATCH-22912-8	Soil	Nitrite-N	0.313	mg/kg dry
0009	WINDY-22912-9	Soil	Nitrite-N	<0.0300	mg/kg dry
0010	WINDY-22912-10	Soil	Nitrite-N	<0.0300	mg/kg dry
0011	WINDY-22912-11	Soil	Nitrite-N	0.651	mg/kg dry
0012	WINDY-22912-12	Soil	Nitrite-N	0.468	mg/kg dry
0013	WINDY-22912-13	Soil	Nitrite-N	<0.0300	mg/kg dry
0014	WINDY-22912-14	Soil	Nitrite-N	<0.0300	mg/kg dry
0015	WINDY-22912-15	Soil	Nitrite-N	<0.0300	mg/kg dry
0016	WINDY-22912-16	Soil	Nitrite-N	<0.0300	mg/kg dry

Other

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result	Note
0015	WINDY-22912-15	Soil		Other	777000	
0016	WINDY-22912-16	Soil		Other	327000	

Comments:

SN-Other is Extractable Soil Sulphate-Sulphur (mg/kg dry).

pH (sat paste), Soil

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result	Note
0001	PATCH-22912-1	Soil		pH	7.5	
0002	PATCH-22912-2	Soil		pH	7.4	
0003	PATCH-22912-3	Soil		pH	8.4	
0004	PATCH-22912-4	Soil		pH	8.3	
0005	PATCH-22912-5	Soil		pH	6.6	
0006	PATCH-22912-6	Soil		pH	6.6	
0007	PATCH-22912-7	Soil		pH	7.6	
0008	PATCH-22912-8	Soil		pH	7.7	
0009	WINDY-22912-9	Soil		pH	7.0	

pH (sat paste), Soil ....Continued

Date Authorized: 2012-Mar-16 18:15

0010	WINDY-22912-10	Soil	pH	6.9
0011	WINDY-22912-11	Soil	pH	8.0
0012	WINDY-22912-12	Soil	pH	8.1
0013	WINDY-22912-13	Soil	pH	6.6
0014	WINDY-22912-14	Soil	pH	6.7
0015	WINDY-22912-15	Soil	pH	6.7
0016	WINDY-22912-16	Soil	pH	6.8

Phosphorus, Soil (mass)

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	PATCH-22912-1	Soil		Phosphorus, Extractable	10.2	mg/kg dry	
0002	PATCH-22912-2	Soil		Phosphorus, Extractable	8.91	mg/kg dry	
0003	PATCH-22912-3	Soil		Phosphorus, Extractable	10.9	mg/kg dry	
0004	PATCH-22912-4	Soil		Phosphorus, Extractable	7.67	mg/kg dry	
0005	PATCH-22912-5	Soil		Phosphorus, Extractable	102	mg/kg dry	
0006	PATCH-22912-6	Soil		Phosphorus, Extractable	94.9	mg/kg dry	
0007	PATCH-22912-7	Soil		Phosphorus, Extractable	174	mg/kg dry	
0008	PATCH-22912-8	Soil		Phosphorus, Extractable	157	mg/kg dry	
0009	WINDY-22912-9	Soil		Phosphorus, Extractable	1.76	mg/kg dry	
0010	WINDY-22912-10	Soil		Phosphorus, Extractable	2.07	mg/kg dry	
0011	WINDY-22912-11	Soil		Phosphorus, Extractable	3.62	mg/kg dry	
0012	WINDY-22912-12	Soil		Phosphorus, Extractable	4.06	mg/kg dry	
0013	WINDY-22912-13	Soil		Phosphorus, Extractable	92.6	mg/kg dry	
0014	WINDY-22912-14	Soil		Phosphorus, Extractable	72.8	mg/kg dry	
0015	WINDY-22912-15	Soil		Phosphorus, Extractable	72.5	mg/kg dry	

Phosphorus, Soil (mass) ....Continued

Date Authorized: 2012-Mar-16 18:15

0016	WINDY-22912-16	Soil		Phosphorus, Extractable	86.2	mg/kg dry

Total Nitrogen

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	PATCH-22912-1	Soil		Nitrogen	0.07	% dry	
0002	PATCH-22912-2	Soil		Nitrogen	0.08	% dry	
0003	PATCH-22912-3	Soil		Nitrogen	0.08	% dry	
0004	PATCH-22912-4	Soil		Nitrogen	0.06	% dry	
0005	PATCH-22912-5	Soil		Nitrogen	0.13	% dry	
0006	PATCH-22912-6	Soil		Nitrogen	0.13	% dry	
0007	PATCH-22912-7	Soil		Nitrogen	0.10	% dry	
0008	PATCH-22912-8	Soil		Nitrogen	0.10	% dry	
0009	WINDY-22912-9	Soil		Nitrogen	0.11	% dry	
0010	WINDY-22912-10	Soil		Nitrogen	0.11	% dry	
0011	WINDY-22912-11	Soil		Nitrogen	0.11	% dry	
0012	WINDY-22912-12	Soil		Nitrogen	0.10	% dry	
0013	WINDY-22912-13	Soil		Nitrogen	0.26	% dry	
0014	WINDY-22912-14	Soil		Nitrogen	0.23	% dry	
0015	WINDY-22912-15	Soil		Nitrogen	0.11	% dry	
0016	WINDY-22912-16	Soil		Nitrogen	0.12	% dry	

Test method(s): SNL-036 SNL-021 SNL-026 Non-routine SNL-006

Supervisor: Nicolaas Schrier MSc 519 823 1268 ext. 57215 nschrier@uoguelph.ca

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UNIVERSITY of GUELPH
LABORATORY SERVICES
Agriculture and Food Laboratory

FINAL Report
Submission# **12-019294**
Reported: 2012-Mar-16

Submitted By:

SIREM LABORATORIES
XIMENA DRUAR
130 RESEARCH LANE
SUITE 2
GUELPH, ON N1G 5G3

Phone: 519 822-2230
Fax: 519 822-3151

Owner:
XIMENA DRUAR

Sampling Date: Not given Received Date: 2012-Feb-29

Nitrate, Soil

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	PATCH-22912-1	Soil		Nitrate-N	1.69	mg/kg	
0002	PATCH-22912-2	Soil		Nitrate-N	0.614	mg/kg	
0003	PATCH-22912-3	Soil		Nitrate-N	0.773	mg/kg	
0004	PATCH-22912-4	Soil		Nitrate-N	0.509	mg/kg	
0005	PATCH-22912-5	Soil		Nitrate-N	0.558	mg/kg	
0006	PATCH-22912-6	Soil		Nitrate-N	0.574	mg/kg	
0007	PATCH-22912-7	Soil		Nitrate-N	0.580	mg/kg	
0008	PATCH-22912-8	Soil		Nitrate-N	0.642	mg/kg	
0009	WINDY-22912-9	Soil		Nitrate-N	0.577	mg/kg	
0010	WINDY-22912-10	Soil		Nitrate-N	0.458	mg/kg	
0011	WINDY-22912-11	Soil		Nitrate-N	0.631	mg/kg	
0012	WINDY-22912-12	Soil		Nitrate-N	1.09	mg/kg	
0013	WINDY-22912-13	Soil		Nitrate-N	2700	mg/kg	
0014	WINDY-22912-14	Soil		Nitrate-N	2180	mg/kg	
0015	WINDY-22912-15	Soil		Nitrate-N	2.05	mg/kg	
0016	WINDY-22912-16	Soil		Nitrate-N	1.57	mg/kg	

Nitrite, Soil

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	PATCH-22912-1	Soil		Nitrite-N	0.208	mg/kg dry	
0002	PATCH-22912-2	Soil		Nitrite-N	0.223	mg/kg dry	
0003	PATCH-22912-3	Soil		Nitrite-N	0.802	mg/kg dry	
0004	PATCH-22912-4	Soil		Nitrite-N	0.439	mg/kg dry	

Nitrite, Soil ....Continued

Date Authorized: 2012-Mar-16 18:15

0005	PATCH-22912-5	Soil	Nitrite-N	<0.0300	mg/kg dry
0006	PATCH-22912-6	Soil	Nitrite-N	<0.0300	mg/kg dry
0007	PATCH-22912-7	Soil	Nitrite-N	0.353	mg/kg dry
0008	PATCH-22912-8	Soil	Nitrite-N	0.313	mg/kg dry
0009	WINDY-22912-9	Soil	Nitrite-N	<0.0300	mg/kg dry
0010	WINDY-22912-10	Soil	Nitrite-N	<0.0300	mg/kg dry
0011	WINDY-22912-11	Soil	Nitrite-N	0.651	mg/kg dry
0012	WINDY-22912-12	Soil	Nitrite-N	0.468	mg/kg dry
0013	WINDY-22912-13	Soil	Nitrite-N	<0.0300	mg/kg dry
0014	WINDY-22912-14	Soil	Nitrite-N	<0.0300	mg/kg dry
0015	WINDY-22912-15	Soil	Nitrite-N	<0.0300	mg/kg dry
0016	WINDY-22912-16	Soil	Nitrite-N	<0.0300	mg/kg dry

Other

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result	Note
0015	WINDY-22912-15	Soil		Other	777000	
0016	WINDY-22912-16	Soil		Other	327000	

Comments:

SN-Other is Extractable Soil Sulphate-Sulphur (mg/kg dry).

pH (sat paste), Soil

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result	Note
0001	PATCH-22912-1	Soil		pH	7.5	
0002	PATCH-22912-2	Soil		pH	7.4	
0003	PATCH-22912-3	Soil		pH	8.4	
0004	PATCH-22912-4	Soil		pH	8.3	
0005	PATCH-22912-5	Soil		pH	6.6	
0006	PATCH-22912-6	Soil		pH	6.6	
0007	PATCH-22912-7	Soil		pH	7.6	
0008	PATCH-22912-8	Soil		pH	7.7	
0009	WINDY-22912-9	Soil		pH	7.0	

pH (sat paste), Soil ....Continued

Date Authorized: 2012-Mar-16 18:15

0010	WINDY-22912-10	Soil	pH	6.9
0011	WINDY-22912-11	Soil	pH	8.0
0012	WINDY-22912-12	Soil	pH	8.1
0013	WINDY-22912-13	Soil	pH	6.6
0014	WINDY-22912-14	Soil	pH	6.7
0015	WINDY-22912-15	Soil	pH	6.7
0016	WINDY-22912-16	Soil	pH	6.8

Phosphorus, Soil (mass)

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	PATCH-22912-1	Soil		Phosphorus, Extractable	10.2	mg/kg dry	
0002	PATCH-22912-2	Soil		Phosphorus, Extractable	8.91	mg/kg dry	
0003	PATCH-22912-3	Soil		Phosphorus, Extractable	10.9	mg/kg dry	
0004	PATCH-22912-4	Soil		Phosphorus, Extractable	7.67	mg/kg dry	
0005	PATCH-22912-5	Soil		Phosphorus, Extractable	102	mg/kg dry	
0006	PATCH-22912-6	Soil		Phosphorus, Extractable	94.9	mg/kg dry	
0007	PATCH-22912-7	Soil		Phosphorus, Extractable	174	mg/kg dry	
0008	PATCH-22912-8	Soil		Phosphorus, Extractable	157	mg/kg dry	
0009	WINDY-22912-9	Soil		Phosphorus, Extractable	1.76	mg/kg dry	
0010	WINDY-22912-10	Soil		Phosphorus, Extractable	2.07	mg/kg dry	
0011	WINDY-22912-11	Soil		Phosphorus, Extractable	3.62	mg/kg dry	
0012	WINDY-22912-12	Soil		Phosphorus, Extractable	4.06	mg/kg dry	
0013	WINDY-22912-13	Soil		Phosphorus, Extractable	92.6	mg/kg dry	
0014	WINDY-22912-14	Soil		Phosphorus, Extractable	72.8	mg/kg dry	
0015	WINDY-22912-15	Soil		Phosphorus, Extractable	72.5	mg/kg dry	

Phosphorus, Soil (mass) ....Continued

Date Authorized: 2012-Mar-16 18:15

0016	WINDY-22912-16	Soil		Phosphorus, Extractable	86.2	mg/kg dry

Total Nitrogen

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	PATCH-22912-1	Soil		Nitrogen	0.07	% dry	
0002	PATCH-22912-2	Soil		Nitrogen	0.08	% dry	
0003	PATCH-22912-3	Soil		Nitrogen	0.08	% dry	
0004	PATCH-22912-4	Soil		Nitrogen	0.06	% dry	
0005	PATCH-22912-5	Soil		Nitrogen	0.13	% dry	
0006	PATCH-22912-6	Soil		Nitrogen	0.13	% dry	
0007	PATCH-22912-7	Soil		Nitrogen	0.10	% dry	
0008	PATCH-22912-8	Soil		Nitrogen	0.10	% dry	
0009	WINDY-22912-9	Soil		Nitrogen	0.11	% dry	
0010	WINDY-22912-10	Soil		Nitrogen	0.11	% dry	
0011	WINDY-22912-11	Soil		Nitrogen	0.11	% dry	
0012	WINDY-22912-12	Soil		Nitrogen	0.10	% dry	
0013	WINDY-22912-13	Soil		Nitrogen	0.26	% dry	
0014	WINDY-22912-14	Soil		Nitrogen	0.23	% dry	
0015	WINDY-22912-15	Soil		Nitrogen	0.11	% dry	
0016	WINDY-22912-16	Soil		Nitrogen	0.12	% dry	

Test method(s): SNL-036 SNL-021 SNL-026 Non-routine SNL-006

Supervisor: Nicolaas Schrier MSc 519 823 1268 ext. 57215 nschrier@uoguelph.ca

This report may not be reproduced except in full without written approval by Laboratory Services.
These test results pertain only to the specimens tested.

APPENDIX E
GENERAL CONDITIONS

GENERAL CONDITIONS

GEOTECHNICAL REPORT

This report incorporates and is subject to these “General Conditions”.

1.0 USE OF REPORT AND OWNERSHIP

This geotechnical report pertains to a specific site, a specific development and a specific scope of work. It is not applicable to any other sites nor should it be relied upon for types of development other than that to which it refers. Any variation from the site or development would necessitate a supplementary geotechnical assessment.

This report and the recommendations contained in it are intended for the sole use of EBA’s Client. EBA does not accept any responsibility for the accuracy of any of the data, the analyses or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than EBA’s Client unless otherwise authorized in writing by EBA. Any unauthorized use of the report is at the sole risk of the user.

This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of EBA. Additional copies of the report, if required, may be obtained upon request.

2.0 ALTERNATE REPORT FORMAT

Where EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed EBA’s instruments of professional service), only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by EBA shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of EBA’s instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except EBA. EBA’s instruments of professional service will be used only and exactly as submitted by EBA.

Electronic files submitted by EBA have been prepared and submitted using specific software and hardware systems. EBA makes no representation about the compatibility of these files with the Client’s current or future software and hardware systems.

3.0 ENVIRONMENTAL AND REGULATORY ISSUES

Unless stipulated in the report, EBA has not been retained to investigate, address or consider and has not investigated, addressed or considered any environmental or regulatory issues associated with development on the subject site.

4.0 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems and methods employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. EBA does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

5.0 LOGS OF TESTHOLES

The testhole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance which requires precise definition of soil or rock zone transition elevations may require further investigation and review.

6.0 STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of test holes and/or soil/rock exposures. Stratigraphy is known only at the locations of the test hole or exposure. Actual geology and stratigraphy between test holes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historic environment. EBA does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional investigation and review may be necessary.

7.0 PROTECTION OF EXPOSED GROUND

Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance which can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

8.0 SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

9.0 INFLUENCE OF CONSTRUCTION ACTIVITY

There is a direct correlation between construction activity and structural performance of adjacent buildings and other installations. The influence of all anticipated construction activities should be considered by the contractor, owner, architect and prime engineer in consultation with a geotechnical engineer when the final design and construction techniques are known.

10.0 OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, as well as the potential of adverse circumstances arising from construction activity, observations during site preparation, excavation and construction should be carried out by a geotechnical engineer. These observations may then serve as the basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein.

11.0 DRAINAGE SYSTEMS

Where temporary or permanent drainage systems are installed within or around a structure, the systems which will be installed must protect the structure from loss of ground due to internal erosion and must be designed so as to assure continued performance of the drains. Specific design detail of such systems should be developed or reviewed by the geotechnical engineer. Unless otherwise specified, it is a condition of this report that effective temporary and permanent drainage systems are required and that they must be considered in relation to project purpose and function.

12.0 BEARING CAPACITY

Design bearing capacities, loads and allowable stresses quoted in this report relate to a specific soil or rock type and condition. Construction activity and environmental circumstances can materially change the condition of soil or rock. The elevation at which a soil or rock type occurs is variable. It is a requirement of this report that structural elements be founded in and/or upon geological materials of the type and in the condition assumed. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions assumed in this report in fact exist at the site.

13.0 SAMPLES

EBA will retain all soil and rock samples for 30 days after this report is issued. Further storage or transfer of samples can be made at the Client's expense upon written request, otherwise samples will be discarded.

14.0 INFORMATION PROVIDED TO EBA BY OTHERS

During the performance of the work and the preparation of the report, EBA may rely on information provided by persons other than the Client. While EBA endeavours to verify the accuracy of such information when instructed to do so by the Client, EBA accepts no responsibility for the accuracy or the reliability of such information which may affect the report.

Appendix A2: Phase 3 Environmental Site Assessment for the Patch Lake Facility Camp

HOPE BAY MINING LIMITED

PHASE 3 ENVIRONMENTAL SITE ASSESSMENT AND SOIL BIOTREATABILITY STUDY
PATCH LAYDOWN, HOPE BAY PROJECT, NU

REPORT

JUNE 2012
ISSUED FOR USE
EBA FILE: Y22101187.001

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LIMITATIONS OF REPORT

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EXECUTIVE SUMMARY

EBA, A Tetra Tech Company, (EBA) is pleased to provide this report to Hope Bay Mining Ltd. (HBML) on the Phase 3 Environmental Site Assessment (ESA) and soil biotreatability study conducted at the former Patch Laydown located at 68°04.12′ N, 106°34.04′ W, within the Hope Bay project area. The site is approximately 68 km southeast of Umingmaktok and 160 km southwest of Cambridge Bay, Nunavut (Figure 1). The Phase 3 ESA report is a part of the submissions related to the Final Abandonment and Restoration Plan for the site, as per Licence No. 2BE-HOP0712 Type "B" issued to Hope Bay Mining Ltd. by the Nunavut Water Board (NWB).

The objectives of the Phase 3 Environmental Site Assessment for the Patch Laydown site were to:

- Delineate the identified constituents of concern (petroleum hydrocarbons and metals) in soil and groundwater.
- Refine the Phase 2 ESA (WESA) estimated volumes of hydrocarbon-impacted soil.
- Investigate pathways of movement or migration of contaminants through soil and groundwater to refine the site conceptual model as well as the fate and transport and risk assessment models.
- The objective of the bench-scale biotreament testing of petroleum hydrocarbon affected soils at Patch Laydown was to evaluate enhanced aerobic biodegradation processes for the F2 hydrocarbon fraction.
- The objective of the bench-scale biotreament testing of petroleum hydrocarbon affected soils for the Patch Laydown was to evaluate enhanced aerobic and anaerobic biodegradation processes for the F2 hydrocarbon fraction and evaluate the option of field trials based on the outcome of the study.

Patch Laydown is located near the north end of Patch Lake (Figure 1). It is situated atop a bedrock ridge approximately 50 to 80 m west of the lake, and approximately 10 to 14 m above the high water level in the lake. The site is on leased Inuit-owned land within the West Kitikmeot region of Nunavut located at approximately 68°3'40"N, 106°37'0"W. The site will be accessible via winter road from the nearby Doris to Windy all-weather road to be completed in 2012.

The footprint of the site is approximately 300 m by 100 m. The site is currently not used except for the disposal of drilling wastes, and is under care and maintenance with regular inspections conducted by Hope Bay Project personnel. As per the terms of the Nunavut Water Board Licence No. 2BE-HOP0712, HBML is currently preparing a Final Abandonment and Restoration Plan for the site, prepared in accordance with the Mine Site Reclamation Guidelines for the Northwest Territories, 2006 and the INAC Mine Site Reclamation Policy for Nunavut, 2002.

The site was formerly operated by Miramar Hope Bay Ltd. (Miramar) that was acquired by HBML (wholly owned by Newmont Mining Corporation) in December 2007. Former facilities included a drill maintenance workshop (also referred to as the Major Drilling shop complex), laydown yards, a generator, an incinerator, and a tank farm with six above ground storage tanks (ASTs).

Based on the known history of the site, previous Phase 2 ESA, and a walk-through of the site upon arrival, the former Patch Laydown site was divided into eight areas of potential environmental concern related to hydrocarbon use and storage. A summary key of the areas is provided on Figure 2, and detailed features of the areas are provided on Figures 3A to 3G. The areas are as follows:

Areas of Potential Environmental Concern at the Patch Laydown

Area	Description
P1	Workshop
P2	Laydown area
P3	Former incinerator
P4	Former fuel storage at south end of site
P5	Former generator
P6	Burn area
P7	Tank farm (tanks removed)
P8	Stained area between generator and incinerator

Test-pitting, soil sampling and groundwater water sampling was completed on August 7, 8, and 10, 2011. Testpits were dug by hand, and soils were visually logged and bagged for field soils screening (hydrocarbon vapours) at approximate intervals of 10 to 30 cm.

A total of seventy six (76) logged test pits were dug by hand. Numerous other shallower pits in various locations were dug to check for visual indications of petroleum hydrocarbon impacts. Test pit depths were advanced to the bottom of hydrocarbon impacts or to rock refusal. The maximum test pit depth of was 1.0 m below surface, which was in the sands encountered at the former shop (P1). No permafrost was encountered on the site.

A summary of the Phase 3 ESA results with areas and estimated in-situ volumes of soils having concentrations of petroleum hydrocarbon concentrations higher than the Nunavut/CCME Tier 1 environmental guidelines is provided below, followed by a summary of observations for each of the eight (8) areas.

Patch Lake Petroleum Hydrocarbon Soils Exceeding Nunavut/CCME Industrial Soil Criteria (coarse grained)

Area of Concern	Hydrocarbon Fraction	Maximum Concentration(s) mg/kg	Estimated Area (m^2)	Estimated Depth (m)	Estimated In-Situ Volume (m^3)
P1A	F1, F2	F1 = 1,600; F2 = 9,300	38	2	76
P1B	F2	F2 = 1,700	13	0.5	7
P3	F2, F3, F4	F2 = 4,000; F3 = 23,000; F4 = 3,700	29	3	87*
P5	Toluene, Ethylbenzene, Xylenes, F1, F2	Toluene = 1, Ethylbenzene = 5.6, Xylenes = 49, F1 = 1,300; F2 = 6,200	16	2	32

Patch Lake Petroleum Hydrocarbon Soils Exceeding Nunavut/CCME Industrial Soil Criteria (coarse grained)

Area of Concern	Hydrocarbon Fraction	Maximum Concentration(s) mg/kg	Estimated Area (m^2)	Estimated Depth (m)	Estimated In-Situ Volume (m^3)
				Estimated in-situ volume (m^3)*	202

*Soils from area P3 (former incinerator) are not considered to be amenable to landfarm treatment.

Tier 1 Environmental Guidelines for Contaminated Site Remediation of Surface Soils for Nunavut (industrial land use and coarse-grained soils)

Parameter	*mg/kg*
F1	240**
F2	260
F3	1,700
F4	3,300

**Includes protection against contaminated groundwater discharge to an adjacent surface water body

Based on the results of the current Phase 3 ESA and the previous Phase 2 ESA, the following summary presents soil volumes with metals concentrations higher than CCME Soil Quality Guideline for the Protection of Environmental and Human Health–Industrial Land Use (coarse-grained soils) that likely resulted from mining exploration activities. These metals impacts are associated with historic spills of waste oil and lubricating oil.

Patch Lake Petroleum Hydrocarbon Soils Exceeding CCME Soil Criteria for Metals (coarse-grained soils)

Area of Concern	Metals	Maximum Concentration(s) mg/kg	Estimated Area (m^2)	Estimated Depth (m)	Estimated In-Situ Volume (m^3)
P1	Cr, Cu, Zn	71,104, 270	120	0.15	18
P3	Cr, Ni,	72, 131	29	3	87
Other Miscellaneous Spills and Staining		-	75	0.30	22
Estimated in-situ volume (m^3)					127

A hydrocarbon biotreatability study was conducted on a composite sample of soils taken from Patch Laydown. The study occurred between October 5, 2011 and February 29, 2012 (147 days, or 5 months) at SiREM Laboratories, in Guelph, Ontario. The purpose of the study was to evaluate intrinsic and enhanced aerobic degradation of petroleum hydrocarbons to indicate the potential success of ex-situ aerobic treatments such as landfarming or biopiles. Aerobic treatments included soil amendment with nutrients (nitrogen and phosphorus), addition of a proprietary oxygen releasing compound (Adventus Americas, Illinois), and a combination of both treatments. Soil microcosms were kept at 10°C for the duration of the study.

Substantial decreases in F2 and F3 concentrations were achieved in 147 days by improving the availability of soil nutrients and simulated weekly tilling. From initial concentrations of F2 and F3 of 4,400 mg/kg and 3,450 mg/kg respectively, final hydrocarbon results were approximately 455 mg/kg for F2 (90% removal) and 2,450 mg/kg for F3 (30% removal).

Excluding some unsuitable (untreatable) soils at the incinerator, an estimated weighted average of F1 and F2 hydrocarbon fraction for the 115 m^3 of biotreatable soils is 9,000 mg/kg. Based on a removal rate of 85% after 3 months of treatment for the F2 fraction, and assuming weekly tilling with optimal nutrient and moisture conditions, the projected F2 concentrations after one season of landfarming treatment would be between 1,000 to 1,500 mg/kg. It is not possible to project how much more time would be required to remediate the soils at Patch Laydown to concentrations less than the Nunavut/CCME industrial guidelines for petroleum hydrocarbons; however, based on the current study it is anticipated that this would take two to three treatment seasons.

The small quantity of biotreatable soils (115 m^3) originating from Patch Laydown do not warrant the construction of a new purpose-built landfarm. Soils could be treated within the existing lined former fuel facility (along with soils originating from Old Windy Camp, if required), or transported to the landfarm at Boston Camp. For the relatively small volume of metals-impacted soils (127 m^3), an off-site disposal option could be considered. The off-site disposal option for the metals soils would cost approximately $120,000 to $150,000.

Based on the outcome of the Phase 3 ESA and the SiREM soil biotreatability study, EBA recommends the following for Patch Laydown:

- The 115 m^3 of biotreatable soils containing F1-F2 fraction could be treated alone or along with the estimated 575 m^3 of petroleum hydrocarbon-impacted materials originating from the Old Windy Camp. The existing lined former fuel facility is large enough for this purpose and already has a suitable protective layer of sand over the liner. Construction of a dedicated landfarm for this small volume of soils would not be economical.
- An additional 127 m^3 of PHC-impacted soils are co-contaminated with metals or are otherwise unsuitable for landfarming. These soils can be disposed of at an approved commercial Class II landfill facility.
- Poor water quality in the active layer at the monitoring wells, including high salinity, low pH and high total concentrations of select metals may be associated with exploration related use of sodium and calcium chloride during drilling activities.
- No estimates of the volume or extent of salt-affected soils was made, although preliminary soil testing suggests that the fill material recently spread over the laydown area would be difficult to revegetate in the current condition due to a combination of high conductivity, high sodium absorption ratio, and low pH.
- If treated to the most stringent Nunavut Tier 1 remediation criteria (wildland land use), treated petroleum hydrocarbon affected soils could potentially be used as a reclamation material and growth media at Patch Laydown.
- Water quality in the existing groundwater monitoring wells should continue to be monitored yearly.

TABLE OF CONTENTS

EXECUTIVE SUMMARY i

1.0 INTRODUCTION 1
1.1 General 1
1.2 Authorization 1
1.3 Scope of Work 1

2.0 BACKGROUND INFORMATION 2
2.1 Site Details and Background 2
2.2 Location, Ownership and Current Land Use 3
2.3 Climate 3
2.4 Site Topography and Vegetation 4
2.5 Regional Quaternary Geology 4
2.6 Regional Bedrock Geology 5
2.6.1 Regional Surficial Soils 5
2.6.2 Hydrogeology and Permafrost 5

3.0 ENVIRONMENTAL CRITERIA 6
3.1 Regulatory Guidelines 6
3.2 Land Use Assessment 6
3.3 Particle Size Designation 6
3.4 Applicable Exposure Pathways 7
3.4.1 Human Pathways 7
3.4.2 Ecological Pathways 7
3.5 Summary of Applicable Guidelines 7

4.0 PHASE 3 SITE WORK AND RESULTS 10
4.1 Site Safety 10
4.2 Test Pitting and Soil Sampling Program 10
4.3 Soil Sampling Results 12
4.4 Groundwater Sampling Results 15

5.0 BIOTREATABILITY RESULTS 17

6.0 REMEDIAL OPTIONS 19

7.0 RECOMMENDATIONS 22

8.0 CLOSURE 24

REFERENCES 25

TABLES

Table 1 Soil Analytical Results for Hydrocarbons and Salinity at P1
Table 2 Soil Analytical Results for Metals and Salinity P2
Table 3 Soil Analytical Results for Hydrocarbons and Leachable Metals at P3
Table 4 Soil Analytical Results for Hydrocarbons at P5
Table 5 Soil Analytical Results for Hydrocarbons at P6
Table 6 Soil Analytical Results for Hydrocarbons at P7
Table 7 Soil Analytical Results for Hydrocarbons at P8
Table 8 Water Analytical Results for Hydrocarbons, Routine Parameters and Regulated Metals at Patch Laydown

FIGURES

Figure 1 Hope Bay Project Location
Figure 2 Patch Camp Layout
Figure 3A P1 – Workshop
Figure 3B P2 – Laydown Area
Figure 3C P3 – Incinerator
Figure 3D P5 – Generator
Figure 3E P6 – Burn Area near North End of Site
Figure 3F P7 –Tank Farm
Figure 3G P8 – Stained Area between Generator and Incinerator
Figure 4 Groundwater Sampling Locations

APPENDICES

Appendix A Laboratory Analytical Results
Appendix B SiREM Biotreatability Proposal
Appendix C SiREM Biotreatability Study Graphs
Appendix D SiREM Biotreatability Study Results
Appendix E General Conditions

1.0 INTRODUCTION

1.1 General

EBA, A Tetra Tech Company, (EBA) is pleased to provide this report to Hope Bay Mining Ltd. (HBML) on the Phase 3 Environmental Site Assessment (ESA) and soil biotreatability study conducted at the former Patch Laydown located at 68°04.12′ N, 106°34.04′ W, within the Hope Bay project area. The site is approximately 68 km southeast of Umingmaktok and 160 km southwest of Cambridge Bay, Nunavut (Figure 1). The Phase 3 ESA report is a part of the submissions related to the Final Abandonment and Restoration Plan for the site, as per Licence No. 2BE-HOP0712 Type "B" issued to Hope Bay Mining Ltd. by the Nunavut Water Board (NWB).

The objectives of the Phase 3 Environmental Site Assessment for the former Patch Laydown were to:

- Delineate the identified constituents of concern (petroleum hydrocarbons and metals) in soil and groundwater.
- Refine the Phase 2 ESA (WESA) estimated volumes of hydrocarbon-impacted soil.
- Investigate pathways of movement or migration of contaminants through soil and groundwater to refine the site conceptual model as well as the fate and transport and risk assessment models.
- The objective of the bench-scale biotreament testing of petroleum hydrocarbon affected soils at Patch Laydown was to evaluate enhanced aerobic biodegradation processes for the F2 hydrocarbon fraction and evaluate the option of field trials based on the outcome of the study

1.2 Authorization

Mr. WRC Langley, Commercial Manager at HBML provided EBA authorization to proceed with the work on May 11, 2011. The Professional Services Agreement number is PSA-HB-10-KE-001 and the Work Order Number is CR-0053.

1.3 Scope of Work

EBA developed the work plan based on a Phase 2 ESA completed in 2009 by WESA Group Inc. The scope of work for the Phase 3 ESA, as outlined in proposal EBA File: PY22101172 letter dated August 15, 2011 and adjusted during the work, was as follows:

- Prepare a health and safety plan for the field program using EBA's in house Safe Work Form (SWF). A safety meeting including a field level risk assessment was conducted on site prior to the start of the field program. All workers on site agreed to the conditions of the SWF before work commenced. In addition, EBA staff completed the in-house site orientation and site-specific training provided by HBML.
- Conduct a Phase 3 ESA to delineate petroleum hydrocarbon impacts, with a sufficient data density to estimate weighted-average soil volume estimates for the F1 to F4 petroleum hydrocarbon soil

fractions and to evaluate areas where the soils are affected by diesel, waste oil, other types of hydrocarbons, or combinations of spills.

- Obtain soil samples at regular intervals from all testpits. Examine soil samples for staining and obvious odour. Measure the photoionization potential on samples using a photoionization detector (PID). Log soil stratigraphy correspondingly for each testpit.
- Submit 60 soil samples to Maxxam Analytics Inc. of Edmonton for the analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX), and PHC fractions F1 through F4. Submit select samples for sieve analysis, salinity and CCME regulated metals. Submit four surface water samples for the analysis of BTEX, PHC fraction F1, and dissolved metals.
- Collect soil samples for site-specific information relevant to a bioremediation option (landfarming and biopile), including soil pH, type/texture, grain size analysis, soil moisture content and field capacity, and soil organic/inorganic carbon.
- Collect a composite soil sample of hydrocarbon-affected soils to evaluate enhanced aerobic and processes for the F2 and F3 hydrocarbon fractions by conducting a bench-scale biotreatment study at SiREM laboratories in Guelph, Ontario. Details of SiREM's study were included in the August 15, 2011 proposal and described in Section 5 of this report. Aerobic treatments include simulated tilling only, tilling with conventional nutrient application, and tilling with a proprietary oxygen releasing compound and nutrients.
- Prepare a Phase 3 ESA report discussing field observations and analytical results

2.0 BACKGROUND INFORMATION

2.1 Site Details and Background

The Patch Laydown is located near the north end of Patch Lake (Figure 1). It is situated atop a bedrock ridge approximately 50 to 80 m west of the lake, and approximately 10 to 14 m above the high water level in the lake. The site is on leased Inuit-owned land within the West Kitikmeot region of Nunavut located at approximately 68°3'40"N, 106°37'0"W. The site will be accessible via winter road from the nearby Doris to Windy all-weather road to be completed in 2012.

The footprint of the site is approximately 300 m by 100 m. The site is currently not used except for the disposal of drilling wastes, and is under care and maintenance with regular inspections conducted by Hope Bay Project personnel. As per the terms of the Nunavut Water Board Licence No. 2BE-HOP0712, HBML is currently preparing a Final Abandonment and Restoration Plan for the site, prepared in accordance with the Mine Site Reclamation Guidelines for the Northwest Territories, 2006 and the INAC Mine Site Reclamation Policy for Nunavut, 2002.

The site was operated by Miramar Hope Bay Ltd. (Miramar) and was acquired by HBML (wholly owned by Newmont Mining Corporation) in December 2007. Former facilities included a drill maintenance workshop (also referred to as the Major Drilling shop complex), laydown yards, a generator, an incinerator, and a tank farm to contain fuel six above ground storage tanks (ASTs). Refer to Figure 2 for the existing and former site features.

The drill maintenance shop was previously decommissioned and materials removed. The fuel ASTs have also been removed since the 2009 Phase 2 ESA, as well as the generator and the incinerator.

Other historic (pre-Newmont) activities at the site included the storage of sodium chloride and calcium chloride for the purpose of on-lake exploratory drilling during the winter, in accordance with Department of the Environment January 12, 2002 Permit No. 4543-2-02886. Present-day exploratory drilling fluids, if required, contain calcium chloride as opposed to sodium chloride.

Drilling fluids from nearby exploration programs are disposed of by helicopter at the topographical low point at the south end of the site. Bags of calcium chloride are stored near the former tank farm, and approximately 135 bags of solid drilling wastes and other materials are stored at the south end of the site.

A Phase 2 environmental site assessment (ESA) at the Patch Facility was conducted in 2009. The report indicated that the chemicals of potential concern included petroleum hydrocarbons (PHC) including the F2 fraction (diesel fuel) and the F3 and F4 fractions (lubricating oils). Metals including chromium and copper were associated with surficial spills of waste oil. Chromium in waste oil generally originates from the wear of engine piston rings, whereas the copper is generally caused by wear of engine bearings or bushings and valve guides.

Based on a comparison of photos from the 2009 study, it appears that soils have been transported to the disturbed laydown areas and graded. The site has a lot of small debris that can present a hazard to helicopters attempting to land near the site, including at the helicopter pad.

The Phase 2 ESA estimated soils volume requiring remediation was 3,400 m^3. Most of the hydrocarbon impacts identified at the time were associated with the workshop, the incinerator, and the generator.

2.2 Location, Ownership and Current Land Use

The Hope Bay Project is on Inuit-owned land administered by the Kitikmeot Inuit Association (KIA), with minerals development authority vested within Nunavut Tunngavik Inc. (NTI). Depending on the location of land within the Hope Bay project area, three entities administer surface and subsurface mine leases on behalf of the Inuit; the KIA (surface rights), the Nunavut Tunngavik Incorporated (subsurface rights), and Aboriginal Affairs and Northern Development Canada (both surface and subsurface rights).

HBML has secured access and mineral rights to the Hope Bay Project through land use and commercial land leases negotiated with these stakeholders.

For the purpose of environmental guideline selection, the current land use at the Hope Bay mine is classified as Industrial. There is no current or future anticipated groundwater use at the site, or use of the water in Patch Lake as a source of drinking water.

2.3 Climate

Based on meteorological data from weather stations at Cambridge Bay approximately 170 km northeast of the site and Contwoyto Lake approximately 280 km southwest of the site, the mean annual temperature is -15°C for the former and -12°C for the latter. Based on 68 complete months of data at the Hope Bay project, the mean monthly air temperatures for Doris station (30 masl) ranged from -33.2°C in February 2008 to

13.2°C in July 2007. The annual average temperatures for 2002 to 2009, using only complete years of available data, were -11.7°C and -11.1°C at Boston and Doris stations, respectively (Rescan, 2009).

Total annual rainfall from 2002 to 2009 (based on available complete years) averaged 30 mm and 85 mm at Boston and Doris stations, respectively (Rescan, 2009). The 1971 to 2000 climate normal annual precipitation at Cambridge Bay regional station is 139 mm, comprised of 70 mm of rainfall and 69 mm of snow water equivalent (SWE).

2.4 Site Topography and Vegetation

The Hope Bay Project generally has a low to moderate surface relief. The former Patch Facilities site has approximately 20 m of differential elevation between the low point (shore of Patch Lake) and the high point (rock outcrop near workshop). The site is flat in the area formerly used for the workshop, and the site loses about four metres of elevation to the south where the drilling wastes are deposited. Marshy areas are present south of the site.

The predominant drainage in the area is north into Hope Bay. Areas of felsenmeer are common and swampy areas are also present. Tundra and moss cover the ground even at higher elevations. Vegetation consists primarily of lichen, moss, dwarf willows and birches.

2.5 Regional Quaternary Geology

The region was subjected to multiple glaciations during the Quaternary period. During each glaciation, the area was overridden by the northwestern sector of the Laurentide Ice Sheet. Evidence of only the most recent (Late Wisconsin) glaciation is preserved in the present-day landscape. Striations, orientation of eskers, grooves and drumlins indicate that the predominant glacial ice movement was north-northwest.

The project area became ice-free about 8,800 years ago as the southwest to northeast trending ice sheet melted back toward the southeast (Dyke and Prest, 1986) leaving a blanket of basal till as the ice retreated. Immediately following deglaciations, the sea level was about 200 m higher than at present (Dyke and Dredge, 1989). The entire project area was submerged and the edge of the ice sheet abutted the open sea. Meltwater streams from the ice carried fine grained sediments toward the sea, resulting in the accumulation of marine sediments on top of the till with the greatest accumulated thickness in the deeper water zones, which now form the valley bottoms.

Following glaciation, isostatic rebound caused a relative decline in sea level. During emergence, the land surface was washed by waves. Easily erodible surfaces such as marine sediments, till, and glaciofluvial sands and gravels were reworked and redistributed by waves, currents and sea ice. Some present-day rock outcrops were exposed as the thin soil washed off the uplands and accumulated in the valley bottoms. Current outcrop cover varies from 35% to 80% in the region. Outcrops tend to form relatively continuous, north-northwest trending ridges throughout the area with broad tundra-covered flat valleys. Lakes are also elongate in a north-northwest direction. Since emergence, natural slope processes, frost action, and permafrost have contributed to the present day landscape.

2.6 Regional Bedrock Geology

Regional bedrock geology consists of sedimentary and volcanic rocks of the Arctic Platform (NRCAN, 1957). The Hope Bay project region is underlain by the late Archean Hope Bay Greenstone Belt, which is approximately 42 km and consists of mostly mafic volcanic rocks.

2.6.1 Regional Surficial Soils

The Geological Survey of Canada (Sharpe, 1993) indicates that glacial till deposits are predominant. Pleistocene deposits are buried beneath marine sediments consisting of clay, silt and sand. The surficial deposits in the region that overlie the bedrock consist of glacial till, marine sediments, glaciofluvial deposits, lacustrine deposits, and alluvial deposits. Unconsolidated lake sediments and clay up to 15 m thick are also present at Doris Lake and other nearby lakes.

Most of the soils encountered within the disturbed area were medium- to coarse-grained sands with some silt. Where vegetation was present in undisturbed areas, the organic layer ranged from 10 to 20 cm. The adjacent areas north of the buildings consist of steep rocky outcrops of bedrock. To the west is a valley cut in the bedrock that rises gently for approximately 600 m before descending to Windy Lake.

2.6.2 Hydrogeology and Permafrost

The project area is coastal lowland with numerous lakes and ponds separated by glacial landforms and parallel geological intrusions including diabase dykes and sills. The drainage basins are generally long and narrow and predominantly oriented along the north-south axis.

Continuous permafrost extends to -560 m. (Heginbottom et. al., 1995). Ground temperature measurements in the project area indicate an active zone thickness ranging between 1.5 to 2.6 m and the depth of zero annual amplitude varying between 11 and 17 m (Golder 2001; EBA 1996).

Groundwater in the continuous permafrost zone is confined to this shallow active layer. Based on the regional geology and the presence of permafrost, the groundwater flow is likely complex and controlled by topography, surface water bodies and bedrock structure. Vertical groundwater flow is limited by the shallow permafrost. The period of groundwater flow is highly influenced by climatic conditions and flow is likely also limited to the short summer season when the active layer thaws, thus allowing water to flow in this horizon. It is expected that the surface water bodies are expressions of the water table.

Based on the site topography (a mound of exposed bedrock), it is expected that flow of the active layer water is radial. The nearest surface water body is Patch Lake, located from 50 to 80 m east of the site. Free water was not encountered on the northern part of the site, and the soils were damp to dry. Soils at the south end of the site were saturated. Water in the active layer is close to surface in this area, and the grassy vegetation observed reflects wetland conditions. Permafrost was not encountered anywhere on the site at the time of the assessment.

3.0 ENVIRONMENTAL CRITERIA

3.1 Regulatory Guidelines

The following subsections outline the rationale for the selection of applicable generic risk management guidelines for soil and surface water. The guideline documents relevant to the Site consist of the following:

3.2 Land Use Assessment

CCME land use criteria and government of Nunavut land use criteria currently recognize four different types of land use:

- Agricultural land use: lands used for growing crops or producing livestock, and that are agricultural in nature. These also include lands that provide habitat for resident and transitory wildlife and native flora.
- Residential/Parkland land use: lands where the primary activity is occupation for residency and recreational purposes. These include lands used as buffer zones between areas of residence, but do not include wildlands, such as national and provincial parks, other than campground areas.
- Commercial land use: lands where the primary activity is related to commercial operations, such as the provision of goods and services (e.g., shopping mall) and occupancy is not for residential or manufacturing purposes. These do not include operations where the growing of food is the primary activity (i.e. agricultural).
- Industrial land use: lands where the primary activity involved the production, manufacture, construction, and/or assembly of goods.

Canadian soil quality guidelines are derived for the protection of receptors under these four different land uses. The site use is currently classified as industrial. This land use will be applicable during exploration phases and through the life of mine until closure, after which the land use will revert to agricultural use. On industrial lands, the primary land use activities are not directly dependent on the need to sustain a high level of ecological processes. However, the same key ecological receptors are considered as for the agricultural and residential/parkland uses.

3.3 Particle Size Designation

A coarse-grained soil is defined as having a median grain size (D_{50}) of 75 µm or greater, whereas a fine-grained soil has a D_{50} of less than 75 µm. A review of the particles size analyses results for the Phase 3 ESA and the previous Phase 2 ESA study indicates that the soils are predominantly coarse-grained. These results corroborate soil textural observations in the field and additional particle size analyses conducted for this study.

3.4 Applicable Exposure Pathways

3.4.1 Human Pathways

The site is covered with sand, gravel, boulders, grassy areas, and sub-arctic tundra vegetation. The majority of the site consists of short grass with sparse vegetation. Soil and water direct contact (dermal contact and ingestion) pathways are considered applicable at the site during remedial activities.

Soil and water direct contact (dermal contact and ingestion) pathways are considered applicable pathways. There are no buildings in use, and given the future anticipated use of the site, the vapour inhalation pathway can be excluded.

Drinking water pathways can be excluded due to the absence of potential surface water bodies used for drinking water.

3.4.2 Ecological Pathways

Under this current land use the eco-soil contact pathway is applicable. Given the proximity of Patch Lake, the protection of groundwater for aquatic life (freshwater) should be given consideration.

3.5 Summary of Applicable Guidelines

Various regulatory guideline documents were consulted and are summarized below. These documents provide a generic set of guidelines against which the analytical results are compared to provide a general site condition.

Canadian Soil Quality Guidelines consider both human health and ecological receptors, and are intended as general guidance for the protection, maintenance, and improvement of specific uses of land and water. Based on the existing site usage, the CCME industrial guidelines are applicable.

SOIL CRITERIA

General Soil Criteria and Metals

- Canadian Council of Ministers of the Environment (CCME), Soil Quality Guideline for the Protection of Environmental and Human Health –Industrial Land Use (coarse-grained soils);
- Canadian Council of Ministers of the Environment (CCME) Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil; and
- Environmental Protection Division, Department of Environment, Government of Nunavut, Environmental Guideline for Contaminated site Remediation (March 2009 Revised) – Industrial Land Use (coarse-grained soils).

Metal concentrations in surficial soils are dependent upon variations of metal content in naturally-occurring media (i.e. bedrock, soil). Soils and stream sediments developed from metal-rich parent materials and bedrock may also be naturally enriched in regulated metals, and contribute to the cycling of metals in the environment including in water and vegetation. As observed from the air during the helicopter flight

from the Doris Camp to the former Windy Camp, many small ponds and wet areas in undisturbed terrain contain reddish sediment that suggests the presence of natural iron oxides in the environment. The biogeochemistry of metals in natural systems is complex; however an understanding of local and regional geochemical processes is necessary to evaluate the effects of metals on the surrounding environment. Natural background soil and sediment metals concentrations impose technical constraints on generic environmental soil criteria for regulated metals, such as the Canadian Council for Ministers of the Environment (CCME) criteria. However, for the current assessment CCME-regulated metals were compared to Tier 1 CCME Soil Quality guidelines for the Protection of Environmental and Human Health, Industrial land use, coarse-grained soils.

Petroleum Hydrocarbons

The Canada-Wide Standard for Petroleum Hydrocarbons in Soil (CWS PHC) is a specialized case of Canadian (CCME) Soil Quality Guidelines (CCME, 2008). To address the diversity of PHC contamination types, including various crudes and product admixtures, hydrocarbons are subdivided into four broad physico-chemical fractions as defined by the US Total Petroleum Hydrocarbons Criteria Working Group. The fractions are defined in equivalent carbon numbers as follows:

- F1: C6 to C10
- F2: >C10 to C16
- F3: >C16 to C34
- F4: C34+

Aliphatic and aromatic sub-fractions are considered separately in a human health assessment.

Whereas the primary focus in PHC CWS standard development is prevention of toxic effects from F1-F4 on the receptors in certain situations these pathways may be of little immediate concern and PHC management is governed by other factors including:

- ignition hazard
- odour and appearance
- effects on buried infrastructure
- formation of non-aqueous phase liquids (NAPL)
- socio-economics and technological capabilities

Soil Quality Guidelines can be used as benchmarks to evaluate the need for further investigation or remediation with respect to a specified land use. Guidelines are applied to identify and classify sites, to assess the general degree of contamination at a site and to determine the need for further action, and as a basis for remediation objectives.

Water Licence

As per Water Licence No. 2BE-HOP0712, the following industrial soil criteria apply to petroleum-affected remediated soils at Old Windy Camp. There is no reference to soils at Patch Laydown since there was no hydrocarbon-impacted soils treatment at this location. The values are provided here for reference only:

Water Licence Soil Remediation Criteria for Petroleum Affected Soils at Old Windy Camp

Parameter	mg/kg
Total Petroleum Hydrocarbons (TPH)	2,500
Benzene	0.5
Toluene	0.8
Ethylbenzene	20
Lead	400

The TPH criterion is no longer considered the best standard to evaluate the risk associated with hydrocarbons in soil, and reflects earlier CCME 1991 Interim Criteria that were in effect at the time the subject water license was issued.

WATER CRITERIA

General Criteria:

- Canadian Council of Ministers of the Environment (CCME), Canadian Water Quality Guidelines for Protection of Fresh/ Marine Water Aquatic Life.

As in the case of soils, the geochemical cycling of CCME-regulated metals naturally present in the environment may cause ambient water quality to exceed the Tier 1 environmental guideline for certain specific parameters in unfrozen water. Nevertheless, water quality results as reflected during the August 2011 surface water quality sampling event were compared to generic Tier 1 criteria for the purpose of the present assessment. Mining exploration and mining activities that cause site disturbance and changes in pH and soil salinity are factors that may contribute to resulting above-background metals concentrations in water, even if natural waters contain CCME-regulated metals in concentrations higher than the Tier 1 criteria.

The Canadian Council of Ministers of the Environment (CCME) does not have established water quality guidelines for the protection of aquatic life for total dissolved solids (TDS) or calcium (CCME, 2007).

Chlorides

For the purpose of this assessment, chloride concentrations were compared to:

- CCME (Canadian Council of Ministers of the Environment). 2011. Canadian water quality guidelines for the protection of aquatic life: Chloride. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg.

In 2011 the CCME released a water guideline for chloride for the protection of aquatic life, including a long-term exposure guideline of 128 mg/L chloride and a short-term benchmark concentration of 586 mg/L

chloride. The long-term exposure guideline is intended to protect all forms of aquatic life for an indefinite exposure period, whereas the short-term benchmark concentration is a concentration at which severe effects are likely to be observed (CCME, 2011).

Water Licence

As per Water Licence No. 2BE-HOP0712, the following water criteria apply to the still-active water monitoring program stations.

Water Licence Water Discharge Requirements for Station HOP-6 (Tank Farm at Patch)

Parameter	Maximum Average Concentration (mg/L)
Oil and Grease	15
Benzene	0.370
Toluene	0.002
Ethylbenzene	0.090
Lead	0.001

4.0 PHASE 3 SITE WORK AND RESULTS

4.1 Site Safety

In accordance with HBML's policies, EBA staff including Ms. Daniela Felske and Mr. Michel Hebert participated in a one-day site orientation and safety training, in addition to a bear awareness course and hand-on training for the use of bear deterrents. EBA completed its in-house Safe Work Form, which was updated and signed daily. Contents of the EBA Safe Work Form were explained to and accepted by the student field assistants assigned to EBA for the day. Pre-job hazard assessments were completed prior to going in the field, and were updated with a field-level assessment once on site. EBA participated in the staff safety meetings each morning, and prepared a trip planner each field day prior to going to site.

4.2 Test Pitting and Soil Sampling Program

Based on the known history of the site, previous Phase 2 ESA, and a walk-through of the site upon arrival, the Patch Laydown site was divided into eight areas of potential environmental concern related to hydrocarbon use and storage. A summary key of the areas is provided on Figure 2, and detailed features of the areas are provided on Figures 3A to 3G. The areas are as follows:

Areas of Potential Environmental Concern at Patch Laydown

Area	Description
P1	Workshop
P2	Laydown area
P3	Former incinerator

Areas of Potential Environmental Concern at Patch Laydown

Area	Description
P4	Former fuel storage a south end of site
P5	Former generator
P6	Burn area
P7	Tank farm (ASTs removed)
P8	Stained area between generator and incinerator

Test-pitting, soil sampling and groundwater water sampling was completed on August 7, 8, and 10, 2011. Testpits were dug by hand, and soils were visually logged and bagged for field soils screening (hydrocarbon vapours) using a photoinization detector (PID) at approximate intervals of 10 to 30 cm.

A total of seventy six (76) logged test pits were dug by hand. Numerous other shallower pits in various locations were dug to check for visual indications of petroleum hydrocarbon impacts. Test pit depths were advanced to the bottom of hydrocarbon impacts or to rock refusal. The total maximum test pit depth of was 1.0 m below surface, which was in the sands encountered at the former shop (P1). No permafrost was encountered on the site.

The organic layer ranged from 10 cm to 15 cm. Soils in the north part of the site consisted of a 20-cm layer of yellowish-brown silt underlain by banded layers of a dark brown silty clay and sandy silt. Coarse-grained sands were encountered at approximately 0.9 m below grade in the north part of the site. Soils were moist to dry, except for areas of saturated soils at the south end of the site.

In the former roadways adjacent to the workshop and other areas with fine-grained fill (i.e., the laydown area), soils were hard, cemented and dry. These areas were very difficult to test pit by hand even with a pickaxe. No vegetation was observed in any of these areas.

Soil samples were field screened for hydrocarbons using the ambient temperature headspace method, where soil samples were placed in plastic bags, were allowed to adjust to outdoor air temperature, and the airspace within the bag was then analyzed for combustible gases using a photoionization detector (PID) MiniRae instrument calibrated to isobutylene. Select PID screening results and depths of screened samples are shown next to the sample location on Figures 3A to 3G.

Soil samples were also collected directly from the test pit and packed with zero headspace in laboratory supplied jars, and stored in an insulated cooler with ice for transport to Maxxam Analytics International Corporation in Edmonton, Alberta. Groundwater samples were collected in designated laboratory-provided bottles, and preserved and/or field filtered as required. Field protocols and QA/QC procedures during sampling were in accordance with standard industry protocols. Holding times for all water and soil samples were within acceptable limits. All coolers still had ice present upon receipt at the laboratory, and the temperature range within the various coolers ranged between 10°C and 13°C. No samples were broken or lost during transport.

Forty (40) samples were analyzed for benzene, toluene, ethylbenzene and total xylenes (BTEX), petroleum hydrocarbon fractions F1 to F4, four (4) samples were analyzed for regulated metals, four (4) samples

were analyzed for salinity parameters, and nine (9) samples were analyzed for particle size analysis (PSA). Based on the results of the Phase 2 ESA, one soil sample was submitted for analysis of the TCLP leachability parameters to compare against Class II landfill requirements.

4.3 Soil Sampling Results

Results of petroleum hydrocarbon sampling are shown on Figures 3A to 3H. Full analytical results are provided in the tables in the Tables section of the report, and complete laboratory reports are provided in Appendix A.

A summary of the Phase 3 ESA results with areas and estimated in-situ volumes of soils having concentrations of petroleum hydrocarbon concentrations higher than the CCME guidelines is provided below, followed by a summary of observations for each of the eight (8) areas.

Patch Lake Petroleum Hydrocarbon Soils Exceeding CCME Industrial Soil Criteria (coarse-grained)

Area of Concern	Hydrocarbon Fraction	Maximum Concentration(s) mg/kg	Estimated Area (m^2)	Estimated Depth (m)	Estimated In-Situ Volume (m^3)
P1A	F1, F2	F1 = 1,600; F2 = 9,300	38	2	76
P1B	F2	F2 = 1,700	13	0.5	7
P3	F2, F3, F4	F2 = 4,000; F3 = 23,000; F4 = 3,700	29	3	87*
P5	Toluene, Ethylbenzene, Xylenes, F1, F2	Toluene = 1, Ethylbenzene = 5.6, Xylenes = 49, F1 = 1,300; F2 = 6,200	16	2	32
Total estimated in-situ volume of petroleum hydrocarbon impacted soils (m^3)					202

*Soils from area P3 (former incinerator) are not considered to be amenable to landfarm treatment.

Tier 1 Environmental Guidelines for Contaminated Site Remediation of Surface Soils for Nunavut (industrial land use and coarse-grained soils)

Parameter	*mg/kg*
F1	240**
F2	260
F3	1,700
F4	3,300

**Includes protection against contaminated groundwater discharge to an adjacent surface water body

Based on the results of the current Phase 3 ESA and the previous Phase 2 ESA, the following summary presents soil volumes with metals concentrations higher than CCME Soil Quality Guideline for the

Protection of Environmental and Human Health, Industrial Land Use (coarse-grained soils) that likely were resulted from exploration activities. These metals impacts are associated with historic spills of waste oil and lubricating oil.

Patch Lake Petroleum Hydrocarbon Soils Exceeding CCME Soil Criteria for Metals (coarse-grained)

Area of Concern	Metals	Maximum Concentration(s) mg/kg	Estimated Area (m^2)	Estimated Depth (m)	Estimated In-Situ Volume (m^3)
P1	Cr, Cu, Zn	71,104, 270	120	0.15	18
P3	Cr, Ni,	72, 131	29	3	87
Other Miscellaneous Spills and Staining		-	75	0.30	22
Estimated in-situ volume of metals-impacted soils (m^3)					127

A summary of the observations and results for all the areas is as follows:

P1 – Workshop

There was one shallow area of PHC affected soils at P1-32, and one deeper area in the vicinity of P1-16 and P1-3, as shown on Figure 3A. Vertical closure of the deeper area around P1-16 was attained at 1.0 m below grade. The estimated volume of diesel-affected soils was calculated to be 83 m^3 in the two areas.

Although it was not possible to collect soil samples beneath the wooden platform, the Phase 2 ESA and site observations indicate that a shallow layer of soil beneath and around the former workshop has waste oil and soil metals concentrations that are higher than CCME criteria. High metals concentrations on the site were associated with a historic spill of waste oil or other petroleum hydrocarbons, and the parameters of concern (chromium, copper, and zinc) are characteristic of engine wear and anti-seize compounds. Approximately 18 m^3 of soils were estimated to be metals-impacted.

W2 – Laydown Area

The area is covered by a fine-grained fill that is cemented and hard. EBA collected four soil samples for the analysis of salinity parameters in order to verify whether the chemical condition of the media would be suitable for revegetation. Extensive non-vegetated areas are subject to erosion and can release sediment to the nearby water bodies.

Salinity analyses indicated that the soils had a high sodium absorption ratio (SAR), high soluble conductivity, and low pH. See Figure 3B for analytical results and photo, and refer to the full results presented in Table 2 of the Tables section. The poor quality of the media in terms of salinity would make the soils very difficult to re-vegetate in the present condition.

Approximately 9,000 boxes of drilling core are stored in the northeast corner of the site. The boxes have shifted over time, and are presently stacked in a manner that makes them unstable. The potential for boxes to topple over and fall from heights presents a safety issue to humans and wildlife.

P3 – Former Incinerator

As reported in the Phase 2 ESA, the pad that supported the former incinerator is highly contaminated with petroleum hydrocarbons (PHC) and metals including chromium and nickel. Since the pad was constructed out of blast rock, the soils were very difficult to sample by hand in this area, even with a pickaxe. Vertical delineation of soil impacts was not achieved (refer to Figure 3C). It was assumed that the PHC impacts extend to 3 m below grade. Based on this assumption, the approximate volume of impacted materials was 87 m^3.

The presence of rock in the material, the high concentrations of F3 and F4 hydrocarbon fractions, and co-contamination with metals concentrations higher than the CCME criteria renders the material unsuitable for landfarming. For this reason, one composite sample was submitted for the analysis of Class II landfill leachability parameters (TCLP procedure). Results are presented in Table 3 of the Tables section. TCLP criteria can vary depending on the criteria set for the specific waste facility, but the material submitted for analysis met the USEPA criteria presented in the Hazardous Waste Management System: Identification and Listing of Hazardous Waste – Toxicity Characteristics Revisions, Final Rule (USEPA 1990).

P4 – Former Fuel Storage

EBA attempted to locate the Phase 2 surface sample location PLF09-SS-085, that was found to have high F2, F3 and F4 concentrations in 2009. Despite advancing several testpits in the area, PHC affected soils were not found. Some earthworks and grading had occurred in the area since the Phase 2 assessment, and it was assumed that the affected soil had been limited in extent, and that it had been moved or removed in the interim. No soil samples were submitted for this area.

P5 – Former Generator

As is typical for small drips of fuel occurring over the long term in an area of coarse-grained soils, the former generator area was found to have a relatively small area of hydrocarbon impacts, but soils with toluene, ethylbenzene, and xylenes, and the F1/F2 fraction concentrations greater than applicable guidelines extended beyond the maximum extent of soil excavation (0.85 m below grade at location P5-3). The depth of the diesel-fuel related soils impacts was assumed to be 2 m below grade, resulting in approximately 32 m^3 of soils not meeting the applicable PHC guidelines. Soil PHC data and a photo of the facility is provided on Figure 3D. Petroleum hydrocarbon analytical results are provided on Table 4.

P6 - Burn Area

An area of dark stained soils in the northeast corner of the site was sampled for PHC concentrations. Refer to Figure 3E for the PHC data and a photo of the area. Complete soil analytical results are provided on Table 5.

It appears that the area was used to burn materials directly on the ground. Small bits of metal and broken debris are also present in the surficial layer of soil. One sample of soil did not meet the soil quality guideline for nickel in 2009.

Based on the past use of the area to burn unknown materials, the aesthetics of leaving stained soils, and the one metals exceedence that was reported in the 2009 Phase 2 ESA, HBML may consider removing for

disposal a small quantity of surficial materials in the area. The total volume of soils to be removed in P6 is estimated to be 10 m^3.

P7 – Tank Farm

The tank farm did not have any standing water at the time of the soil investigation. Soil PHC data and a photo of the facility is provided on Figure 3F. Petroleum hydrocarbon analytical results are provided on Table 6. All the soils were below the applicable criteria for hydrocarbons. Soils within the facility were coarse-grained.

P8 – Stained Area between Generator and Incinerator

A small area of stained soils was sampled and found to have petroleum hydrocarbon (PHC) concentrations less than the applicable guidelines. Refer to Figure 3G for the PHC data and a photo of the area. Petroleum hydrocarbon analytical results are provided on Table 7. Miscellaneous small historic spills of lubricating oil or waste oil that have PHC concentrations less than the applicable guidelines are best removed for co-disposal with other inert materials during decommissioning. The estimated volume of stained soils at P8 is less than 1 m^3.

4.4 Groundwater Sampling Results

Only two of the five groundwater wells installed in 2009 by WESA (wells PW-4 and PW-5) had sufficient water at the time of the site investigation (August 11, 2011) to collect samples for the analysis of BTEX, F1, F2, total and dissolved CCME regulated metals, routine parameters and dissolved chloride:

- Well PW-4 (to the west) had a total length of 0.81m with 0.50 m below grade. Water level was 10 cm below grade at this location.
- Well PW-5 (to the south) had a total length of 1.04 m, of which 0.7 m was below grade. The water level was 13 cm below grade.

Partial analytical parameters were submitted for the following wells:

- Well PW-1 (east of the workshop) was analyzed for metals, routine parameters and chloride, but insufficient water was present to analyze for hydrocarbons. The total length of pipe was 0.87 of which 0.42 m was below grade. The water level could not be determined.
- Well PW-2 (east of the laydown area) was nearly dry. The total pipe length was 1.18 m, of which 0.61 m was below grade. The water level could not be determined. A sample was collected without purging and was analyzed for chlorides.

No analytical parameters were available for the following well:

- Well PW-3 (to the north) was dry. The total length of the pipe was 1.02 m of which 0.67 was below grade.

All wells were serviceable and had caps. No information on the well completions was provided in the Phase 2 ESA. Water in the wells was observed to be turbid and brown in color.

Summary water results and well locations are provided on Figure 4. Full analytical results are provided in Table 9 of the Tables section of the report, and complete laboratory reports are provided in Appendix A.

A summary of the number of groundwater sample parameters that exceed guidelines is provided below:

Groundwater Exceedance Summary Table

Parameter	Applicable Guidelines (mg/L)[1]	Number Samples Analyzed	Number of Exceedances	Range of Exceedances (mg/L)
pH	6.5 - 9	2	2	5.53
Nitrite	0.06	2	1	0.19
Chloride	128	3	3	460 - 8,100
Aluminum	0.005 - 0.1	3	3	39 - 840
Arsenic	0.005	3	3	0.012 - 0.13
Cadmium	0.00065	3	3	0.4 - 8.6
Copper	0.002 - 0.004	3	3	0.1 - 2.6
Chromium	0.0089	2	2	0.12 - 0.21
Iron	0.3	3	3	80 - 6,400
Lead	0.001 - 0.007	3	3	0.021 - 0.7
Nickel	0.025 - 0.150	3	3	0.082 - 2.6
Zinc	0.03	3	3	0.18 - 4.7

Specific exceedances are described as follows and are presented in Figure 4.

- Monitoring Well PW-1 exceeded the applicable guidelines for chloride (460 mg/L), aluminum (39 mg/L), arsenic (0.012 mg/L), cadmium (1.6 mg/L), chromium (0.12 mg/L), copper (0.1 mg/L), iron (80 mg/L), lead (0.021 mg/L), nickel (0.082 mg/L) and zinc (0.18 mg/L);
- Monitoring Well PW-2 exceeded the applicable guidelines for chloride (1,200 mg/L);
- Monitoring Well PW-3 exceeded the applicable guidelines for aluminum (63 mg/L), arsenic (0.026 mg/L), cadmium (0.4 mg/L), chromium (0.21 mg/L), copper (0.17 mg/L), iron (170 mg/L), lead (0.03 mg/L), nickel (0.13 mg/L) and zinc (0.24 mg/L) and;
- Monitoring Well PW-5 exceeded the applicable guidelines for chloride (8,100 mg/L), aluminum (840 mg/L), arsenic (0.13 mg/L), cadmium (8.6 mg/L), chromium (2.4 mg/L), copper (2.6 mg/L), iron (6,400 mg/L), lead (0.7 mg/L), nickel (2.6 mg/L) and zinc (4.7 mg/L).

The remaining groundwater sample parameters were below guidelines or laboratory detection limits.

[1] CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life

Water quality tables in the Mine Closure and Reclamation Plan (Miramar, 2003) report that background CWQGs were exceeded for parameters including total suspended solids, turbidity, and total metals including aluminum, cadmium, chromium and copper. Total arsenic, iron, lead and zinc have also been reported to exceed the CWQG.

5.0 BIOTREATABILITY RESULTS

A hydrocarbon biotreatability study was conducted on a composite sample of soils taken from Patch Laydown. The composite soils sample comprised of approximately equal amounts of soils from locations P1-3, P3-7 and P5-3. The objectives of the bench-scale testing were to evaluate enhanced aerobic biodegradation processes for the F2 and F3 fractions of the soils at Patch.

The study occurred between October 5, 2011 and February 29, 2012 (147 days, or 5 months) at SiREM Laboratories, in Guelph, Ontario. The purpose of the study was to evaluate intrinsic and enhanced aerobic degradation of petroleum hydrocarbons to indicate the potential success of ex-situ aerobic treatments such as landfarming or biopiles. Aerobic treatments included soil amendment with nutrients (nitrogen and phosphorus), addition of a proprietary oxygen releasing compound (Adventus Americas, Illinois), and a combination of both treatments. Soil microcosms were kept at 10°C for the duration of the study. Details of the study are included in SiREM's proposal dated March 11, 2011 (Si-1274-030111) and are included in Appendix B.

Substantial decreases in F2 and F3 concentrations were achieved in 147 days by improving the availability of soil nutrients and simulated weekly tilling. From initial concentrations of F2 and F3 of 4,400 mg/kg and 3,450 mg/kg respectively, final hydrocarbon results were approximately 455 mg/kg for F2 (90% removal) and 2,450 mg/kg for F3 (30% removal).

Aerobic treatments included periodic stirring of the soils with the addition of the following amendments to enhance aerobic biodegradation processes:

- A proprietary oxygen releasing compound (magnesium peroxide) that includes nutrients.
- Conventional nutrient addition (solution of diammonium phosphate)
- Combination of nutrients and proprietary oxygen releasing compound.

The dates for the SiREM biotreatability sampling were:

- October 5, 2011 (baseline)
- November 2, 2011 (Day 28, Sample Event #1)
- December 7, 2011 (Day 63, Sample Event #2)
- January 18, 2012 (Day 105, Sample Event #3)
- February 29, 2012 (Day 147, Sample Event #4 and conclusion of study).

A more detailed summary of the treatments for Patch Laydown is as follows:

Summary of Microcosm Controls, Treatments and Amendments

Microcosm Name	Description
Active control	No amendments added. Distilled water was added periodically during the study to maintain the target moisture content (50% of the water holding capacity).
Aerobic Treatment (EHC-O Amended)	Amended with 0.5 g of proprietary oxygen releasing compound (EHC-O) on Day 0 and re-amended with 0.5 g of EHC-O on Day 50. Weighed throughout the duration of the study to verify that moisture content remained at 50% of the water holding capacity. This commercial amendment does contain some soil microbe nutrients including nitrogen and phosphorus.
Aerobic Treatment (Nutrient Amended)	Amended with 189 mg diammonium phosphate/200g soil to a target concentration of 200 mg/kg as nitrogen on Day 0. Re-amended with 1 ml of 153 mg/mL stock solution of NH_4Cl to a target concentration of 200 mg/kg as nitrogen on Day 50. Amended with distilled water throughout the duration of the study to maintain the target 50% of the water holding capacity.
Aerobic Treatment (Combined Nutrient and EHC-O Amended)	Amended with 189 mg diammonium phosphate/200g soil to a target concentration of 200 mg/kg as nitrogen and 0.5 g EHC-O on day 0. Re-amended with 1 mL of 153 mg/mL stock solution of NH_4Cl to a target concentration of 200 mg/kg as nitrogen and 0.5 g EHC-O on day 50. Amended with distilled water throughout the duration of the study to maintain the target 50% of the water holding capacity.

The water holding capacity for the composite sample of soils from Patch Laydown was determined to be 0.39 mL water per gram of dry soil. In general, approximately one half of the water holding capacity of the soil is recommended in order to maintain adequate soil moisture without waterlogging the soils. Too much moisture can inhibit intrinsic bioremediation processes. Water was added to the soil microcosms periodically throughout the study to maintain the target moisture content.

The proprietary oxygen releasing compound was applied at a rate of 2.5 g EHC-O/kg of soil, as recommended by the manufacturer, Adventus Americas.

The average F2 concentration at the start of the study (t = 0) was 4,400 mg/kg and the average F3 fraction was 3,450 mg/kg. Water content of the soil was adjusted to be optimal for the type of soil (50-70% of field capacity), and treatments were applied as described in the proposal. The soils were maintained at a temperature of 10°C throughout the study.

Graphs of the F1-F4 concentrations over time are shown in Appendix C, which are extracted from SiREM's final report for the study provided in Appendix D. The graphs show the F1 to F4 hydrocarbon fraction concentrations on the left-hand axis plotted against time. A summary of study and results is as follows:

- Graph 1 represents the aerobic control. Samples were irrigated to maintain optimal moisture condition and were stirred to promote aeration. This treatment simulates tilling only.
- Graph 2 is the aerobic treatment involving weekly stirring and periodic addition of the proprietary peroxygen compound.
- Graph 3 is the aerobic treatment involving weekly stirring and periodic application of conventional nutrients.
- Graph 4 is the combined aerobic treatment of nutrients along with the proprietary oxygen releasing compound.

As the control data presented on Graph 1 illustrates, F2 concentrations decreased from an initial 4,400 mg/kg to 1,550 mg/kg by weekly tilling alone after 147 days. As expected, the F3 and F4 fractions remained unchanged.

Graph 2 indicates that the application of the proprietary oxygen-releasing compound provided no additional remedial benefit to decreasing the F2 and F3 concentrations in the soils after 147days. There was no benefit to the EHC-O treatment compared to the control.

Substantial decreases in F2 and F3 concentrations were achieved by simply improving the availability of nutrients to intrinsic soil microorganisms, as shown on Graph 3. Even a modest decrease in F4 fraction was observed. Final hydrocarbon results were approximately 455 mg/kg for F2 and 2,450 mg/kg for F3. The concentration of F4 hydrocarbon fraction decreased by about 200 mg/kg.

The combined treatment of nutrients and oxygen-releasing compound did not appear to increase biodegradation by microorganisms (and may have inhibited biodegradation compared to nutrients alone). The final F2 concentration after 147 days was 875 mg/kg, and the F3 concentration was 2,850mg/kg. The concentration of F4 hydrocarbon fraction decreased by roughly 100 mg/kg. Refer to Graph 4 for the results.

A detailed summary of analytical results is provided in the tables in Appendix D.

Not including the soils at the incinerator, an estimated weighted average of F1 and F2 hydrocarbon fraction for the remaining 115 m^3 soils is 9,000 mg/kg. Based on the results of the biotreatability study for the F2 fraction (a removal rate of 85% after 3 months of treatment, equivalent to one season) and assuming weekly tilling with optimal nutrient and moisture conditions, the projected F2 concentrations after one season of landfarming treatment would be between 1,000 to 1,500 mg/kg. Because of the limited data it is difficult to project how much more time would be required to remediate the soils at Patch Laydown to concentrations less than the CCME industrial guidelines; however, based on the current study it is anticipated that this would take two to three treatment seasons.

6.0 REMEDIAL OPTIONS

Using the results of the 2009 Phase 2 ESA by WESA, in 2010 EBA prepared a cold climate bioremediation literature review and ranked potential remediation options for the former Patch Laydown (EBA, 2010). A summary of remediation options with Arctic/Antarctic case studies was provided along with a listing of the advantages and disadvantages of each. Proposed remedial options were ranked using an approach based on the life cycle framework assessment for remediation options developed by Diamond et al. (1999).

Established soil treatment options that were evaluated report, from most rapid to the most protracted, included physical treatments, such as excavation and landfilling (encapsulation), incineration, thermal desorption, and biological/chemical treatments, such as landfarming, or biopile remediation, surfactant addition, soil washing, and monitored natural attenuation. The on-site landfilling option is not available at Hope Bay Project.

A summary of the proposed remedial alternatives for the petroleum hydrocarbon impacted areas is provided below:

Summary of Remediation Options for Patch Laydown Soils

Areas	Predominant Hydrocarbon Fraction Requiring Treatment	Remedial Alternative
P1A, P1B, P3 (no landfarming) P5	PHC: F2 fraction. Source: historic diesel fuel spills and waste oil spills. Concentrations: F2 up to 9,300 mg/kg, F3 up to 23,000 mg/kg at P3. Some soils are co-contaminated with CCME metals, which cannot be disposed of or treated on-site.	**Excavation and Off-Site Disposal** Advantages: ▪ Quick remedial timeframe. Disadvantages: ▪ Requires importation of clean backfill. ▪ Backfilling should be done soon after excavation in order to mitigate possible permafrost degradation. ▪ Generally most expensive option.
		Landfarming: Hydrocarbon affected soils are spread out in a layer about 0.3 m to 0.5 m thick, nutrients are added, and periodically the soils are mixed (i.e., by tilling). Soil moisture may also be adjusted. Other amendments including proprietary oxygen releasing compounds may be added. Advantages: ▪ Proven technology in the arctic. ▪ Cost effective, and coarse-grained soils requiring treatment for the F2 fraction (diesel) ▪ Treated soils can be used as backfill or growth media where appropriate. Disadvantages: ▪ Treatment season in the arctic is short (generally three months). ▪ Excavations in arctic generally require rapid importation of clean backfill in order to prevent permafrost damage. ▪ Requires monitoring and periodic tilling effort. ▪ Requires the addition of amendments (nitrogen and phosphorous sources) ▪ Facility requires permitting and periodic inspections. ▪ May be difficult to achieve most stringent remedial criteria (Tier 1 remedial objectives for wildland land use). ▪ Facility collects precipitation and snowmelt that may require treatment prior to disposal.
		Biopiles: A bioremediation technique whereby the soil is piled over an air distribution system and aerated. The air distribution system can also be used to provide heat to the soil. Advantages: ▪ For a given volume of soils requiring treatment, biopiles require less area than a landfarm. ▪ Stockpiling soil reduces the rate of heat loss by increasing the volume/surface ratio, effectively extending the length of the treatment season. Disadvantages: ▪ Require significant engineering and entail higher construction/operation costs than a landfarm. ▪ Excavations generally require importation of clean backfill in order to prevent permafrost degradation.

Summary of Remediation Options for Patch Laydown Soils

Areas	Predominant Hydrocarbon Fraction Requiring Treatment	Remedial Alternative
		• Forced air generally reduces remedial timeframes but there is a requirement for a power supply. Wind-powered systems may not be effective to achieve remedial goals. ▪ Construction materials (i.e., PVC pipe) must be disposed of at the end of remediation.
		Enhanced Anaerobic Biodegradation: Solutions of electron acceptors (nitrates and or sulphates) are applied to soils in-situ to enhance natural anaerobic biodegradation processes. Advantages: ▪ Less site disturbance and damage to permafrost compared to excavating soils. Disadvantages: ▪ Anaerobic degradation of hydrocarbons by microbes in polar climates is not well understood and there is little published research to establish this as a viable remedial alternative in the arctic. ▪ Requires chemical inputs that must be controlled to avoid adverse effects on nearby water bodies (introduction of nitrates and sulphates into the environment). ▪ The five month bench-scale study did not suggest that this option would be successful for the Old Windy Camp soils.
		Surfactant Soil Washing: On-site set-up to agitate soils in a surfactant solution (or water) to remove petroleum hydrocarbons. Advantages: ▪ Can be less time-consuming than bioremediation and natural treatment systems. ▪ Best suited for coarse-grained soils, like those at Old Windy Camp. Disadvantages: ▪ Chemical inputs can disrupt soil properties and nutrient cycling. ▪ Technology produces a liquid stream that that must be treated separately. ▪ Resulting treated soil typically requires dewatering prior to backfilling, as it has little to no bearing strength post-treatment. ▪ Large manpower and energy requirements
		Monitored Natural Attenuation: In-situ a remediation approach including variety of physical, chemical, or biological processes that can act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil. Advantages: ▪ Minimizes or avoids air and land emissions, tundra damage, and non-renewable resource depletion. ▪ Good alternative for areas that are difficult to access (soils under buildings or wetlands). ▪ Allows cleanup workers to avoid contact with contaminated soils. ▪ Less equipment and labor than most methods.

Summary of Remediation Options for Patch Laydown Soils

Areas	Predominant Hydrocarbon Fraction Requiring Treatment	Remedial Alternative
		▪ Less expensive. ▪ Sampling and testing over years can be costly, but it may still cost less than other methods. Disadvantages: ▪ Remedial timeframe may be protracted. ▪ Difficult to demonstrate in advance that approach will work. For this reason, approach may not be acceptable to stakeholders.

Based on an evaluation of the remediation options above, landfarming provides the best balance between remedial effectiveness/use of a demonstrated technology, cost and remedial timeframes. This approach is the preferred remedial alternative for all the petroleum hydrocarbon affected areas, except for P3, the former incinerator area. Soils in this area are too heavily contaminated with heavier-end hydrocarbons that would not be expected to bioremediate within a reasonable timeframe. Also, the soils are co-contaminated with heavy metals including chromium and nickel.

It would not be cost-effective to construct a landfarm for the 115 m^3 of soils from Patch Laydown amenable to landfarming treatment. The most cost-effective way to remediate the soils is to treat them along with the PHC-impacted soils identified at Old Windy Camp in a bulk soil treatment program. The probable range of remedial cost for the excavation and landfarming of the Old Windy Camp soils was estimated to range between $150,000 and $200,000 (refer to Phase 3 Environmental Site Assessment And Soil Biotreatability Study Old Windy Camp, Hope Bay Project, NU, June 2012) , with a remedial timeframe of two to three treatment seasons.

For the relatively small volume (127 m^3) of metals-impacted soils co-contaminated with hydrocarbons, an off-site disposal option is preferred. The off-site disposal option for these soils would cost approximately $120,000 to $150,000.

7.0 RECOMMENDATIONS

Based on the outcome of the Phase 3 ESA and the SiREM soil biotreatability study, EBA recommends the following for Patch Laydown:

- The 115 m^3 of biotreatable soils containing F1-F2 fraction could be treated alone or along with the estimated 575 m^3 of petroleum hydrocarbon-impacted materials originating from the Old Windy Camp. The existing lined former fuel facility is large enough for this purpose and already has a suitable protective layer of sand over the liner. Construction of a dedicated landfarm for this small volume of soils would not be economical.

- An additional 127 m^3 of PHC-impacted soils are co-contaminated with metals or are otherwise unsuitable for landfarming. These soils can be disposed of at an approved commercial Class II landfill facility.
- Poor water quality in the active layer at the monitoring wells, including high salinity, low pH and high total concentrations of select metals may be associated with exploration related use of sodium and calcium chloride during drilling activities.
- No estimates of the volume or extent of salt-affected soils was made, although preliminary soil testing suggests that the fill material recently spread over the laydown area would be difficult to revegetate in the current condition due to a combination of high conductivity, high sodium absorption ratio, and low pH.
- If treated to the most stringent Nunavut Tier 1 remediation criteria (wildland land use), treated petroleum hydrocarbon affected soils could potentially be used as a reclamation material and growth media at Patch Laydown.
- Water quality in the existing groundwater monitoring wells should continue to be monitored yearly.

8.0 CLOSURE

We trust that this report meets your present requirements. Should you have any questions or comments, please contact the undersigned at your convenience.

Sincerely,
EBA Engineering Consultants Ltd.

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TABLES

Table 1	Soil Analytical Results for Hydrocarbons and Salinity at P1
Table 2	Soil Analytical Results for Metals and Salinity P2
Table 3	Soil Analytical Results for Hydrocarbons and Leachable Metals at P3
Table 4	Soil Analytical Results for Hydrocarbons at P5
Table 5	Soil Analytical Results for Hydrocarbons at P6
Table 6	Soil Analytical Results for Hydrocarbons at P7
Table 7	Soil Analytical Results for Hydrocarbons at P8
Table 8	Water Analytical Results for Hydrocarbons, Routine Parameters and Regulated Metals at Patch Laydown

Table 1: Soil Analytical Results for Hydrocarbons and Salinity at P1 (Patch Laydown)

Sample Date				10-Aug-11	10-Aug-11	10-Aug-11	10-Aug-11	10-Aug-11	10-Aug-11	10-Aug-11	10-Aug-11	10-Aug-11	10-Aug-11	10-Aug-11	10-Aug-11	10-Aug-11	10-Aug-11	10-Aug-11	10-Aug-11	10-Aug-11
Sample Depth (m)				0.40 m	0.95 m	0.25 m	0.20 m	0.20 m	0.25 m	0.20 m	0.20 m	0.20 m	0.10 m	0.10 m	0.15 m	0.20 m	0.20 m	0.10 m	Surface	0.15 m
Sample Number				11P1_03	11P1_03	11P1_5	11P1_10	11P1_16	11P1_16B	11P1_16C	11P1_18	11P1_18A	11P1_21	11P1_23A	11P1_24	11P1_28	11P1_30	11P1_31	11P1_32	11P1_32
Test Parameter	**Unit**	**CCME[1]**	**Environmental Guideline for Contaminated Site Remediation - Nunavut[3]**																	
BTEX and Hydrocarbon Fractions F1 to F4																				
Benzene	mg/kg	0.03	0.03	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	<0.0050
Toluene	mg/kg	0.37	0.37	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	-	<0.020
Ethylbenzene	mg/kg	0.082	0.082	<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	<0.010	<0.010	-	<0.010
Xylenes	mg/kg	11	11	2.4	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	7.3	<0.040	<0.040	-	<0.040
F1 (C6 - C10)	mg/kg	-	240	**1,600**	<12	<12	<12	53	68	<12	<12	<12	<12	<12	<12	110	<12	<12	-	26
F2 (>C10 - C16)	mg/kg	-	260	**9,300**	110	<10	<10	**670**	**1,600**	13	710	<10	33	<10	<10	180	13	24	-	**1,700**
F3 (>C16 - C34)	mg/kg	-	1,700	1,500	82	<10	<10	120	340	34	310	<10	500	570	15	150	300	600	-	710
F4 (>C34 - C50)	mg/kg	-	3,300	<10	<10	<10	<10	<10	<10	<10	<10	<10	100	96	<10	35	54	100	-	70
Reached Baseline at C50	-	-	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	-	YES
Calculated Parameters																				
Anion Sum	meq/L	-	-	1.2	1.1	-	-	-	-	-	-	-	-	41.0	-	-	-	84.0	13.0	-
Cation Sum	meq/L	-	-	3.3	2.2	-	-	-	-	-	-	-	-	46.0	-	-	-	90.0	17.0	-
Ion Balance	-	-	-	2.7	2.0	-	-	-	-	-	-	-	-	1.1	-	-	-	1.1	1.3	-
Soluble Parameters																				
Soluble Calcium (Ca)	mg/L	-	-	22	5.2	-	-	-	-	-	-	-	-	460	-	-	-	790	150	-
Soluble Magnesium (Mg)	mg/L	-	-	16	3.2	-	-	-	-	-	-	-	-	140	-	-	-	280	50	-
Soluble Potassium (K)	mg/L	-	-	3.6	3.9	-	-	-	-	-	-	-	-	7.9	-	-	-	11	4.6	-
Soluble Sodium (Na)	mg/L	-	-	18	37	-	-	-	-	-	-	-	-	270	-	-	-	620	120	-
Soluble Chloride (Cl)	mg/L	-	-	33	27	-	-	-	-	-	-	-	-	1,400 (1)	-	-	-	2,800 (1)	420	-
Sodium Absorption Ratio (SAR)	-	12	12	0.7	3.2	-	-	-	-	-	-	-	-	2.9	-	-	-	4.9	2.2	-
Soluble Sulfur (as SO_4)	mg/L	-	-	14	18	-	-	-	-	-	-	-	-	120	-	-	-	240	69	-
% Saturation	%	-	-	63	31	-	-	-	-	-	-	-	-	47	-	-	-	49	49	-
Soluble Conductivity	dS/m	4	4	0.3	0.2	-	-	-	-	-	-	-	-	**4.7**	-	-	-	**8.7**	1.7	-
Theoretical Gypsum Requirement	tonnes/ha	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	<0.1	-	-	-	<0.1	<0.1	-
Soluble ($CaCl_2$) pH	-	6 to 8	6 to 8	6.00	7.30	-	-	-	-	-	-	-	-	7.19	-	-	-	7.07	7.06	-
Physical Properties																				
Moisture %	-	%	-		5.9	7.7	8.0	9.1	8.1	5.3	5.0	3.3	15.0	7.9	8.1	8.0	11.0	6.3		5.0
Soil Texture																				
Grain Size (%>75 µm)		%	-	53	-	-	-	67	-	-	-	-	-	-	-	-	-	-	-	70
Soil Type		-	COARSE	COARSE				COARSE												COARSE

Notes:

[1] Canadian Soil Quality Guidelines for Protection of Environmental and Human Health, September 2007, for Industrial, coarse-grained soils

[2] Environmental Guidelines for Contaminated Site Remediation, Nunavut, for Industrial, coarse-grained soil

- = Not detected/not analyzed/no unit/no guidelines

(1) Detection Limit raised due to dilution to bring analyte within the calibrated range

Bold = Greater than the referenced guideline

Table 2: Soil Analytical Results for Metals and Salinity at P2 (Laydown Area, Patch Laydown)

Sample Date				10-Aug-11	10-Aug-11	10-Aug-11	10-Aug-11
Sample Depth (m)				Surface	Surface	Surface	Surface
Sample Number				11P2_01	11P2_02	11P2_03	11P2_04
Test Parameter	**Unit**	**CCME[1]**	**Environmental Guideline for Contaminated Site Remediation - Nunavut[2]**				
Metals							
Boron (B)	mg/kg	-	-	1.1	1.1	0.4	4
Hex. Chromium Cr 6+	mg/kg	1.4	1.4	<0.15	<0.15	<0.15	<0.15
Antimony (Sb)	mg/kg	40	40	<1	<1	<1	<1
Arsenic (As)	mg/kg	12	12.0	3	3	3	3
Barium (Ba)	mg/kg	2000	2000	67	110	46	120
Beryllium (Be)	mg/kg	8	8	<0.4	0.5	<0.4	0.7
Cadmium (Cd)	mg/kg	22	22	<0.1	<0.1	<0.1	<0.1
Chromium (Cr), total	mg/kg	87	87	44	59	33	67
Cobalt (Co)	mg/kg	300	300	10	12	8	14
Copper (Cu)	mg/kg	91	91	20	27	17	36
Lead (Pb)	mg/kg	600	600	13	13	6	10
Mercury (inorganic)	mg/kg	50	50	<0.05	<0.05	<0.05	<0.05
Molybdenum (Mo)	mg/kg	40	40	1	0.8	0.5	0.8
Nickel (Ni)	mg/kg	50	50	23	30	19	38
Selenium (Se)	mg/kg	2.9	2.9	<0.5	<0.5	<0.5	<0.5
Silver (Ag)	mg/kg	40	40	<1	<1	<1	<1
Thallium (Tl)	mg/kg	1	1	<0.3	<0.3	<0.3	<0.3
Tin (Sn)	mg/kg	300	300	<1	1	<1	1
Uranium (U)	mg/kg	300	300	1	2	<1	2
Vanadium (V)	mg/kg	130	130	51	64	39	69
Zinc (Zn)	mg/kg	360	360	52	64	35	67
Calculated Parameters							
Anion Sum	meq/L	-	-	21	410.0	160.0	420.0
Cation Sum	meq/L	-	-	24	390.0	170.0	390.0
Ion Balance	-	-	-	1.3	0.95	1.1	0.92
Soluble Parameters							
Soluble Calcium (Ca)	mg/L	-	-	58	1500	670	1700
Soluble Magnesium (Mg)	mg/L	-	-	45	2100	660	1700
Soluble Potassium (K)	mg/L	-	-	7.2	55	17	130
Soluble Sodium (Na)	mg/L	-	-	470	3200	1800	4400
Soluble Chloride (Cl)	mg/L	-	-	370	1400 (1)	4500 (1)	13000 (1)
Sodium Absorption Ratio (SAR)	-	12	12	11	12	12	**19**
Soluble Sulfur (as SO_4)	mg/L	-	-	530	1600	1500	2600
% Saturation	%	-	-	55	64	43	72
Soluble Conductivity	dS/m	4	4	2.5	**36.0**	**14.0**	**34.0**
Theoretical Gypsum Requirement	tonnes/ha	-	-	<0.1	<0.1	<0.1	210.0
Soluble ($CaCl_2$) pH	-	6 to 8	6 to 8	6.45	**5.69**	7.10	**5.84**
Physical Properties							
Moisture %	%	-	-	-	-	-	-
Soil Texture							
Grain Size (%>75 µm)	%	-	-	-	-	-	-
Soil Type	-	-	-				

Notes:

[1] Canadian Soil Quality Guidelines for Protection of Environmental and Human Health, September 2007, for Industrial, coarse-grained soils

[2] Environmental Guidelines for Contaminated Site Remediation, Nunavut, for Industrial, coarse-grained soil

- = Not detected/not analyzed/no unit/no guidelines

(1) Detection Limit raised due to dilution to bring analyte within the calibrated range

Bold = Greater than the referenced guideline

Table 3: Soil Analytical Results for Hydrocarbons and Basic Class II Landfill TCLP Analysis at P3 (Incinerator, Patch Laydown)

Sample Date				10-Aug-11	10-Aug-11	10-Aug-11	10-Aug-11	10-Aug-11
Sample Depth (m)				0.10	0.15	0.20	0.45	COMPOSITE
Sample Number				11P3_1	11P3_3	11P3_5	11P3_7	P3_7
Test Parameter	**Unit**	**CCME[1]**	**Environmental Guideline for Contaminated Site Remediation - Nunavut[2]**					
BTEX and Hydrocarbon Fractions F1 to F4								
Benzene	mg/kg	0.03	0.03	<0.0050	<0.0050	<0.0050	<0.0050	-
Toluene	mg/kg	0.37	0.37	<0.020	<0.020	<0.020	<0.020	-
Ethylbenzene	mg/kg	0.082	0.082	<0.010	<0.010	<0.010	<0.010	-
Xylenes	mg/kg	11	11	<0.040	<0.040	<0.040	0.07	-
F1 (C6 - C10)	mg/kg	-	240	14	<12	<12	53	-
F2 (>C10 - C16)	mg/kg	-	260	**3,000**	<10	12	**4,000**	-
F3 (>C16 - C34)	mg/kg	-	1,700	**23,000**	54	550	**19,000**	-
F4 (>C34 - C50)	mg/kg	-	3,300	**3,700**	14	200	2,100	-
Reached Baseline at C50	-	-	-	NO	YES	YES	NO	-
Physical Properties								
Moisture %	%	-	-	4.3	1.1	2.1	12.0	-
Basic Class II Landfill Package - Leachate Elements **Elements**								
Leachable Antimony (Sb)	mg/kg	-	-	-	-	-	-	<1
Leachable Arsenic (As)	mg/kg	-	-	-	-	-	-	<0.5
Leachable Barium (Ba)	mg/kg	-	-	-	-	-	-	1
Leachable Beryllium (Be)	mg/kg	-	-	-	-	-	-	0.5
Leachable Boron (B)	mg/kg	-	-	-	-	-	-	1
Leachable Cadmium (Cd)	mg/kg	-	-	-	-	-	-	0.1
Leachable Chromium (Cr), total	mg/kg	-	-	-	-	-	-	0.5
Leachable Cobalt (Co)	mg/kg	-	-	-	-	-	-	1
Leachable Copper (Cu)	mg/kg	-	-	-	-	-	-	1
Leachable Iron (Fe)	mg/kg	-	-	-	-	-	-	1
Leachable Lead (Pb)	mg/kg	-	-	-	-	-	-	0.5
Leachable Mercury (inorganic)	mg/kg	-	-	-	-	-	-	0.02
Leachable Nickel (Ni)	mg/kg	-	-	-	-	-	-	0.5
Leachable Selenium (Se)	mg/kg	-	-	-	-	-	-	0.1
Leachable Silver (Ag)	mg/kg	-	-	-	-	-	-	0.5
Leachable Thallium (Tl)	mg/kg	-	-	-	-	-	-	0.5
Leachable Uranium (U)	mg/kg	-	-	-	-	-	-	0.2
Leachable Vanadium (V)	mg/kg	-	-	-	-	-	-	1
Leachable Zinc (Zn)	mg/kg	-	-	-	-	-	-	1
Leachable Zirconium (Zr)	mg/kg	-	-	-	-	-	-	1
Basic Class II Landfill Package - Leachate Volatiles **Volatiles**								
Leachable (ZH) Benzene		-	-	-	-	-	-	<10
Leachable (ZH) Toluene		-	-	-	-	-	-	<10
Leachable (ZH) Ethylbenzene		-	-	-	-	-	-	<10
Leachable (ZH) Xylenes		-	-	-	-	-	-	<20
Basic Class II Landfill Package - Soil								
Soluble pH	-	-	-	-	-	-	-	7.39
Closed Cup Flashpoint	°C	-	-	-	-	-	-	>61
Free liquid	-	-	-	-	-	-	-	PASS
Soil Texture								
Grain Size (%>75 µm)		-	-	-	93	-	64	-
Soil Type	-	-	COARSE		COARSE		COARSE	

Notes:

[1] Canadian Soil Quality Guidelines for Protection of Environmental and Human Health, September 2007, for Industrial, coarse-grained soils

[2] Environmental Guidelines for Contaminated Site Remediation, Nunavut, for Industrial, coarse-grained soil

- = Not detected/not analyzed/no unit/no guidelines

Bold = Greater than the referenced guideline

Table 4: Soil Analytical Results for Hydrocarbons at P5 (Generator, Patch Laydown)

Sample Number	Date Sampled	Sample Depth (m)	BTEX and Hydrocarbon Fractions F1 to F4 (mg/kg)									Soil Texture		Physical Properties
			Benzene	Toluene	Ethylbenzene	Xylene	F1 (C6-C10)	F2 (>C10-C16)	F3 (>C16-C34)	F4 (>C34-C50)	Reached Baseline at C50	Grain Size (% >75 um)		Moisture (%)
11P5_1	11-Aug-11	0.15	<0.0050	<0.020	**0.14**	**19**	**920**	**6,200**	270	22	YES	-		10.0
11P5_2	11-Aug-11	0.15	<0.0050	<0.020	<0.010	<0.040	<12	<10	680	390	NO	89	COARSE	3.8
11P5_3	11-Aug-11	0.70	<0.0050	0.06	**0.18**	**16**	**1,200**	**4,800**	160	69	YES	89	COARSE	8.1
11P5_3	11-Aug-11	0.85	<0.0050	**1**	**5.6**	**49**	**1,300**	**5,400**	160	<10	YES	-		4.2
11P5_5	11-Aug-11	0.15	<0.0050	<0.020	<0.010	<0.040	<12	42	170	48	YES	-		18.0
11P5_7	11-Aug-11	0.20	<0.0050	<0.020	<0.010	<0.040	<12	<10	<10	<10	YES	-		2.1
11P5_8	11-Aug-11	0.20	<0.0050	<0.020	<0.010	<0.040	<12	<10	13	<10	YES	-		5.9
CCME[1]		**-**	**0.03**	**0.37**	**0.082**	**11**	**-**	**-**	**-**	**-**	**-**	**-**		
Environmental Guideline for Contaminated Site Remediation - Nunavut[2]		**-**	**0.03**	**0.37**	**0.082**	**11**	**240**	**260**	**1,700**	**3,300**	**-**	**-**		

Notes:

[1] Canadian Soil Quality Guidelines for Protection of Environmental and Human Health, September 2007, for Industrial, coarse-grained soils

[2] Environmental Guidelines for Contaminated Site Remediation, Nunavut, for Industrial, coarse-grained soil

- = Not detected/not analyzed/no unit/no guidelines

Bold = Greater than the referenced guideline

Table 5: Soil Analytical Results for Hydrocarbons at P6 (Burned Area Near North End of Site, Patch Laydown)

Sample Number	Date Sampled	Sample Depth (m)	BTEX and Hydrocarbon Fractions F1 to F4 (mg/kg)									Physical Properties
			Benzene	Toluene	Ethylbenzene	Xylene	F1 (C6-C10)	F2 (>C10-C16)	F3 (>C16-C34)	F4 (>C34-C50)	Reached Baseline at C50	Moisture (%)
11P6_1	10-Aug-11	0.15	<0.0050	<0.020	<0.010	<0.040	<12	17	1,700	570	NO	2.9
11P6_3	10-Aug-11	0.15	<0.0050	<0.020	<0.010	<0.040	<12	<10	<10	<10	YES	4.7
CCME[1]		**-**	**0.03**	**0.37**	**0.082**	**11**	**-**	**-**	**-**	**-**	**-**	**-**
Environmental Guideline for Contaminated Site Remediation - Nunavut[2]		**-**	**0.03**	**0.37**	**0.082**	**11**	**240**	**260**	**1,700**	**3,300**	**-**	**-**

Notes:

[1] Canadian Soil Quality Guidelines for Protection of Environmental and Human Health, September 2007, for Industrial, coarse-grained soils

[2] Environmental Guidelines for Contaminated Site Remediation, Nunavut, for Industrial, coarse-grained soil

- = Not detected/not analyzed/no unit/no guidelines

Bold = Greater than the referenced guideline

Table 6: Soil Analytical Results for Hydrocarbons at P7 (Tankfarm, no ASTs, Patch Laydown)

Sample Number	Date Sampled	Sample Depth (m)	BTEX and Hydrocarbon Fractions F1 to F4 (mg/kg)									Soil Texture		Physical Properties
			Benzene	Toluene	Ethylbenzene	Xylene	F1 (C6-C10)	F2 (>C10-C16)	F3 (>C16-C34)	F4 (>C34-C50)	Reached Baseline at C50	Grain Size (% 75 µm)		Moisture (%)
11P7_1	11-Aug-11	0.10	<0.0050	<0.020	<0.010	<0.040	<12	67	56	<10	YES	-		2.1
11P7_5	11-Aug-11	0.10	<0.0050	<0.020	<0.010	<0.040	<12	<10	18	<10	YES	87	COARSE	5.8
11P7_7	11-Aug-11	0.15	<0.0050	<0.020	<0.010	<0.040	<12	84	97	<10	YES	-		18.0
11P7_11	11-Aug-11	0.20	<0.0050	<0.020	<0.010	<0.040	<12	<10	<10	<10	YES	-		4.1
CCME[1]		**-**	**0.03**	**0.37**	**0.082**	**11**	**-**	**-**	**-**	**-**	**-**	**-**		
Environmental Guideline for Contaminated Site Remediation - Nunavut[2]		**-**	**0.03**	**0.37**	**0.082**	**11**	**240**	**260**	**1,700**	**3,300**	**-**	**-**		

Notes:

[1] Canadian Soil Quality Guidelines for Protection of Environmental and Human Health, September 2007, for Industrial, coarse-grained soils

[2] Environmental Guidelines for Contaminated Site Remediation, Nunavut, for Industrial, coarse-grained soil

- = Not detected/not analyzed/no unit/no guidelines

Bold = Greater than the referenced guideline

Table 7: Soil Analytical Results for Hydrocarbons at P8 (Stained Area Between Generator and Incinerator, Patch Laydown)

Sample Number	Date Sampled	Sample Depth (m)	BTEX and Hydrocarbon Fractions F1 to F4 (mg/kg)									Physical Properties
			Benzene	Toluene	Ethylbenzene	Xylene	F1 (C6-C10)	F2 (>C10-C16)	F3 (>C16-C34)	F4 (>C34-C50)	Reached Baseline at C50	Moisture (%)
11P8_1	10-Aug-11	0.10	<0.0050	<0.020	<0.010	<0.040	<12	<10	1,500	140	YES	6.9
CCME[1]		**-**	**0.03**	**0.37**	**0.082**	**11**	**-**	**-**	**-**	**-**	**-**	**-**
Environmental Guideline for Contaminated Site Remediation - Nunavut[2]		**-**	**0.03**	**0.37**	**0.082**	**11**	**240**	**260**	**1,700**	**3,300**	**-**	**-**

Notes:

[1] Canadian Soil Quality Guidelines for Protection of Environmental and Human Health, September 2007, for Industrial, coarse-grained soils

[2] Environmental Guidelines for Contaminated Site Remediation, Nunavut, for Industrial, coarse-grained soil

- = Not detected/not analyzed/no unit/no guidelines

Bold = Greater than the referenced guideline

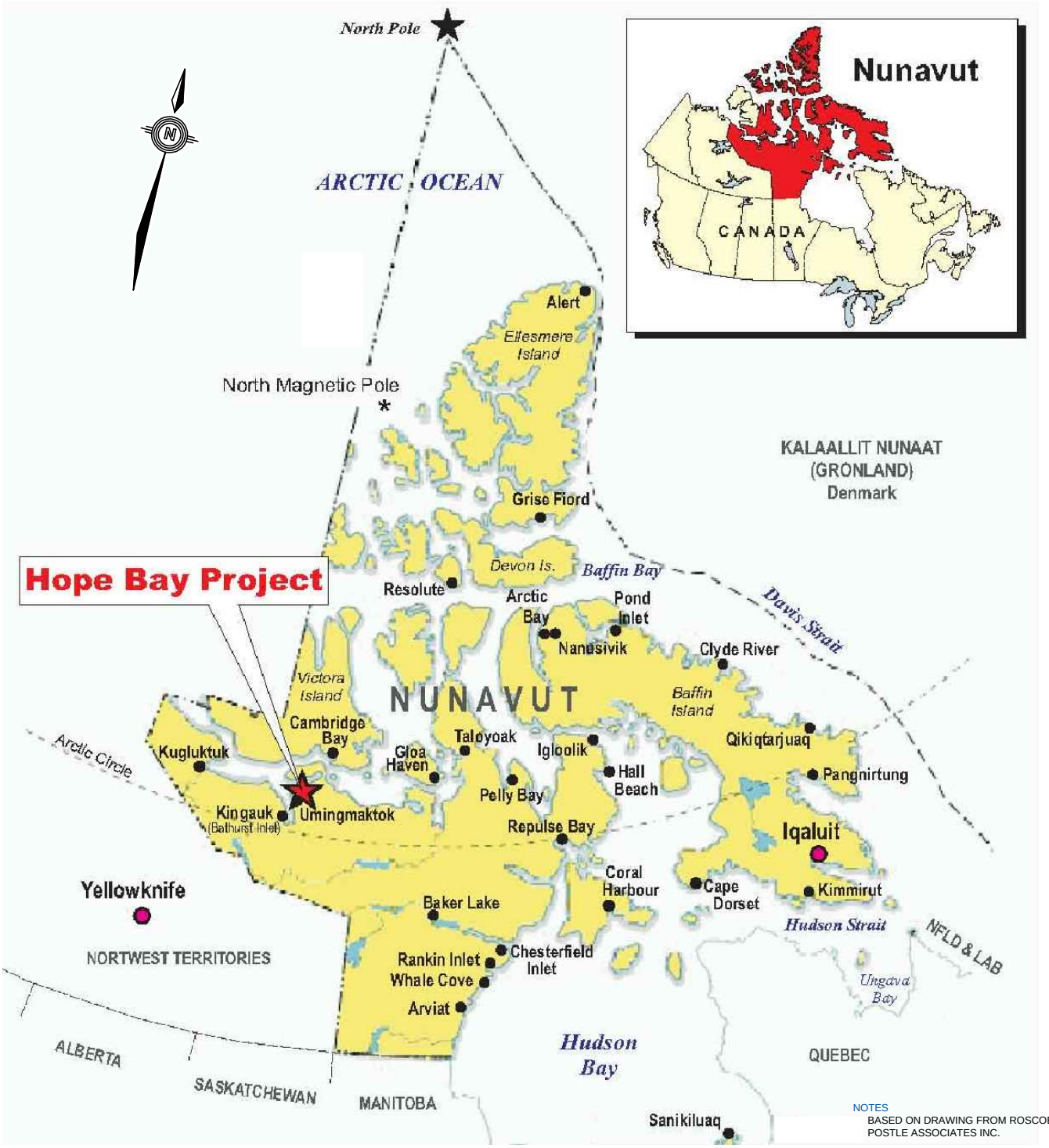
Table 8: Water Analytical Results for Hydrocarbons, Routine Water and Regulated Metals at Patch Laydown

Sample Date				10-Aug-11	10-Aug-11	10-Aug-11	10-Aug-11
Sample Number				11PW_1	11PW_2	11PW_4	11PW_5
Test Parameter	**Unit**	**CCME[1]**	**Licence No. 2BE-HOP0712**				
BTEX and Hydrocarbon Fractions F1 to F2							
Benzene	mg/L	0.37	0.370	-	-	<0.0004	<0.0004
Toluene	mg/L	0.002	0.002	-	-	<0.0004	<0.0004
Ethylbenzene	mg/L	0.090	0.090	-	-	<0.0004	<0.0004
Xylenes	mg/L	-	-	-	-	<0.0008	<0.0008
F1 (C6 - C10)	mg/L	-	-	-	-	<0.1	<0.1
F2 (>C10 - C16)	mg/L	-	-	-	-	< 0.2 (1)	<0.1
Routine Water and Diss. Regulated Metals Misc. Inorganics							
Conductivity	uS/cm	-		1,800		-	22,000
pH	-	6.5 to 9		**6.46**	-	-	**5.53**
Routine Water and Diss. Regulated Metals Calculated Parameters							
Anion Sum	meq/L	-		17	-	-	230
Cation Sum	meq/L	-		15	-	-	230
Hardness ($CaCO_3$)	mg/L	-		500	-	-	10,000
Ion Balance	-	-		0.91	-	-	0.97
Dissolved Nitrate (NO_3)	mg/L	13		0.04	-	-	0.8
Nitrate plus Nitrite (N)	mg/L	-		0.01	-	-	0.19
Dissolved Nitrite (NO_2)	mg/L	0.060		<0.01	-	-	<0.1
Total Dissolved Solids	mg/L	-		930	-	-	12,000
Routine Water and Diss. Regulated Metals Anions							
Alkalinity (PP as $CaCO_3$)	mg/L	-		<0.5	-	-	<0.5
Alkalinity (Total as $CaCO_3$)	mg/L	-		24	-	-	11
Bicarbonate (HCO_3)	mg/L	-		29	-	-	13
Carbonate (CO_3)	mg/L	-		<0.5	-	-	<0.5
Hydroxide (OH)	mg/L	-		<0.5	-	-	<0.5
Dissolved Sulphate (SO_4)	mg/L	-		160	-	-	180
Dissolved Chloride (Cl)	mg/L	128		**460 (1)**	**1,200 (1)**	-	**8,100 (1)**
Routine Water and Diss. Regulated Metals Nutrients							
Dissolved Nitrite (N)	mg/L	-		<0.003	-	-	<0.03 (2)
Dissolved Nitrate (N)	mg/L	-		0.01	-	-	<0.19 (2)
Routine Water and Diss. Regulated Metals Elements							
Dissolved Aluminum (Al)	mg/L	0.005-0.1		0.009	-	-	0.09
Dissolved Antimony (Sb)	mg/L	-		<0.0006	-	-	<0.03
Dissolved Arsenic (As)	mg/L	0.005		0.0015	-	-	<0.01
Dissolved Barium (Ba)	mg/L	-		0.05	-	-	1.4
Dissolved Beryllium (Be)	mg/L	-		<0.001	-	-	<0.05
Dissolved Boron (B)	mg/L	-		0.06	-	-	0.11
Dissolved Cadmium (Cd)	mg/L	0.132*		0.024	-	-	**0.7**
Dissolved Calcium (Ca)	mg/L	-		120	-	-	2,900 (1)
Dissolved Chromium (Cr), Trivalent	mg/L	0.0085		<0.001	-	-	<0.05
Dissolved Cobalt (Co)	mg/L	-		0.0098	-	-	0.13
Dissolved Copper (Cu)	mg/L	0.0094*		0.0042	-	-	**0.01**
Dissolved Iron (Fe)	mg/L	0.3		**0.2**	-	-	**100**
Dissolved Lead (Pb)	mg/L	0.025*	0.001	<0.0002	-	-	<0.01
Dissolved Lithium (Li)	mg/L	-		0.2	-	-	0.1
Dissolved Magnesium (Mg)	mg/L	-		47	-	-	740 (1)
Dissolved Manganese (Mn)	mg/L	-		0.96	-	-	15
Dissolved Molybdenum (Mo)	mg/L	-		<0.0002	-	-	<0.01
Dissolved Nickel (Ni)	mg/L	0.325*		0.0048	-	-	0.09
Dissolved Phosphorus (P)	mg/L	-		0.1	-	-	0.3
Dissolved Potassium (K)	mg/L	-		9.1	-	-	40
Dissolved Selenium (Se)	mg/L	0.001		0.0002	-	-	<0.01
Dissolved Silicon (Si)	mg/L	-		9.6	-	-	8.4
Dissolved Silver (Ag)	mg/L	0.0001		<0.0001	-	-	<0.005
Dissolved Sodium (Na)	mg/L	-		110	-	-	310
Dissolved Strontium (Sr)	mg/L	-		0.23	-	-	7.4 (1)
Dissolved Sulphur (S)	mg/L	-		48	-	-	55
Dissolved Thallium (Tl)	mg/L	0.0008		<0.0002	-	-	<0.01
Dissolved Tin (Sn)	mg/L	-		<0.001	-	-	<0.05
Dissolved Titanium (Ti)	mg/L	-		<0.001	-	-	<0.05
Dissolved Uranium (U)	mg/L	-		<0.0001	-	-	<0.005
Dissolved Vanadium (V)	mg/L	-		<0.001	-	-	<0.05
Dissolved Zinc (Zn)	mg/L	0.03		0.011	-	-	<0.2
Total Regulated Metals Elements							
Total Aluminum (Al)	mg/L	0.005-0.1		**39 (2)**	-	**63 (2)**	**840 (2)**
Total Antimony (Sb)	mg/L	-		<0.006	-	<0.01	<0.03
Total Arsenic (As)	mg/L	0.005		**0.012**	-	**0.026**	**0.13**
Total Barium (Ba)	mg/L	-		0.38	-	0.48	23
Total Beryllium (Be)	mg/L	-		<0.01	-	<0.02	<0.05
Total Boron (B)	mg/L	-		0.07	-	0.08	1.9
Total Cadmium (Cd)	mg/L	0.132*		**1.6**	-	**0.4**	**8.6**
Total Calcium (Ca)	mg/L	-		140	-	200	3100
Total Chromium (Cr), Trivalent	mg/L	0.0085		**0.12**	-	**0.21**	**2.4**
Total Cobalt (Co)	mg/L	-		0.042	-	0.061	1
Total Copper (Cu)	mg/L	0.0094*		**0.1**	-	**0.17**	**2.6**
Total Iron (Fe)	mg/L	0.3		**80**	-	**170**	**6,400 (2)**
Total Lead (Pb)	mg/L	0.025*	0.001	**0.021**	-	**0.03**	**0.7**
Total Lithium (Li)	mg/L	-		0.09	-	0.11	6.2
Total Magnesium (Mg)	mg/L	-		75	-	110	3000
Total Manganese (Mn)	mg/L	-		1.7	-	2.5	92
Total Molybdenum (Mo)	mg/L	-		<0.002	-	<0.004	<0.01
Total Nickel (Ni)	mg/L	0.325*		0.082	-	0.13	**2.6**
Total Phosphorus (P)	mg/L	-		0.9	-	2.2	120
Total Potassium (K)	mg/L	-		21	-	22	950
Total Selenium (Se)	mg/L	0.001		<0.002	-	<0.004	<0.01
Total Silicon (Si)	mg/L	-		62	-	71	410
Total Silver (Ag)	mg/L	0.0001		<0.001	-	<0.002	<0.005
Total Sodium (Na)	mg/L	-		120	-	150	340
Total Strontium (Sr)	mg/L	-		0.29	-	0.46	10
Total Sulphur (S)	mg/L	-		48	-	59	60
Total Thallium (Tl)	mg/L	0.0008		<0.002	-	<0.004	0.02
Total Tin (Sn)	mg/L	-		<0.01	-	<0.02	<0.05
Total Titanium (Ti)	mg/L	-		2.7	-	4	2.8
Total Uranium (U)	mg/L	-		0.004	-	0.007	0.12
Total Vanadium (V)	mg/L	-		0.11	-	0.21	4.0
Total Zinc (Zn)	mg/L	0.03		**0.18**	-	**0.24**	**4.7**

Notes:
[1] Canadian Water Quality Guidelines for Protection of Aquatic Life - freshwater, long-term exposure
-' = Not detected/not analyzed/no unit/no guidelines
* Based on hardness of 500 mg/L
(1) Detection Limit raised based on sample volume used for analysis/ due to dilution to bring analyte within calibrated range
(2) Detection Limits raised due to matrix interference
Bold = Greater than the referenced guideline

FIGURES

Figure 1	Hope Bay Project Location
Figure 2	Patch Camp Layout
Figure 3A	P1 – Workshop
Figure 3B	P2 – Laydown Area
Figure 3C	P3 – Incinerator
Figure 3D	P5 – Generator
Figure 3E	P6 – Burn Area near North End of Site
Figure 3F	P7 –Tank Farm
Figure 3G	P8 – Stained Area between Generator and Incinerator
Figure 4	Groundwater Sampling Locations



NOTES
BASED ON DRAWING FROM ROSCOE POSTLE ASSOCIATES INC.

STATUS
ISSUED FOR USE

0 1 000 m
Scale: 1: 20 000

CLIENT
NEWMONT

A TETRA TECH COMPANY

PHASE III ENVIRONMENTAL SITE ASSESSMENT AT PATCH LAYDOWN HOPE BAY GOLD PROJECT, NUNAVUT

HOPE BAY PROJECT LOCATION

PROJECT NO.	DWN	CKD	REV
Y22101187.001	EL	DF	1

OFFICE	DATE
EDM	June 2011

Figure 1

LEGEND:

- GROUNDWATER MONITORING WELL (WESA, 2009)

0 100 m

Scale: 1: 2 000

CLIENT

NEWMONT

eba A TETRA TECH COMPANY

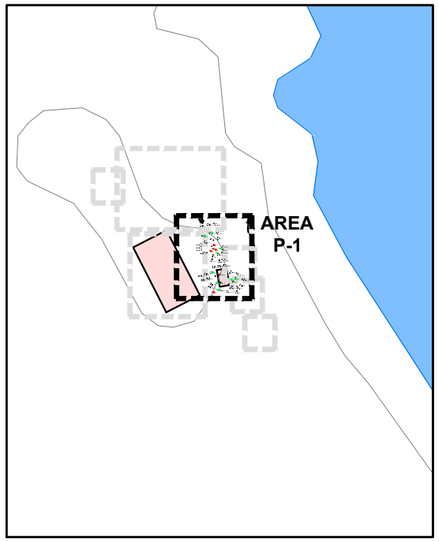
PHASE III ENVIRONMENTAL SITE ASSESSMENT AT PATCH LAYDOWN HOPE BAY GOLD PROJECT, NUNAVUT

PATCH CAMP LAYOUT

PROJECT NO.	DWN	CKD	REV
Y22101187.001	EL	DF	1

OFFICE	DATE
EDM	June 2012

Figure 2



KEY PLAN
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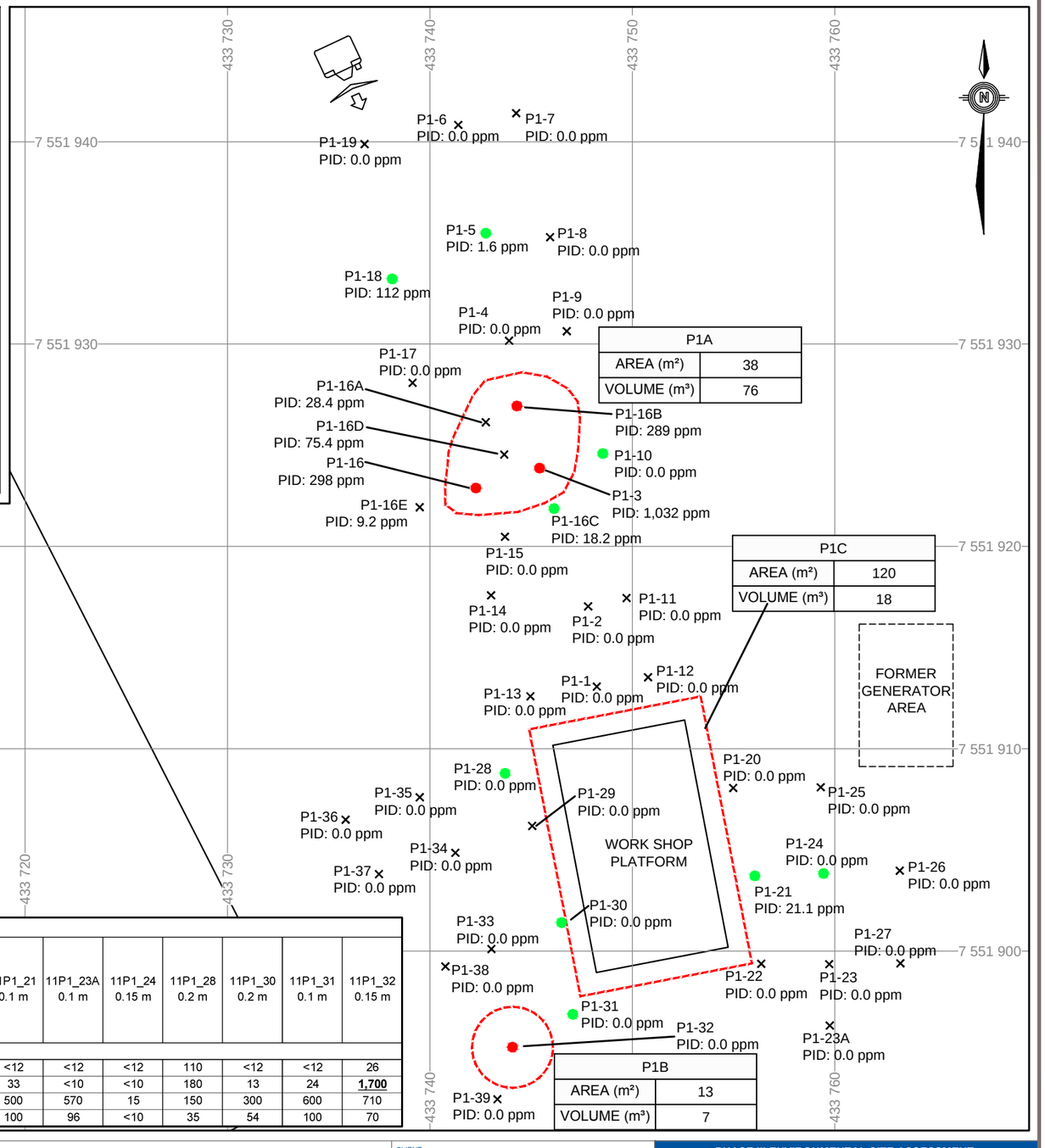


Confirmatory Soil Analytical Results for Hydrocarbons at P1 (Workshop)

Test Parameter	Unit	Tier 1 Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarsed-Grained Soil)		11P1_03 0.4 m	11P1_03 0.95 m	11P1_5 0.25 m	11P1_10 0.2 m	11P1_16 0.2 m	11P1_16B 0.25 m	11P1_16C 0.2 m	11P1_18 0.2 m	11P1_18A 0.2 m	11P1_21 0.1 m	11P1_23A 0.1 m	11P1_24 0.15 m	11P1_28 0.2 m	11P1_30 0.2 m	11P1_31 0.1 m	11P1_32 0.15 m
		Industrial	Wildland																
Hydrocarbon Fractions F1 to F4																			
F1 (C6 - C10)	mg/kg	240	30	**1,600**	<12	<12	<12	53	68	<12	<12	<12	<12	<12	<12	110	<12	<12	26
F2 (>C10 - C16)	mg/kg	260	150	**9,300**	110	<10	<10	**670**	**1,600**	13	710	<10	33	<10	<10	180	13	24	**1,700**
F3 (>C16 - C34)	mg/kg	1,700	300	1500	82	<10	<10	120	340	34	310	<10	500	570	15	150	300	600	710
F4 (>C34 - C50)	mg/kg	3,300	2,800	<10	<10	<10	<10	<10	<10	<10	<10	<10	100	96	<10	35	54	100	70

LEGEND
- ✕ - SOIL SCREENING POINT
- ● - SAMPLE BELOW TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION
- ● - SAMPLE ABOVE TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION
- - - - FORMER FACILITY LOCATION
- - - - AREA HIGHER THAN INDUSTRIAL GUIDELINE

NOTES
- GPS POINTS WERE COLLECTED IN UTM WITH NAD83 DATUM, ZONE 13, METER; CENTRAL MERIDIAN 105d W.
- **BOLD AND UNDERLINED**: VALUE GREATER THAN THE INDUSTRIAL GUIDELINE
- DEPTH SHOWN IS IN METRES BELOW BELOW GRADE

STATUS
ISSUED FOR USE

CLIENT
NEWMONT

PHASE III ENVIRONMENTAL SITE ASSESSMENT AT PATCH LAYDOWN HOPE BAY GOLD PROJECT, NUNAVUT

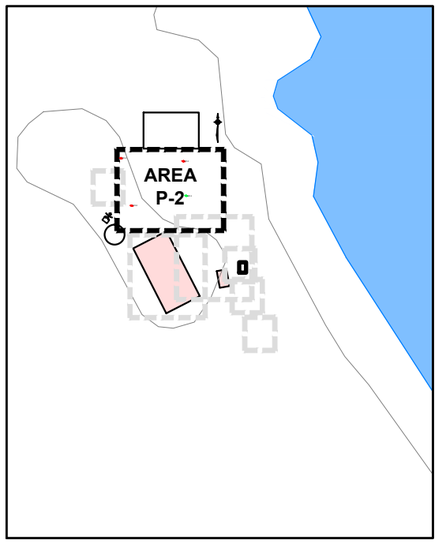
P1 - WORKSHOP

eba A TETRATECH COMPANY

PROJECT NO.	DWN	CKD	REV
Y22101187.001	EL	DF	1
OFFICE: EDM	DATE: June 2012		

Figure 3A

Q:\Edmonton\Drafting\PROJECTS\Y22\Y22101187000\1\AutoCAD\Patch\Y22101187.001-Patch_FIG 3A_R0.dwg [FIGURE 3A] June 15, 2012 - 7:46:56 am (BY: KIROS, TIGISTI)



KEY PLAN
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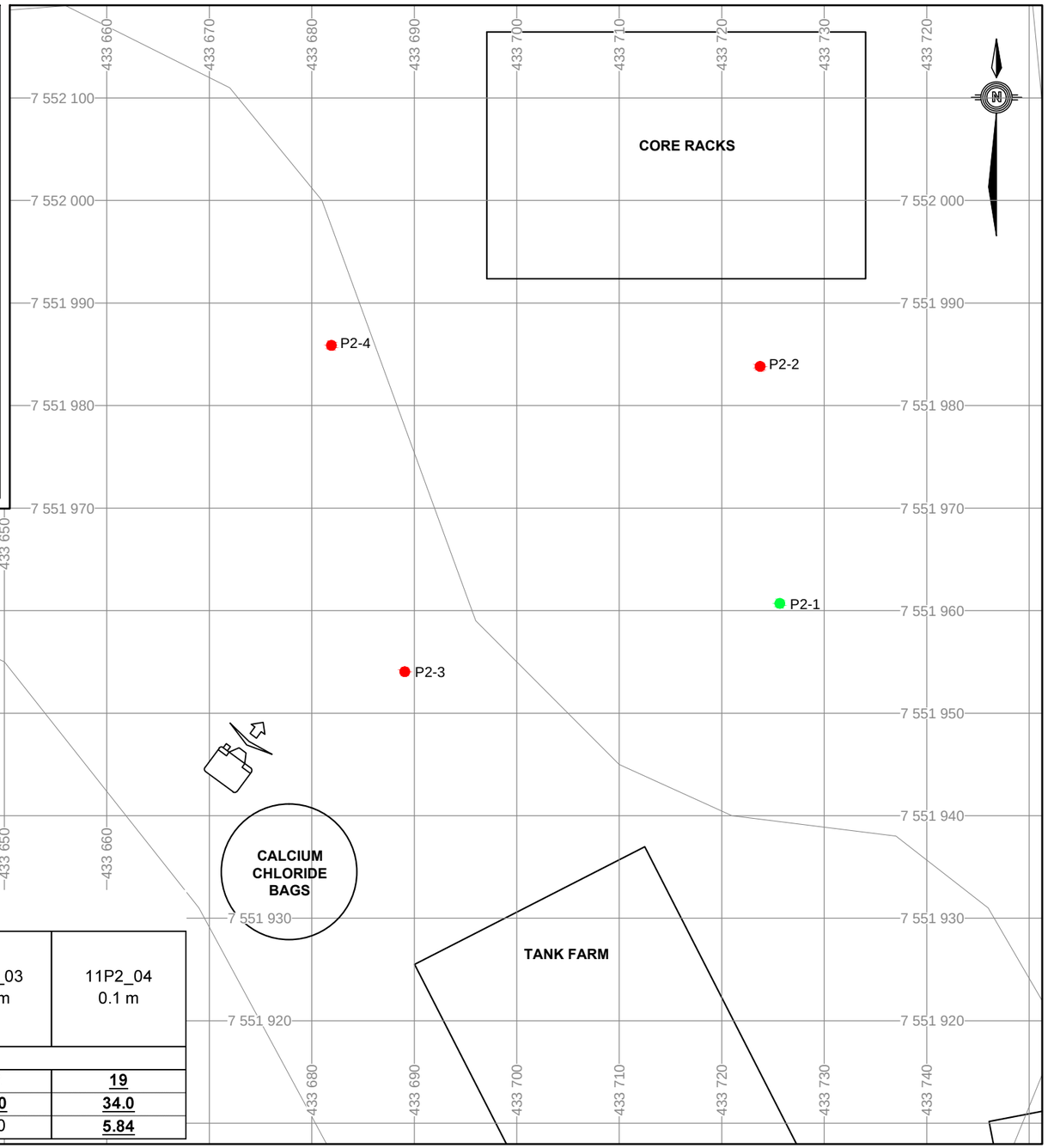
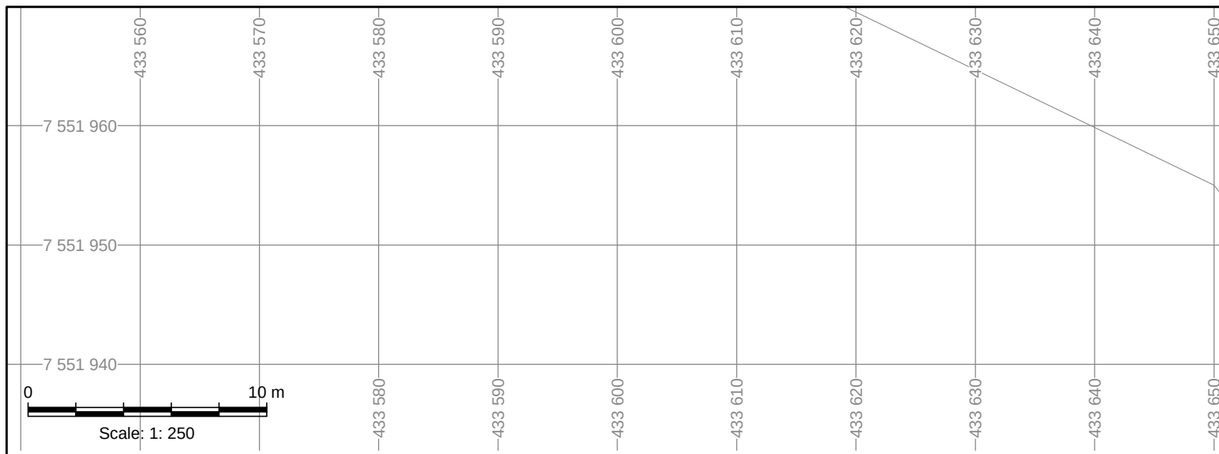




Confirmatory Soil Analytical Results for Salinity at P2 (Laydown Area)

Test Parameter	Unit	Tier 1 Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarsed-Grained Soil)		11P2_01 0.1 m	11P2_02 0.1 m	11P2_03 0.1 m	11P2_04 0.1 m
		Industrial	Wildland				
Soluble Parameters							
Sodium Absorption Ratio (SAR)	-	12	5	11	12	12	**19**
Soluble Conductivity	dS/m	4	2	2.5	**36.0**	**14.0**	**34.0**
Soluble ($CaCl_2$) pH	-	6 to 8	6 to 8	6.45	**5.69**	7.10	**5.84**

LEGEND
- SAMPLE BELOW TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION
- SAMPLE ABOVE TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION

NOTES
- GPS POINTS WERE COLLECTED IN UTM WITH NAD83 DATUM, ZONE 13, METER; CENTRAL MERIDIAN 105d W.
- **BOLD AND UNDERLINED**: VALUE GREATER THAN THE INDUSTRIAL GUIDELINE
- DEPTH SHOWN IS IN METRES BELOW BELOW GRADE

STATUS
ISSUED FOR USE

CLIENT
NEWMONT

PHASE III ENVIRONMENTAL SITE ASSESSMENT
AT PATCH LAYDOWN
HOPE BAY GOLD PROJECT, NUNAVUT

P2 - LAYDOWN AREA

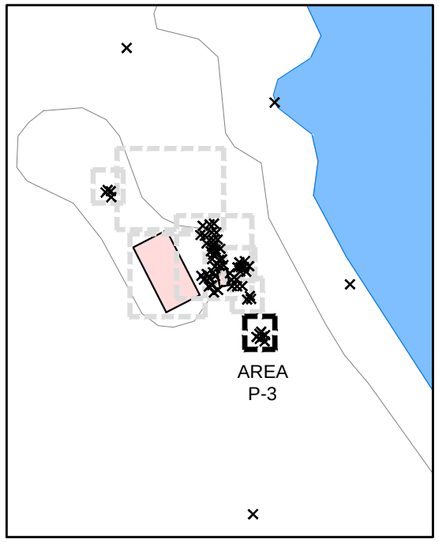
PROJECT NO.	DWN	CKD	REV
Y22101187.001	EL	DF	1

OFFICE: EDM
DATE: June 2012

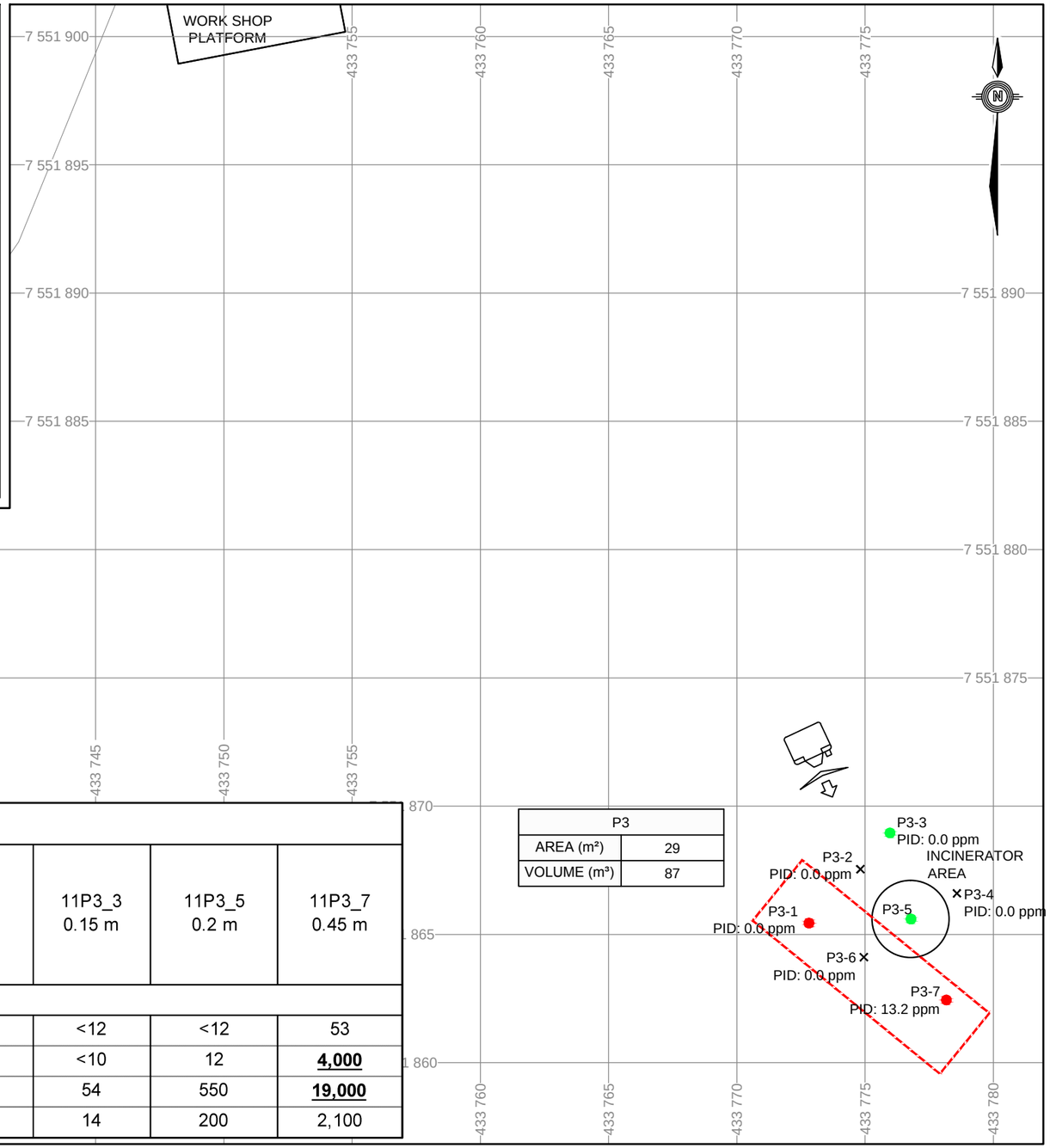
Figure 3B

A TETRA TECH COMPANY

Q:\Edmonton\Drafting\PROJECTS\Y22\1\Y22101187001\AutoCADPatch\Y22101187.001-Patch_FIG 3B_R0.dwg [FIGURE 3B] June 15, 2012 - 7:48:05 am (BY: KIROS, TIGISTI)



KEY PLAN
1:4000



Confirmatory Soil Analytical Results for Hydrocarbons at P3 (Incinerator)

Test Parameter	Unit	Tier 1 Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarsed-Grained Soil)		11P3_1 0.1 m	11P3_3 0.15 m	11P3_5 0.2 m	11P3_7 0.45 m
		Industrial	Wildland				
Hydrocarbon Fractions F1 to F4							
F1 (C6 - C10)	mg/kg	240	30	14	<12	<12	53
F2 (>C10 - C16)	mg/kg	260	150	**3,000**	<10	12	**4,000**
F3 (>C16 - C34)	mg/kg	1,700	300	**23,000**	54	550	**19,000**
F4 (>C34 - C50)	mg/kg	3,300	2,800	**3,700**	14	200	2,100

LEGEND
- ✕ - SOIL SCREENING POINT
- ● - SAMPLE BELOW TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION
- ● - SAMPLE ABOVE TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION
- - - - - AREA HIGHER THAN INDUSTRIAL GUIDELINE

NOTES
- GPS POINTS WERE COLLECTED IN UTM WITH NAD83 DATUM, ZONE 13, METER; CENTRAL MERIDIAN 105d W.
- **BOLD AND UNDERLINED**; VALUE GREATER THAN THE INDUSTRIAL GUIDELINE
- DEPTH SHOWN IS IN METRES BELOW BELOW GRADE

STATUS
ISSUED FOR USE

CLIENT
NEWMONT

eba A TETRA TECH COMPANY

PHASE III ENVIRONMENTAL SITE ASSESSMENT AT PATCH LAYDOWN HOPE BAY GOLD PROJECT, NUNAVUT

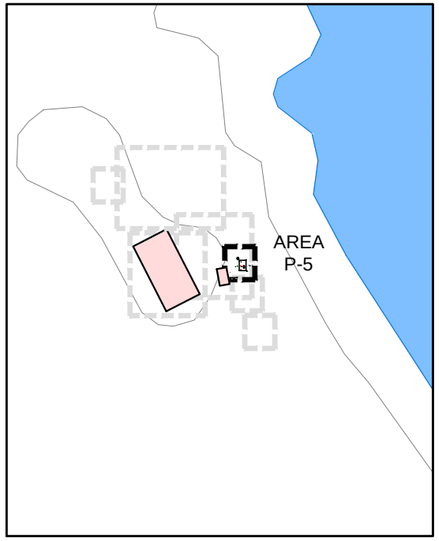
P3 - INCINERATOR

PROJECT NO.	DWN	CKD	REV
Y22101187.001	EL	DF	1

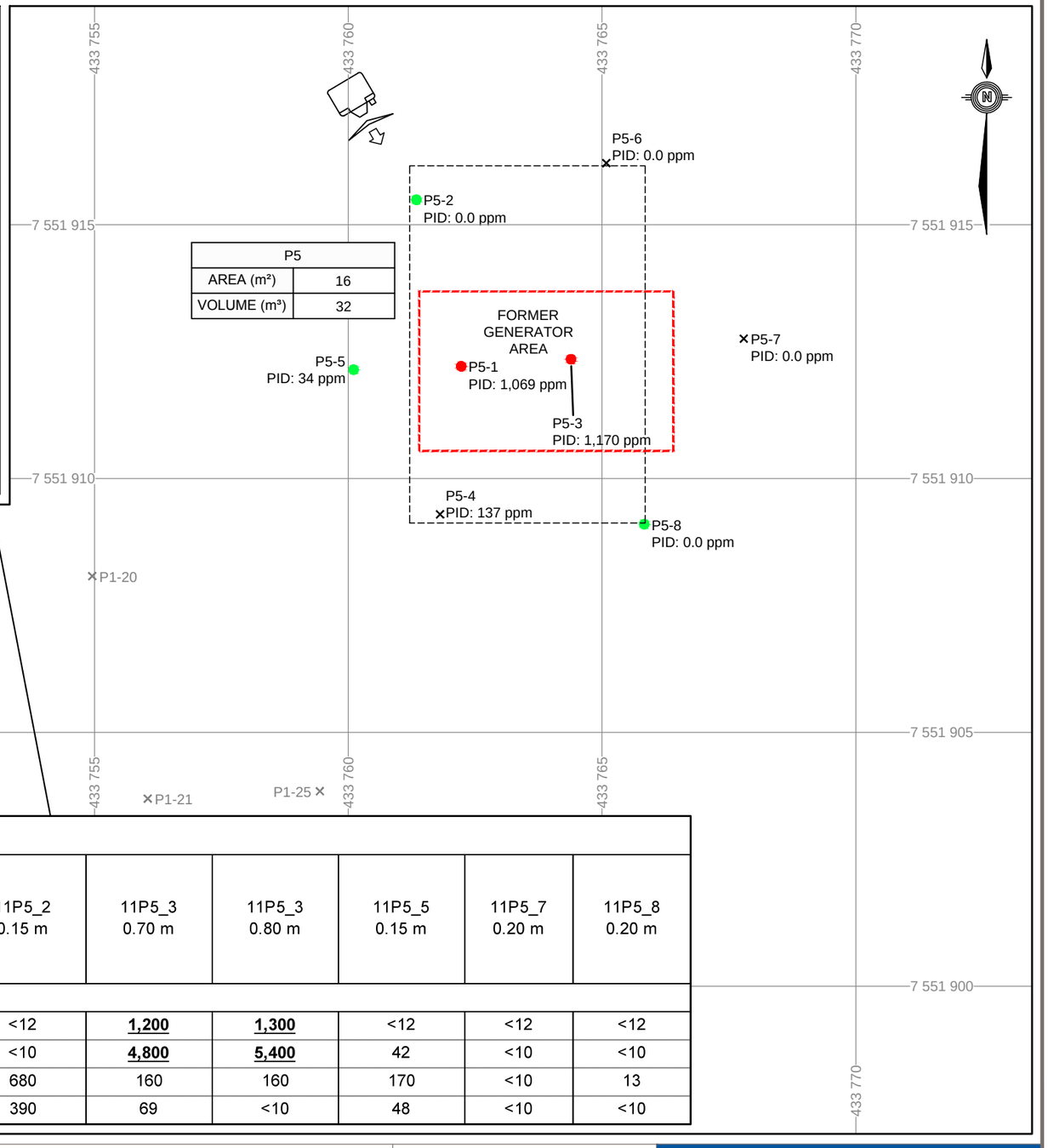
OFFICE: EDM
DATE: June 2012

Figure 3C

Q:\Edmonton\Drafting\PROJECTS\Y22\1Y22101187\001\AutoCAD\Patch\Y22101187.001-Patch_FIG 3C_R0.dwg [FIGURE 3C] June 15, 2012 - 7:48:15 am (BY: KIROS, TIG(ST))



KEY PLAN
1:4000



Confirmatory Soil Analytical Results for Hydrocarbons at P5 (Generator)

Test Parameter	Unit	Tier 1 Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarsed-Grained Soil)		11P5_1 0.15 m	11P5_2 0.15 m	11P5_3 0.70 m	11P5_3 0.80 m	11P5_5 0.15 m	11P5_7 0.20 m	11P5_8 0.20 m
		Industrial	Wildland							
Hydrocarbon Fractions F1 to F4										
F1 (C6 - C10)	mg/kg	240	30	**920**	<12	**1,200**	**1,300**	<12	<12	<12
F2 (>C10 - C16)	mg/kg	260	150	**6,200**	<10	**4,800**	**5,400**	42	<10	<10
F3 (>C16 - C34)	mg/kg	1,700	300	270	680	160	160	170	<10	13
F4 (>C34 - C50)	mg/kg	3,300	2,800	22	390	69	<10	48	<10	<10

LEGEND
- ✕ - SOIL SCREENING POINT
- ● - SAMPLE BELOW TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION
- ● - SAMPLE ABOVE TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION
- ------ - AREA HIGHER THAN INDUSTRIAL GUIDELINE

NOTES
- GPS POINTS WERE COLLECTED IN UTM WITH NAD83 DATUM, ZONE 13, METER; CENTRAL MERIDIAN 105d W.
- **BOLD AND UNDERLINED**: VALUE GREATER THAN THE INDUSTRIAL GUIDELINE
- DEPTH SHOWN IS IN METRES BELOW BELOW GRADE

STATUS
ISSUED FOR USE

CLIENT
NEWMONT

A TETRATECH COMPANY

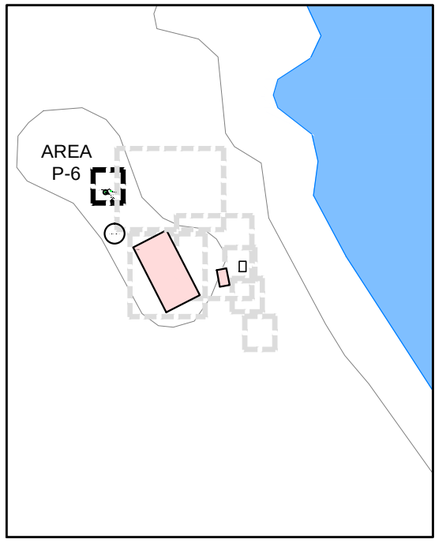
PHASE III ENVIRONMENTAL SITE ASSESSMENT
AT PATCH LAYDOWN
HOPE BAY GOLD PROJECT, NUNAVUT

P5 - GENERATOR

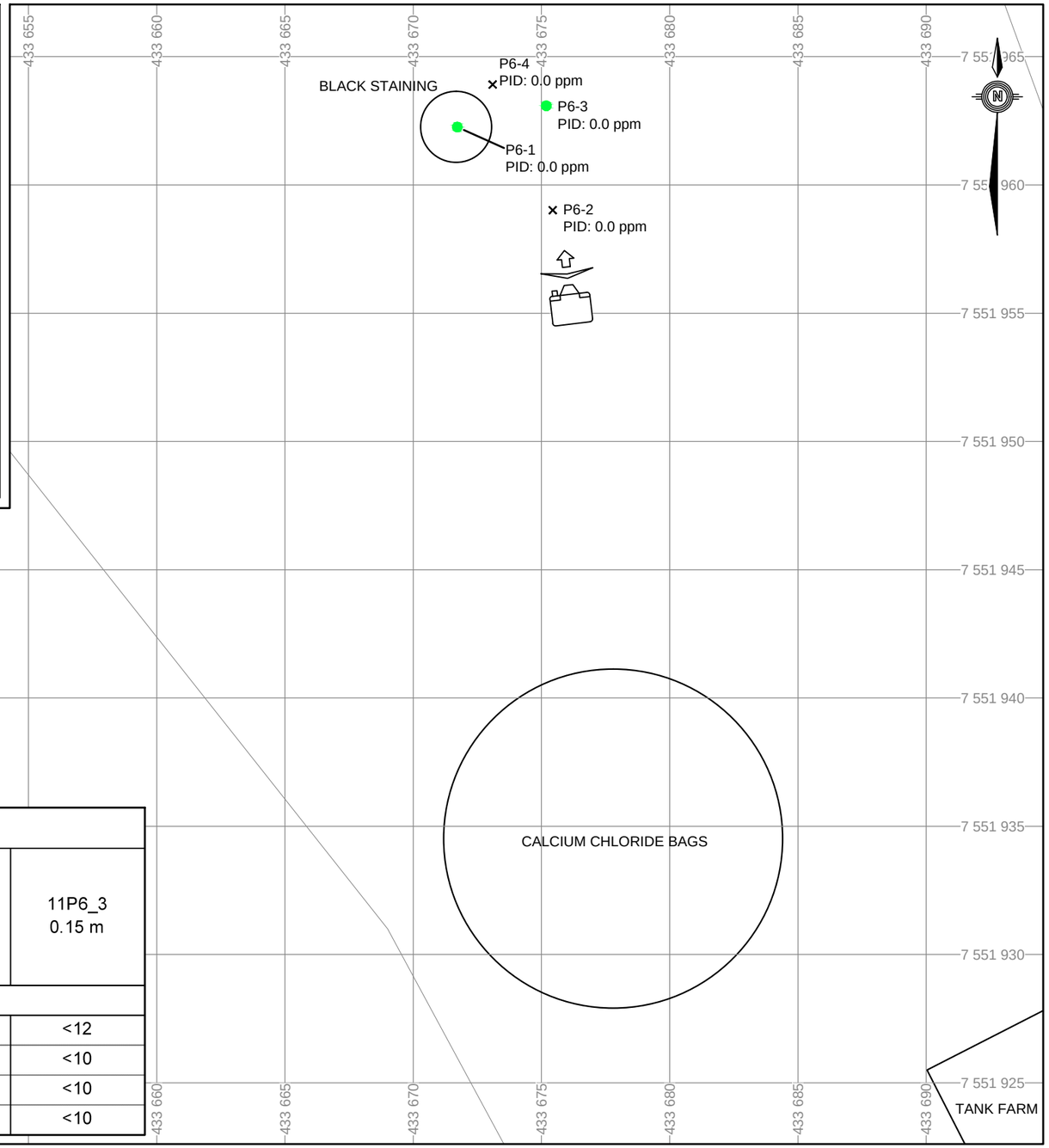
PROJECT NO.	DWN	CKD	REV
Y22101187.001	EL	DF	1
OFFICE: EDM	DATE: June 2012		

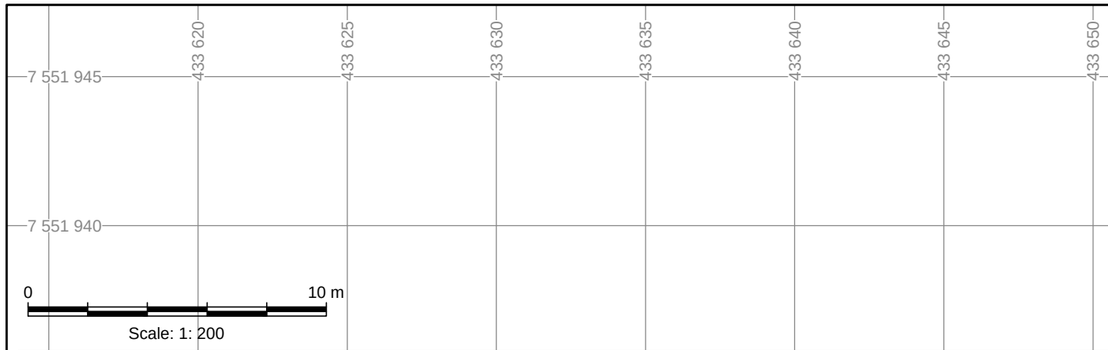
Figure 3D

Q:\Edmonton\Drafting\PROJECTS\Y22\Y22101187.001\AutoCAD\Patch\Y22101187.001-Patch_FIG 3D_R0.dwg [FIGURE 3D] June 15, 2012 - 7:51:09 am (BY: KIROS, TIGIST)



KEY PLAN
1:4000





Confirmatory Soil Analytical Results for Hydrocarbons at P6 (Burned Area Near North End of Site)

Test Parameter	Unit	Tier 1 Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarsed-Grained Soil)		11P6_1 0.15 m	11P6_3 0.15 m
		Industrial	Wildland		
Hydrocarbon Fractions F1 to F4					
F1 (C6 - C10)	mg/kg	240	30	<12	<12
F2 (>C10 - C16)	mg/kg	260	150	17	<10
F3 (>C16 - C34)	mg/kg	1,700	300	1,700	<10
F4 (>C34 - C50)	mg/kg	3,300	2,800	570	<10

LEGEND
- ✕ - SOIL SCREENING POINT
- ● - SAMPLE BELOW TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION

NOTES
- GPS POINTS WERE COLLECTED IN UTM WITH NAD83 DATUM, ZONE 13, METER; CENTRAL MERIDIAN 105d W.
- EBA's HAND HELD GPS UNIT HAS AN ACCURACY OF ±2-3 m
- **BOLD AND UNDERLINED**: VALUE GREATER THAN THE INDUSTRIAL GUIDELINE
- DEPTH SHOWN IS IN METRES BELOW BELOW GRADE

STATUS
ISSUED FOR USE

CLIENT
NEWMONT

PHASE III ENVIRONMENTAL SITE ASSESSMENT
AT PATCH LAYDOWN
HOPE BAY GOLD PROJECT, NUNAVUT

P6 - BURNED AREA NEAR NORTH END OF SITE

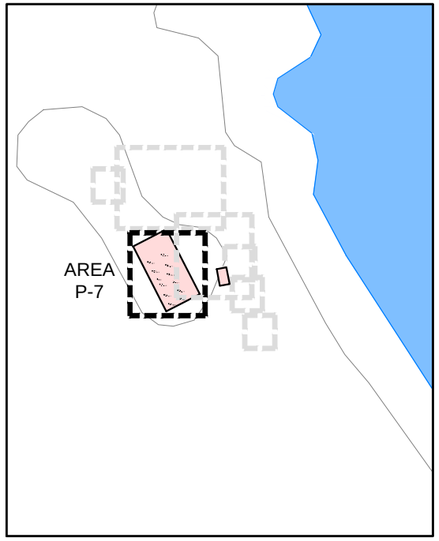
eba A TETRA TECH COMPANY

PROJECT NO.	DWN	CKD	REV
Y22101187.001	EL	DF	1

OFFICE: EDM
DATE: June 2012

Figure 3E

Q:\Edmonton\Drafting\PROJECTS\Y22\1\Y22101187001\AutoCADPatch\Y22101187.001-Patch_FIG 3E_R0.dwg [FIGURE 3E] June 15, 2012 - 7:52:13 am (BY: KIROS, TIGISTI)



KEY PLAN
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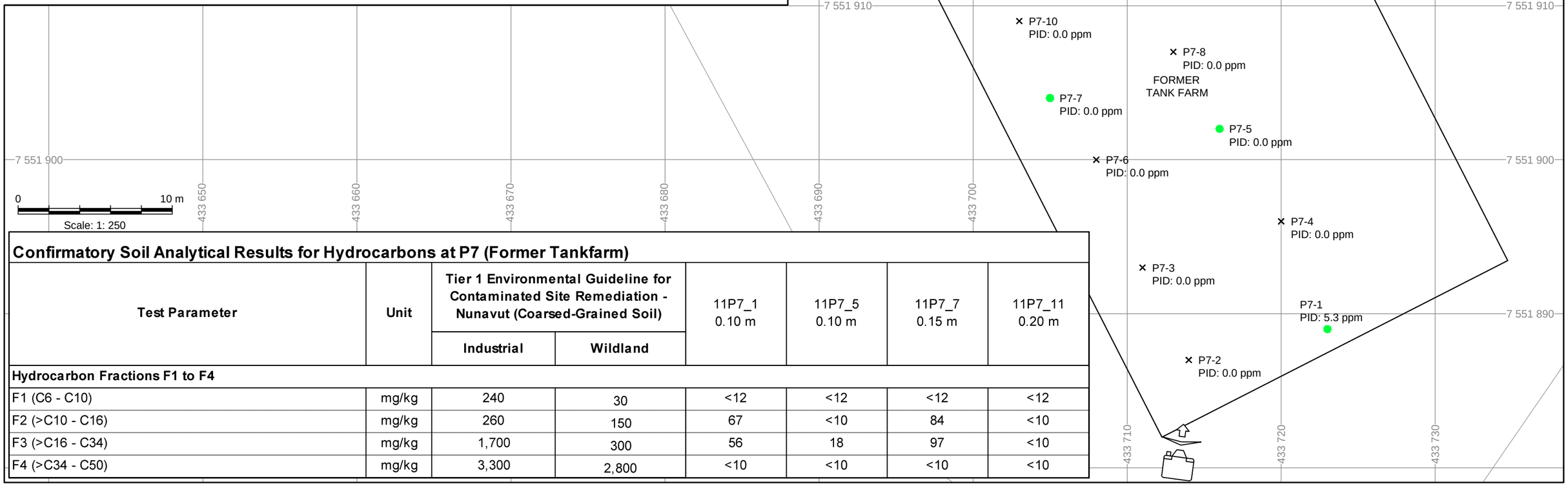


Confirmatory Soil Analytical Results for Hydrocarbons at P7 (Former Tankfarm)

Test Parameter	Unit	Tier 1 Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarsed-Grained Soil)		11P7_1 0.10 m	11P7_5 0.10 m	11P7_7 0.15 m	11P7_11 0.20 m
		Industrial	Wildland				
Hydrocarbon Fractions F1 to F4							
F1 (C6 - C10)	mg/kg	240	30	<12	<12	<12	<12
F2 (>C10 - C16)	mg/kg	260	150	67	<10	84	<10
F3 (>C16 - C34)	mg/kg	1,700	300	56	18	97	<10
F4 (>C34 - C50)	mg/kg	3,300	2,800	<10	<10	<10	<10

LEGEND
- ✕ - SOIL SCREENING POINT
- ● - SAMPLE BELOW TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION

NOTES
- GPS POINTS WERE COLLECTED IN UTM WITH NAD83 DATUM, ZONE 13, METER; CENTRAL MERIDIAN 105d W.
- **BOLD AND UNDERLINED**: VALUE GREATER THAN THE INDUSTRIAL GUIDELINE
- DEPTH SHOWN IS IN METRES BELOW BELOW GRADE

STATUS
ISSUED FOR USE

CLIENT
NEWMONT

PHASE III ENVIRONMENTAL SITE ASSESSMENT
AT PATCH LAYDOWN
HOPE BAY GOLD PROJECT, NUNAVUT

P7 - FORMER TANK FARM

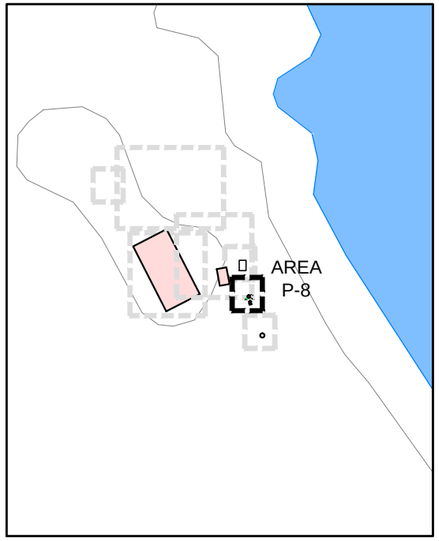
eba A TETRA TECH COMPANY

PROJECT NO.	DWN	CKD	REV
Y221011187.001	EL	DF	1

OFFICE	DATE
EDM	June 2012

Figure 3F

Q:\Edmonton\Drafting\PROJECTS\Y221\Y221011187.001\AutoCAD\Patch\Y221011187.001-Patch_FIG 3F_R0.dwg [FIGURE 3F] June 15, 2012 - 7:53:24 am (BY: KIROS, TIGIST)



KEY PLAN
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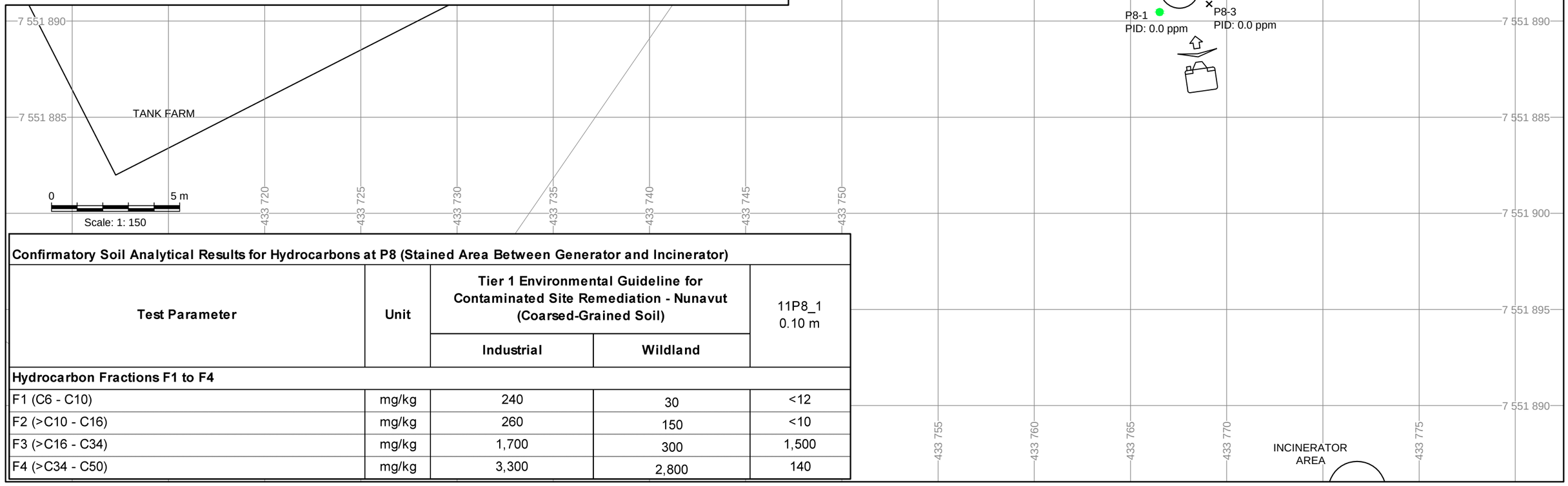


Confirmatory Soil Analytical Results for Hydrocarbons at P8 (Stained Area Between Generator and Incinerator)

Test Parameter	Unit	Tier 1 Environmental Guideline for Contaminated Site Remediation - Nunavut (Coarsed-Grained Soil)		11P8_1 0.10 m
		Industrial	Wildland	
Hydrocarbon Fractions F1 to F4				
F1 (C6 - C10)	mg/kg	240	30	<12
F2 (>C10 - C16)	mg/kg	260	150	<10
F3 (>C16 - C34)	mg/kg	1,700	300	1,500
F4 (>C34 - C50)	mg/kg	3,300	2,800	140

LEGEND
- ✕ - SOIL SCREENING POINT
- ● - SAMPLE BELOW TIER 1 ENVIRONMENTAL GUIDELINE FOR CONTAMINATED SITE REMEDIATION

NOTES
- GPS POINTS WERE COLLECTED IN UTM WITH NAD83 DATUM, ZONE 13, METER; CENTRAL MERIDIAN 105d W.
- **BOLD AND UNDERLINED**: VALUE GREATER THAN THE INDUSTRIAL GUIDELINE
- DEPTH SHOWN IS IN METRES BELOW BELOW GRADE

STATUS
ISSUED FOR USE

CLIENT
NEWMONT

PHASE III ENVIRONMENTAL SITE ASSESSMENT
AT PATCH LAYDOWN
HOPE BAY GOLD PROJECT, NUNAVUT

P8 - STAINED AREA BETWEEN GENERATOR AND INCINERATOR

PROJECT NO.	DWN	CKD	REV
Y22101187.001	EL	DF	1

OFFICE: EDM
DATE: June 2012

Figure 3G

eba A TETRATECH COMPANY

Q:\Edmonton\Drafting\PROJECTS\Y22\Y22101187.001\AutoCAD\Patch\Y22101187.001-Patch_FIG 3G_R0.dwg [FIGURE 3G] June 15, 2012 - 7:54:40 am (BY: KIROS, TIGIST)

Confirmatory Water Analytical Results for Hydrocarbons, Routine Water and Regulated Metals at Patch Workshop

Sample Date				10-Aug-11	10-Aug-11	10-Aug-11	10-Aug-11
Sample Number				11PW_1	11PW_2	11PW_4	11PW_5
Test Parameter	Unit	CCME[1]	Licence No. 2BE-HOP0712				
BTEX and Hydrocarbon Fractions F1 to F2							
Benzene	mg/L	0.37	0.370	-	-	<0.0004	<0.0004
Toluene	mg/L	0.002	0.002	-	-	<0.0004	<0.0004
Ethylbenzene	mg/L	0.090	0.090	-	-	<0.0004	<0.0004
Xylenes	mg/L	-	-	-	-	<0.0008	<0.0008
F1 (C6 - C10)	mg/L	-	-	-	-	<0.1	<0.1
F2 (>C10 - C16)	mg/L	-	-	-	-	< 0.2 (1)	<0.1
Routine Water and Diss. Regulated Metals							
Misc. Inorganics							
Conductivity	uS/cm	-		1,800		-	22,000
pH	-	6.5 to 9		**6.46**	-	-	**5.53**
Routine Water and Diss. Regulated Metals							
Calculated Parameters							
Anion Sum	meq/L	-		17	-	-	230
Cation Sum	meq/L	-		15	-	-	230
Hardness ($CaCO_3$)	mg/L	-		500	-	-	10,000
Ion Balance	-	-		0.91	-	-	0.97
Dissolved Nitrate (NO_3)	mg/L	13		0.04	-	-	0.8
Nitrate plus Nitrite (N)	mg/L	-		0.01	-	-	0.19
Dissolved Nitrite (NO_2)	mg/L	0.06		<0.01	-	-	<0.1
Total Dissolved Solids	mg/L	-		930	-	-	12,000
Routine Water and Diss. Regulated Metals							
Anions							
Alkalinity (PP as $CaCO_3$)	mg/L	-		<0.5	-	-	<0.5
Alkalinity (Total as $CaCO_3$)	mg/L	-		24	-	-	11
Bicarbonate (HCO_3)	mg/L	-		29	-	-	13
Carbonate (CO_3)	mg/L	-		<0.5	-	-	<0.5
Hydroxide (OH)	mg/L	-		<0.5	-	-	<0.5
Dissolved Sulphate (SO_4)	mg/L	-		160	-	-	180
Dissolved Chloride (Cl)	mg/L	128		**460 (1)**	**1,200 (1)**	-	**8,100 (1)**
Total Regulated Metals							
Elements							
Total Aluminum (Al)	mg/L	0.005-0.1		**39 (2)**	-	**63 (2)**	**840 (2)**
Total Arsenic (As)	mg/L	0.005		**0.012**	-	**0.026**	**0.13**
Total Cadmium (Cd)	mg/L	0.132*		**1.6**	-	**0.4**	**8.6**
Total Chromium (Cr), Trivalent	mg/L	0.0089		**0.12**	-	**0.21**	**2.4**
Total Copper (Cu)	mg/L	0.0094*		**0.1**	-	**0.17**	**2.6**
Total Iron (Fe)	mg/L	0.3		**80**	-	**170**	**6,400 (2)**
Total Lead (Pb)	mg/L	0.025*	0.001	**0.021**	-	**0.03**	**0.7**
Total Nickel (Ni)	mg/L	0.325*		0.082	-	0.13	**2.6**
Total Selenium (Se)	mg/L	0.001		<0.002	-	<0.004	<0.01
Total Silver (Ag)	mg/L	0.0001		<0.001	-	<0.002	<0.005
Total Thallium (Tl)	mg/L	0.0008		<0.002	-	<0.004	0.02
Total Zinc (Zn)	mg/L	0.03		**0.18**	-	**0.24**	**4.7**

Notes:

[1] Canadian Water Quality Guidelines for Protection of Aquatic Life - Freshwater

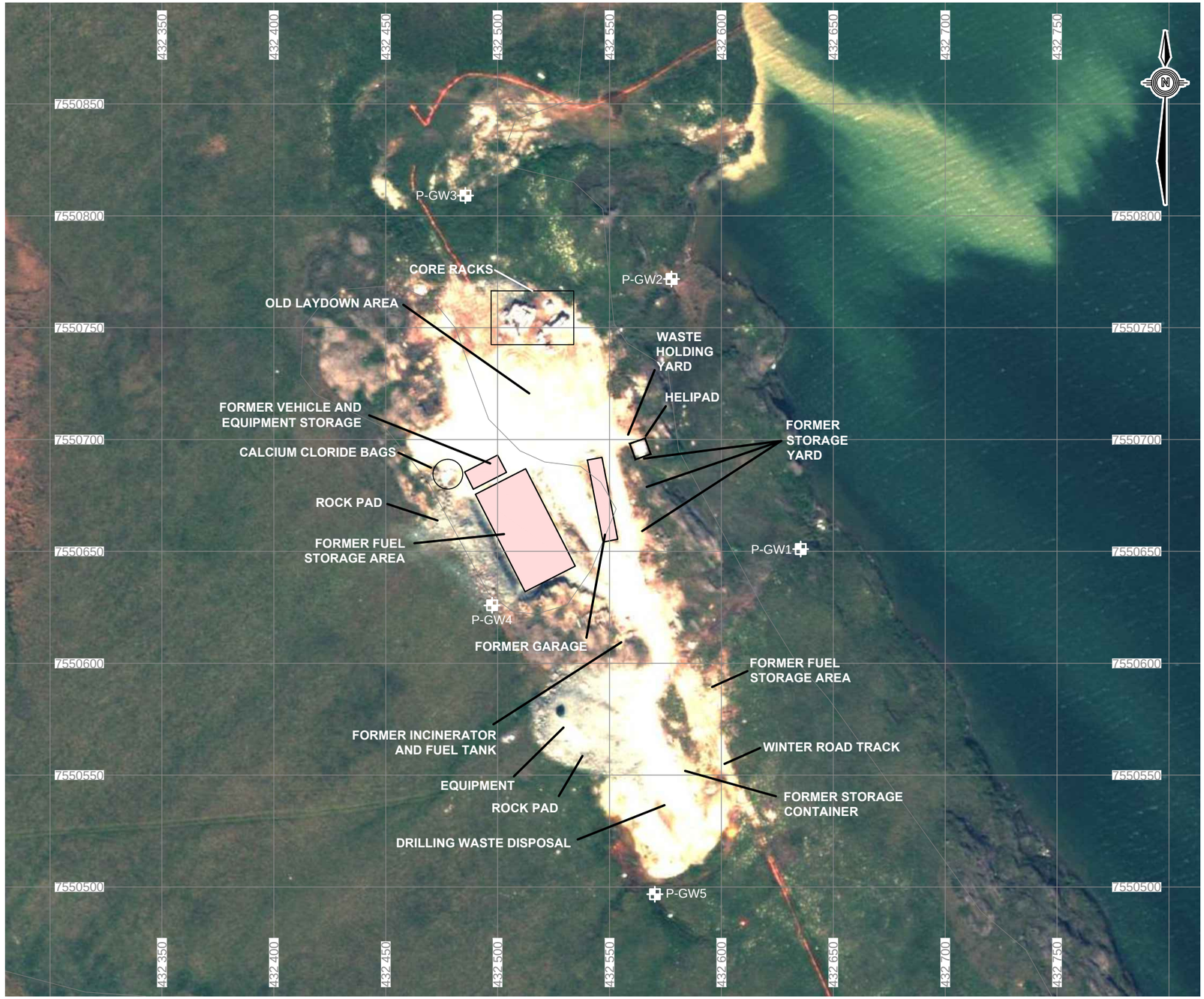
'-' = Not detected/not analyzed/no unit/no guidelines

* Based on hardness of 500 mg/L

(1) Detection Limit raised based on sample volume used for analysis/ due to dilution to bring analyte within calibrated range

(2) Detection Limits raised due to matrix interference

Bold = Greater than the referenced guideline



LEGEND

- GROUNDWATER MONITORING WELL (INSTALLED 2009 BY WESA)

0 100 m

Scale: 1: 2 000

STATUS
ISSUED FOR USE

CLIENT
NEWMONT

PHASE III ENVIRONMENTAL SITE ASSESSMENT
AT PATCH LAYDOWN
HOPE BAY GOLD PROJECT, NUNAVUT

GROUNDWATER SAMPLING LOCATIONS

eba A TETRA TECH COMPANY

PROJECT NO.	DWN	CKD	REV
Y22101187.001	EL	DF	1
OFFICE: EDM	DATE: June 2012		

Figure 4

Q:\Edmonton\Drafting\PROJECTS\Y221\Y22101187.001\AutoCADPatch\Y22101187.001-Patch_FIG 4_R0.dwg [FIGURE 4] June 15, 2012 - 7:55:48 am (BY: KIROS.TIGISTI)

APPENDIX A

APPENDIX A LABORATORY ANALYTICAL RESULTS

Maxxam

Your P.O. #: V22101187.001
Site Location: PATCH
Your C.O.C. #: A050086, A050091, A050089, A050090

Attention: DANIELA FELSKE
EBA ENGINEERING CONSULTANTS LTD.
EDMONTON - Rebate
14940-123 AVENUE
EDMONTON, AB
CANADA T5V 1B4

Report Date: 2011/08/22

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B174548
Received: 2011/08/13, 10:00

Sample Matrix: Leachate
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX in Leachates by HS GC/MS	1	2011/08/15	2011/08/16	AB SOP-00039	EPA 1311/8260C
ICPMS Metals on TCLP Leachate	1	2011/08/18	2011/08/19	AB SOP-00043	EPA 200.8

Sample Matrix: Soil
Samples Received: 40

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Boron (Hot Water Soluble)	4	2011/08/17	2011/08/17	AB SOP-00042	EPA 200.7
BTEX/F1 by HS GC/MS (MeOH extract)	21	2011/08/14	2011/08/16	EENVSOP-00012 EENVSOP-00002 EENVSOP-00005	CCME CWS, EPA 8260C
BTEX/F1 by HS GC/MS (MeOH extract)	13	2011/08/14	2011/08/17	EENVSOP-00012 EENVSOP-00002 EENVSOP-00005	CCME CWS, EPA 8260C
Chloride (Soluble)	4	2011/08/16	2011/08/17	AB SOP-00026	SM 4110-B
Chloride (Soluble)	5	2011/08/16	2011/08/18	AB SOP-00026	SM 4110-B
Hexavalent Chromium	3	2011/08/14	2011/08/16	EENVSOP-00131	SM 3500-Cr B
Hexavalent Chromium	1	2011/08/15	2011/08/15	EENVSOP-00131	SM 3500-Cr B
Conductivity @25C (Soluble)	9	2011/08/16	2011/08/16	AB SOP-00004	SSMA 15.3
CCME Hydrocarbons (F2-F4 in soil)	14	2011/08/14	2011/08/17	AB SOP-00040 AB SOP-00036	CCME PHC-CWS
CCME Hydrocarbons (F2-F4 in soil)	20	2011/08/14	2011/08/18	AB SOP-00040 AB SOP-00036	CCME PHC-CWS
CCME Hydrocarbons (F4G in soil)	3	2011/08/14	2011/08/17	AB SOP-00040 AB SOP-00036	CCME PHC-CWS
CCME Hydrocarbons (F4G in soil)	1	2011/08/14	2011/08/19	AB SOP-00040 AB SOP-00036	CCME PHC-CWS
Flash Point	1	N/A	2011/08/14	EENVSOP-00079	ASTM D3828-05
Elements by ICPMS - Soils	4	2011/08/17	2011/08/17	AB SOP-00043	EPA 200.8
Ion Balance	9	N/A	2011/08/18	AB WI-00065	SM 1030E
Sum of Cations, Anions	9	N/A	2011/08/17	AB WI-00065	SM 1030E
Moisture	36	N/A	2011/08/15	EENVSOP-00139	Carter SSMA 51.2
Moisture	1	N/A	2011/08/17	EENVSOP-00139	Carter SSMA 51.2
Moisture	2	N/A	2011/08/19	EENVSOP-00139	Carter SSMA 51.2
Free Liquid (Paint filter)	1	N/A	2011/08/14	AB SOP-00047	EPA SW846/9095B

../2

Maxxam

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EBA ENGINEERING CONSULTANTS LTD.
EDMONTON - Rebate
14940-123 AVENUE
EDMONTON, AB
CANADA T5V 1B4

Report Date: 2011/08/22

CERTIFICATE OF ANALYSIS

Sample Matrix: Soil
Samples Received: 40

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
pH @25C (1:2 Calcium Chloride Extract)	9	2011/08/15	2011/08/15	AB SOP-00006	SSMA 16.3
pH @25C (1:1 extract, solid waste)	1	2011/08/17	2011/08/17	AB SOP-00006	SSMA 16.2
Particle Size by Sieve (75 micron)	6	N/A	2011/08/15	AB SOP-00022	SSMA 55.4
Particle Size by Sieve (75 micron)	3	N/A	2011/08/16	AB SOP-00022	SSMA 55.4
Sodium Adsorption Ratio	9	N/A	2011/08/17	AB WI-00065	SSMA 15.4.4
Ca,Mg,Na,K,SO4 (Soluble)	9	2011/08/16	2011/08/16	AB SOP-00042	EPA 200.7
Soluble Paste	9	2011/08/16	2011/08/16	AB SOP-00033	SSMA 15.2
Theoretical Gypsum Requirement (1)	9	N/A	2011/08/17	CAL WI-00087	CJSS 79:449-455

(1) Units for TGR have changed from tons/acre to tonnes/ha

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Jeremy Wakaruk, B.Sc., Senior Project Manager
Email: JWakaruk@maxxam.ca
Phone# (780) 577-7105 Ext:7105

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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.

Total cover pages: 2

Maxxam Job #: B174548
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: PATCH
Your P.O. #: V22101187.001

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		BG1755	BG1756	BG1757	BG1758		
Sampling Date		2011/08/10	2011/08/10	2011/08/10	2011/08/10		
COC Number		A050086	A050086	A050086	A050086		
	Units	**11P1_23A@10CM**	**11P1_30@20CM**	**11P1_32@15CM**	**11P1_31@10CM**	**RDL**	**QC Batch**
Physical Properties							
Moisture	%	7.9	11	5.0	6.3	0.3	5090571
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	13	1700	24	10	5093068
F3 (C16-C34 Hydrocarbons)	mg/kg	570	300	710	600	10	5093068
F4 (C34-C50 Hydrocarbons)	mg/kg	96	54	70	100	10	5093068
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	N/A	5093068
Volatiles							
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5093933
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	5093933
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	5093933
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	5093933
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	5093933
o-Xylene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	5093933
F1 (C6-C10) - BTEX	mg/kg	<12	<12	26	<12	12	5093933
(C6-C10)	mg/kg	<12	<12	26	<12	12	5093933
Surrogate Recovery (%)							
4-BROMOFLUOROBENZENE (sur.)	%	96	95	102	99	N/A	5093933
D10-ETHYLBENZENE (sur.)	%	115	109	109	107	N/A	5093933
D4-1,2-DICHLOROETHANE (sur.)	%	102	100	96	99	N/A	5093933
D8-TOLUENE (sur.)	%	99	94	99	95	N/A	5093933
O-TERPHENYL (sur.)	%	68	77	65	69	N/A	5093068

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: B174548
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: PATCH
Your P.O. #: V22101187.001

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		BG1759	BG1760	BG1761	BG1762		
Sampling Date		2011/08/10	2011/08/10	2011/08/10	2011/08/10		
COC Number		A050086	A050086	A050086	A050086		
	Units	**11P1_28@20CM**	**11P1_10@20CM**	**11P1_16B@25CM**	**11P1_16C@20CM**	**RDL**	**QC Batch**
Physical Properties							
Moisture	%	8.0	8.0	8.1	5.3	0.3	5090571
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/kg	180	<10	1600	13	10	5093068
F3 (C16-C34 Hydrocarbons)	mg/kg	150	<10	340	34	10	5093068
F4 (C34-C50 Hydrocarbons)	mg/kg	35	<10	<10	<10	10	5093068
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	N/A	5093068
Volatiles							
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5093933
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	5093933
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	5093933
Xylenes (Total)	mg/kg	7.3	<0.040	<0.040	<0.040	0.040	5093933
m & p-Xylene	mg/kg	0.64	<0.040	<0.040	<0.040	0.040	5093933
o-Xylene	mg/kg	6.7	<0.020	<0.020	<0.020	0.020	5093933
F1 (C6-C10) - BTEX	mg/kg	110	<12	68	<12	12	5093933
(C6-C10)	mg/kg	120	<12	68	<12	12	5093933
Surrogate Recovery (%)							
4-BROMOFLUOROBENZENE (sur.)	%	92	98	94	103	N/A	5093933
D10-ETHYLBENZENE (sur.)	%	108	112	107	108	N/A	5093933
D4-1,2-DICHLOROETHANE (sur.)	%	100	99	100	95	N/A	5093933
D8-TOLUENE (sur.)	%	98	98	94	101	N/A	5093933
O-TERPHENYL (sur.)	%	92	87	93	88	N/A	5093068

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: B174548
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: PATCH
Your P.O. #: V22101187.001

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		BG1763	BG1764	BG1765	BG1766		
Sampling Date		2011/08/10	2011/08/10	2011/08/10	2011/08/10		
COC Number		A050086	A050086	A050086	A050086		
	Units	**11P1_16@20CM**	**11P1_03@40CM**	**11P1_18A@20CM**	**11P1_03@95CM**	**RDL**	**QC Batch**
Physical Properties							
Moisture	%	9.1	18	3.3	5.9	0.3	5090571
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/kg	670	9300	<10	110	10	5093068
F3 (C16-C34 Hydrocarbons)	mg/kg	120	1500	<10	82	10	5093068
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	<10	<10	<10	10	5093068
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	N/A	5093068
Volatiles							
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5093933
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	5093933
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	5093933
Xylenes (Total)	mg/kg	<0.040	2.4	<0.040	<0.040	0.040	5093933
m & p-Xylene	mg/kg	<0.040	0.31	<0.040	<0.040	0.040	5093933
o-Xylene	mg/kg	<0.020	2.1	<0.020	<0.020	0.020	5093933
F1 (C6-C10) - BTEX	mg/kg	53	1600	<12	<12	12	5093933
(C6-C10)	mg/kg	53	1600	<12	<12	12	5093933
Surrogate Recovery (%)							
4-BROMOFLUOROBENZENE (sur.)	%	89	130	98	98	N/A	5093933
D10-ETHYLBENZENE (sur.)	%	111	119	98	107	N/A	5093933
D4-1,2-DICHLOROETHANE (sur.)	%	99	103	97	99	N/A	5093933
D8-TOLUENE (sur.)	%	98	98	97	97	N/A	5093933
O-TERPHENYL (sur.)	%	85	92	84	91	N/A	5093068

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: B174548
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: PATCH
Your P.O. #: V22101187.001

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		BG1770	BG1771	BG1772	BG1773		
Sampling Date		2011/08/10	2011/08/10	2011/08/10	2011/08/10		
COC Number		A050089	A050089	A050089	A050089		
	Units	**11P7_7@15CM**	**11P7_11@20CM**	**11P7_5@10CM**	**11P7_1@10CM**	**RDL**	**QC Batch**
Physical Properties							
Moisture	%	18	4.1	5.8	2.1	0.3	5090571
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/kg	84	<10	<10	67	10	5093068
F3 (C16-C34 Hydrocarbons)	mg/kg	97	<10	18	56	10	5093068
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	<10	<10	<10	10	5093068
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	N/A	5093068
Volatiles							
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5093933
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	5093933
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	5093933
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	5093933
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	5093933
o-Xylene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	5093933
F1 (C6-C10) - BTEX	mg/kg	<12	<12	<12	<12	12	5093933
(C6-C10)	mg/kg	<12	<12	<12	<12	12	5093933
Surrogate Recovery (%)							
4-BROMOFLUOROBENZENE (sur.)	%	98	96	98	98	N/A	5093933
D10-ETHYLBENZENE (sur.)	%	105	107	107	114	N/A	5093933
D4-1,2-DICHLOROETHANE (sur.)	%	99	97	101	101	N/A	5093933
D8-TOLUENE (sur.)	%	98	98	99	97	N/A	5093933
O-TERPHENYL (sur.)	%	89	94	93	90	N/A	5093068

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RDL = Reportable Detection Limit

Maxxam Job #: B174548
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: PATCH
Your P.O. #: V22101187.001

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		BG1774	BG1775	BG1776	BG1777		
Sampling Date		2011/08/10	2011/08/10	2011/08/10	2011/08/10		
COC Number		A050089	A050089	A050089	A050089		
	Units	**11P5_3@85CM**	**11P3_1@10CM**	**11P5_3@70CM**	**11P5_7@20CM**	**RDL**	**QC Batch**
Physical Properties							
Moisture	%	4.2	4.3	8.1	2.1	0.3	5090554
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/kg	5400	3000	4800	<10	10	5093068
F3 (C16-C34 Hydrocarbons)	mg/kg	160	23000	160	<10	10	5093068
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	3700	69	<10	10	5093068
Reached Baseline at C50	mg/kg	Yes	No	Yes	Yes	N/A	5093068
F4G-SG (Heavy Hydrocarbons-Grav.)	mg/kg	N/A	28000	N/A	N/A	500	5105817
Volatiles							
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5093933
Toluene	mg/kg	1.0	<0.020	0.060	<0.020	0.020	5093933
Ethylbenzene	mg/kg	5.6	<0.010	0.18	<0.010	0.010	5093933
Xylenes (Total)	mg/kg	49	<0.040	16	<0.040	0.040	5093933
m & p-Xylene	mg/kg	30	<0.040	8.8	<0.040	0.040	5093933
o-Xylene	mg/kg	19	<0.020	6.7	<0.020	0.020	5093933
F1 (C6-C10) - BTEX	mg/kg	1300	14	1200	<12	12	5093933
(C6-C10)	mg/kg	1400	14	1200	<12	12	5093933
Surrogate Recovery (%)							
4-BROMOFLUOROBENZENE (sur.)	%	111	105	110	97	N/A	5093933
D10-ETHYLBENZENE (sur.)	%	112	101	113	107	N/A	5093933
D4-1,2-DICHLOROETHANE (sur.)	%	93	100	95	99	N/A	5093933
D8-TOLUENE (sur.)	%	96	97	94	96	N/A	5093933
O-TERPHENYL (sur.)	%	81	54	90	90	N/A	5093068

N/A = Not Applicable
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Maxxam Job #: B174548
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: PATCH
Your P.O. #: V22101187.001

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		BG1778	BG1779	BG1780	BG1781		
Sampling Date		2011/08/10	2011/08/10	2011/08/10	2011/08/10		
COC Number		A050089	A050089	A050089	A050089		
	Units	**11P5_8@15CM**	**11P5_5@15CM**	**11P5_2@15CM**	**11P5_1@15CM**	**RDL**	**QC Batch**
Physical Properties							
Moisture	%	5.9	18	3.8	10	0.3	5090554
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	42	<10	6200	10	5093072
F3 (C16-C34 Hydrocarbons)	mg/kg	13	170	680	270	10	5093072
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	48	390	22	10	5093072
Reached Baseline at C50	mg/kg	Yes	Yes	No	Yes	N/A	5093072
F4G-SG (Heavy Hydrocarbons-Grav.)	mg/kg	N/A	N/A	1500	N/A	500	5101637
Volatiles							
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5093943
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	5093943
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	0.14	0.010	5093943
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	19	0.040	5093943
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	7.7	0.040	5093943
o-Xylene	mg/kg	<0.020	<0.020	<0.020	11	0.020	5093943
F1 (C6-C10) - BTEX	mg/kg	<12	<12	<12	920	12	5093943
(C6-C10)	mg/kg	<12	<12	<12	940	12	5093943
Surrogate Recovery (%)							
4-BROMOFLUOROBENZENE (sur.)	%	95	98	99	90	N/A	5093943
D10-ETHYLBENZENE (sur.)	%	123	120	124	122	N/A	5093943
D4-1,2-DICHLOROETHANE (sur.)	%	97	99	96	127	N/A	5093943
D8-TOLUENE (sur.)	%	106	104	106	119	N/A	5093943
O-TERPHENYL (sur.)	%	87	83	86	85	N/A	5093072

N/A = Not Applicable
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Maxxam Job #: B174548
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: PATCH
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AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		BG1857	BG1858	BG1859	BG1860		
Sampling Date							
COC Number		A050090	A050090	A050090	A050090		
	Units	**11P6_1@15CM**	**11P6_3@15CM**	**11P3_7@45CM**	**11P8_1@10CM**	**RDL**	**QC Batch**
Physical Properties							
Moisture	%	2.9	4.7	12	6.9	0.3	5090554
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/kg	17	<10	4000	<10	10	5093072
F3 (C16-C34 Hydrocarbons)	mg/kg	1700	<10	19000	1500	10	5093072
F4 (C34-C50 Hydrocarbons)	mg/kg	570	<10	2100	140	10	5093072
Reached Baseline at C50	mg/kg	No	Yes	No	Yes	N/A	5093072
F4G-SG (Heavy Hydrocarbons-Grav.)	mg/kg	2700	N/A	21000	N/A	500	5101637
Volatiles							
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5093943
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	5093943
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	5093943
Xylenes (Total)	mg/kg	<0.040	<0.040	0.070	<0.040	0.040	5093943
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	5093943
o-Xylene	mg/kg	<0.020	<0.020	0.070	<0.020	0.020	5093943
F1 (C6-C10) - BTEX	mg/kg	<12	<12	53	<12	12	5093943
(C6-C10)	mg/kg	<12	<12	53	<12	12	5093943
Surrogate Recovery (%)							
4-BROMOFLUOROBENZENE (sur.)	%	96	97	87	91	N/A	5093943
D10-ETHYLBENZENE (sur.)	%	108	107	113	128	N/A	5093943
D4-1,2-DICHLOROETHANE (sur.)	%	96	97	103	98	N/A	5093943
D8-TOLUENE (sur.)	%	107	105	112	108	N/A	5093943
O-TERPHENYL (sur.)	%	88	88	94	84	N/A	5093072

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: B174548
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: PATCH
Your P.O. #: V22101187.001

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		BG1861	BG1862	BG1863	BG1864		
Sampling Date							
COC Number		A050090	A050090	A050090	A050090		
	Units	**11P3_5@20CM**	**11P3_3@15CM**	**11P1_24@15CM**	**11P1_21@10CM**	**RDL**	**QC Batch**
Physical Properties							
Moisture	%	2.1	1.1	8.1	15	0.3	5090554
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/kg	12	<10	<10	33	10	5093072
F3 (C16-C34 Hydrocarbons)	mg/kg	550	54	15	500	10	5093072
F4 (C34-C50 Hydrocarbons)	mg/kg	200	14	<10	100	10	5093072
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	N/A	5093072
Volatiles							
Benzene	mg/kg	0.013	<0.0050	<0.0050	<0.0050	0.0050	5093943
Toluene	mg/kg	0.021	<0.020	<0.020	<0.020	0.020	5093943
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	5093943
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	5093943
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	5093943
o-Xylene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	5093943
F1 (C6-C10) - BTEX	mg/kg	<12	<12	<12	<12	12	5093943
(C6-C10)	mg/kg	<12	<12	<12	<12	12	5093943
Surrogate Recovery (%)							
4-BROMOFLUOROBENZENE (sur.)	%	95	95	98	97	N/A	5093943
D10-ETHYLBENZENE (sur.)	%	118	125	117	127	N/A	5093943
D4-1,2-DICHLOROETHANE (sur.)	%	98	96	104	96	N/A	5093943
D8-TOLUENE (sur.)	%	105	103	102	104	N/A	5093943
O-TERPHENYL (sur.)	%	87	90	88	92	N/A	5093072

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: B174548
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: PATCH
Your P.O. #: V22101187.001

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		BG1865	BG1866		
Sampling Date					
COC Number		A050090	A050090		
	Units	**11P1_5@25CM**	**11P1_18@20CM**	**RDL**	**QC Batch**
Physical Properties					
Moisture	%	7.7	5.0	0.3	5090554
Ext. Pet. Hydrocarbon					
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	710	10	5093072
F3 (C16-C34 Hydrocarbons)	mg/kg	<10	310	10	5093072
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	<10	10	5093072
Reached Baseline at C50	mg/kg	Yes	Yes	N/A	5093072
Volatiles					
Benzene	mg/kg	<0.0050	<0.0050	0.0050	5093943
Toluene	mg/kg	<0.020	<0.020	0.020	5093943
Ethylbenzene	mg/kg	<0.010	<0.010	0.010	5093943
Xylenes (Total)	mg/kg	<0.040	<0.040	0.040	5093943
m & p-Xylene	mg/kg	<0.040	<0.040	0.040	5093943
o-Xylene	mg/kg	<0.020	<0.020	0.020	5093943
F1 (C6-C10) - BTEX	mg/kg	<12	<12	12	5093943
(C6-C10)	mg/kg	<12	<12	12	5093943
Surrogate Recovery (%)					
4-BROMOFLUOROBENZENE (sur.)	%	99	94	N/A	5093943
D10-ETHYLBENZENE (sur.)	%	126	109	N/A	5093943
D4-1,2-DICHLOROETHANE (sur.)	%	96	93	N/A	5093943
D8-TOLUENE (sur.)	%	104	105	N/A	5093943
O-TERPHENYL (sur.)	%	85	93	N/A	5093072

N/A = Not Applicable
RDL = Reportable Detection Limit

BASIC CLASS II LANDFILL PACKAGE (LEACHATE)

Maxxam ID		BG1875		
Sampling Date		2011/08/10		
COC Number		A050091		
	Units	**P3_7**	**RDL**	**QC Batch**
Elements				
Leachable Antimony (Sb)	mg/L	<1	1	5106377
Leachable Arsenic (As)	mg/L	<0.5	0.5	5106377
Leachable Barium (Ba)	mg/L	5	1	5106377
Leachable Beryllium (Be)	mg/L	<0.5	0.5	5106377
Leachable Boron (B)	mg/L	<1	1	5106377
Leachable Cadmium (Cd)	mg/L	<0.1	0.1	5106377
Leachable Chromium (Cr)	mg/L	<0.5	0.5	5106377
Leachable Cobalt (Co)	mg/L	<1	1	5106377
Leachable Copper (Cu)	mg/L	<1	1	5106377
Leachable Iron (Fe)	mg/L	4	1	5106377
Leachable Lead (Pb)	mg/L	<0.5	0.5	5106377
Leachable Mercury (Hg)	mg/L	<0.02	0.02	5106377
Leachable Nickel (Ni)	mg/L	<0.5	0.5	5106377
Leachable Selenium (Se)	mg/L	<0.1	0.1	5106377
Leachable Silver (Ag)	mg/L	<0.5	0.5	5106377
Leachable Thallium (Tl)	mg/L	<0.5	0.5	5106377
Leachable Uranium (U)	mg/L	<0.2	0.2	5106377
Leachable Vanadium (V)	mg/L	<1	1	5106377
Leachable Zinc (Zn)	mg/L	<1	1	5106377
Leachable Zirconium (Zr)	mg/L	<1	1	5106377
Volatiles				
Leachable (ZH) Benzene	ug/L	<10	10	5093945
Leachable (ZH) Toluene	ug/L	<10	10	5093945
Leachable (ZH) Ethylbenzene	ug/L	<10	10	5093945
Leachable (ZH) o-Xylene	ug/L	<10	10	5093945
Leachable (ZH) m & p-Xylene	ug/L	<20	20	5093945
Leachable (ZH) Xylenes (Total)	ug/L	<20	20	5093945
Surrogate Recovery (%)				
Leachable (ZH) 4-BROMOFLUOROBENZENE (sur.)	%	102	N/A	5093945
Leachable (ZH) D4-1,2-DICHLOROETHANE (sur.)	%	94	N/A	5093945
Leachable (ZH) D8-TOLUENE (sur.)	%	92	N/A	5093945

N/A = Not Applicable
RDL = Reportable Detection Limit

BASIC CLASS II LANDFILL PACKAGE (SOIL)

Maxxam ID		BG1875	
Sampling Date		2011/08/10	
COC Number		A050091	
	Units	**P3_7**	**QC Batch**
Soluble Parameters			
Soluble (1:1) pH	N/A	7.39	5097834
Physical Properties			
Closed Cup Flash point	deg. C	>61	5090236
Free Liquid	N/A	PASS	5090267

Maxxam Job #: B174548
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: PATCH
Your P.O. #: V22101187.001

REGULATED METALS (CCME/AT1) - SOILS

Maxxam ID		BG1882		BG1883	BG1884	BG1885		
Sampling Date		2011/08/10		2011/08/10	2011/08/10	2011/08/10		
COC Number		A050091		A050091	A050091	A050091		
	Units	**P2_01@SURF**	**QC Batch**	**P2_02@SURF**	**P2_03@SURF**	**P2_04@SURF**	**RDL**	**QC Batch**
Elements								
Soluble (Hot water) Boron (B)	mg/kg	1.1	5099637	1.1	0.4	4.1	0.1	5099637
Hex. Chromium (Cr 6+)	mg/kg	<0.15	5092257	<0.15	<0.15	<0.15	0.15	5094204
Total Antimony (Sb)	mg/kg	<1	5099378	<1	<1	<1	1	5099378
Total Arsenic (As)	mg/kg	3	5099378	3	3	3	1	5099378
Total Barium (Ba)	mg/kg	67	5099378	110	46	120	10	5099378
Total Beryllium (Be)	mg/kg	<0.4	5099378	0.5	<0.4	0.7	0.4	5099378
Total Cadmium (Cd)	mg/kg	<0.1	5099378	<0.1	<0.1	<0.1	0.1	5099378
Total Chromium (Cr)	mg/kg	44	5099378	59	33	67	1	5099378
Total Cobalt (Co)	mg/kg	10	5099378	12	8	14	1	5099378
Total Copper (Cu)	mg/kg	20	5099378	27	17	36	5	5099378
Total Lead (Pb)	mg/kg	13	5099378	13	6	10	1	5099378
Total Mercury (Hg)	mg/kg	<0.05	5099378	<0.05	<0.05	<0.05	0.05	5099378
Total Molybdenum (Mo)	mg/kg	1.0	5099378	0.8	0.5	0.8	0.4	5099378
Total Nickel (Ni)	mg/kg	23	5099378	30	19	38	1	5099378
Total Selenium (Se)	mg/kg	<0.5	5099378	<0.5	<0.5	<0.5	0.5	5099378
Total Silver (Ag)	mg/kg	<1	5099378	<1	<1	<1	1	5099378
Total Thallium (Tl)	mg/kg	<0.3	5099378	<0.3	<0.3	<0.3	0.3	5099378
Total Tin (Sn)	mg/kg	<1	5099378	1	<1	1	1	5099378
Total Uranium (U)	mg/kg	1	5099378	2	<1	2	1	5099378
Total Vanadium (V)	mg/kg	51	5099378	64	39	69	1	5099378
Total Zinc (Zn)	mg/kg	52	5099378	64	35	67	10	5099378

RDL = Reportable Detection Limit

Maxxam Job #: B174548
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: PATCH
Your P.O. #: V22101187.001

SOIL SALINITY 4 (SOIL)

Maxxam ID		BG1755		BG1758		BG1764		
Sampling Date		2011/08/10		2011/08/10		2011/08/10		
COC Number		A050086		A050086		A050086		
	Units	**11P1_23A@10CM**	**RDL**	**11P1_31@10CM**	**RDL**	**11P1_03@40CM**	**RDL**	**QC Batch**
Calculated Parameters								
Anion Sum	meq/L	41	N/A	84	N/A	1.2	N/A	5089769
Cation Sum	meq/L	46	N/A	90	N/A	3.3	N/A	5089769
Ion Balance	N/A	1.1	0.01	1.1	0.01	2.7	0.01	5089768
Soluble Parameters								
Soluble Chloride (Cl)	mg/L	1400 (1)	10	2800 (1)	20	33	5	5098557
Soluble Conductivity	dS/m	4.7	0.02	8.7	0.02	0.25	0.02	5093737
Soluble (CaCl2) pH	N/A	7.19	N/A	7.07	N/A	6.00	N/A	5090590
Sodium Adsorption Ratio	N/A	2.9	0.1	4.8	0.1	0.7	0.1	5089770
Soluble Calcium (Ca)	mg/L	460	1.5	790	1.5	22	1.5	5096063
Soluble Magnesium (Mg)	mg/L	140	1.0	280	1.0	16	1.0	5096063
Soluble Sodium (Na)	mg/L	270	2.5	620	2.5	18	2.5	5096063
Soluble Potassium (K)	mg/L	7.9	1.3	11	1.3	3.6	1.3	5096063
Saturation %	%	47	N/A	49	N/A	63	N/A	5093730
Soluble Sulphate (SO4)	mg/L	120	5.0	240	5.0	14	5.0	5096063
Theoretical Gypsum Requirement	tonnes/ha	<0.1	0.1	<0.1	0.1	<0.1	0.1	5089772

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

Maxxam Job #: B174548
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: PATCH
Your P.O. #: V22101187.001

SOIL SALINITY 4 (SOIL)

Maxxam ID		BG1766	BG1881	BG1882		BG1883		
Sampling Date		2011/08/10	2011/08/10	2011/08/10		2011/08/10		
COC Number		A050086	A050091	A050091		A050091		
	Units	**11P1_03@95CM**	**P1_32@SURF**	**P2_01@SURF**	**RDL**	**P2_02@SURF**	**RDL**	**QC Batch**
Calculated Parameters								
Anion Sum	meq/L	1.1	13	21	N/A	410	N/A	5089769
Cation Sum	meq/L	2.2	17	27	N/A	390	N/A	5089769
Ion Balance	N/A	2.0	1.3	1.3	0.01	0.95	0.01	5089768
Soluble Parameters								
Soluble Chloride (Cl)	mg/L	27	420	370	5	14000 (1)	100	5098557
Soluble Conductivity	dS/m	0.20	1.7	2.5	0.02	36	0.02	5093737
Soluble (CaCl2) pH	N/A	7.30	7.06	6.45	N/A	5.69	N/A	5090743
Sodium Adsorption Ratio	N/A	3.2	2.2	11	0.1	12	0.1	5089770
Soluble Calcium (Ca)	mg/L	5.2	150	58	1.5	1500	1.5	5096063
Soluble Magnesium (Mg)	mg/L	3.2	50	45	1.0	2100	1.0	5096063
Soluble Sodium (Na)	mg/L	37	120	470	2.5	3200	2.5	5096063
Soluble Potassium (K)	mg/L	3.9	4.6	7.2	1.3	55	1.3	5096063
Saturation %	%	31	49	55	N/A	64	N/A	5093730
Soluble Sulphate (SO4)	mg/L	18	69	530	5.0	1600	5.0	5096063
Theoretical Gypsum Requirement	tonnes/ha	<0.1	<0.1	<0.1	0.1	<0.1	0.1	5089772

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

Maxxam Job #: B174548
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: PATCH
Your P.O. #: V22101187.001

SOIL SALINITY 4 (SOIL)

Maxxam ID		BG1884		BG1885		
Sampling Date		2011/08/10		2011/08/10		
COC Number		A050091		A050091		
	Units	**P2_03@SURF**	**RDL**	**P2_04@SURF**	**RDL**	**QC Batch**
Calculated Parameters						
Anion Sum	meq/L	160	N/A	420	N/A	5089769
Cation Sum	meq/L	170	N/A	390	N/A	5089769
Ion Balance	N/A	1.1	0.01	0.92	0.01	5089768
Soluble Parameters						
Soluble Chloride (Cl)	mg/L	4500 (1)	30	13000 (1)	100	5098557
Soluble Conductivity	dS/m	14	0.02	34	0.02	5093737
Soluble (CaCl2) pH	N/A	7.10	N/A	5.84	N/A	5090743
Sodium Adsorption Ratio	N/A	12	0.1	19	0.1	5089770
Soluble Calcium (Ca)	mg/L	670	1.5	1700	1.5	5096063
Soluble Magnesium (Mg)	mg/L	660	1.0	1400	1.0	5096063
Soluble Sodium (Na)	mg/L	1800	2.5	4400	2.5	5096063
Soluble Potassium (K)	mg/L	17	1.3	130	1.3	5096063
Saturation %	%	43	N/A	72	N/A	5093730
Soluble Sulphate (SO4)	mg/L	1500	5.0	2600	5.0	5096063
Theoretical Gypsum Requirement	tonnes/ha	<0.1	0.1	210	0.1	5089772

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

Maxxam Job #: B174548
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: PATCH
Your P.O. #: V22101187.001

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		BG1757	BG1762	BG1764	BG1772		
Sampling Date		2011/08/10	2011/08/10	2011/08/10	2011/08/10		
COC Number		A050086	A050086	A050086	A050089		
	Units	**11P1_32@15CM**	**11P1_16C@20CM**	**11P1_03@40CM**	**11P7_5@10CM**	**RDL**	**QC Batch**
Physical Properties							
Sieve - Pan	%	30	33	47	13	0.2	5090843
Sieve - #200 (>0.075mm)	%	70	67	53	87	0.2	5090843
Grain Size	%	COARSE	COARSE	COARSE	COARSE	0.2	5090843

RDL = Reportable Detection Limit

Maxxam ID		BG1776		BG1780	BG1859		BG1862		
Sampling Date		2011/08/10		2011/08/10					
COC Number		A050089		A050089	A050090		A050090		
	Units	**11P5_3@70CM**	**QC Batch**	**11P5_2@15CM**	**11P3_7@45CM**	**QC Batch**	**11P3_3@15CM**	**RDL**	**QC Batch**
Physical Properties									
Sieve - Pan	%	11	5093871	11	36	5090843	6.5	0.2	5093871
Sieve - #200 (>0.075mm)	%	89	5093871	89	64	5090843	93	0.2	5093871
Grain Size	%	COARSE	5093871	COARSE	COARSE	5090843	COARSE	0.2	5093871

RDL = Reportable Detection Limit

Maxxam ID		BG1875		BG1882	BG1883		BG1884		
Sampling Date		2011/08/10		2011/08/10	2011/08/10		2011/08/10		
COC Number		A050091		A050091	A050091		A050091		
	Units	**P3_7**	**QC Batch**	**P2_01@SURF**	**P2_02@SURF**	**QC Batch**	**P2_03@SURF**	**RDL**	**QC Batch**
Physical Properties									
Moisture	%	6.7	5099404	11	17	5090554	5.1	0.3	5106254
Sieve - Pan	%	14	5093871	N/A	N/A	N/A	N/A	0.2	N/A
Sieve - #200 (>0.075mm)	%	86	5093871	N/A	N/A	N/A	N/A	0.2	N/A
Grain Size	%	COARSE	5093871	N/A	N/A	N/A	N/A	0.2	N/A

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: B174548
Report Date: 2011/08/22

EBA ENGINEERING CONSULTANTS LTD.

Site Location: PATCH
Your P.O. #: V22101187.001

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		BG1885		
Sampling Date		2011/08/10		
COC Number		A050091		
	Units	**P2_04@SURF**	**RDL**	**QC Batch**
Physical Properties				
Moisture	%	21	0.3	5106254

RDL = Reportable Detection Limit

General Comments

Results relate only to the items tested.

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: V22101187.001
Site Location: PATCH

Quality Assurance Report

Maxxam Job Number: EB174548

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5090236	EH1	RPD	Closed Cup Flash point	2011/08/14	NC		%	35
5090554	APA	Method Blank	Moisture	2011/08/15	<0.3		%	
		RPD [BG1774-01]	Moisture	2011/08/15	4.7		%	20
5090571	APA	Method Blank	Moisture	2011/08/15	<0.3		%	
		RPD	Moisture	2011/08/15	2.2		%	20
5090590	CBE	QC Standard	Soluble (CaCl2) pH	2011/08/15		100	%	97 - 103
		Spiked Blank	Soluble (CaCl2) pH	2011/08/15		99	%	97 - 103
		RPD	Soluble (CaCl2) pH	2011/08/15	0.3		%	5
5090743	CBE	QC Standard	Soluble (CaCl2) pH	2011/08/15		100	%	97 - 103
		Spiked Blank	Soluble (CaCl2) pH	2011/08/15		100	%	97 - 103
		RPD	Soluble (CaCl2) pH	2011/08/15	1.8		%	5
5090843	EH1	Method Blank	Sieve - Pan	2011/08/15	<0.2		%	
			Sieve - #200 (>0.075mm)	2011/08/15	<0.2		%	
		RPD	Sieve - Pan	2011/08/15	1.6		%	35
			Sieve - #200 (>0.075mm)	2011/08/15	2.3		%	35
5092257	BA3	Spiked Blank	Hex. Chromium (Cr 6+)	2011/08/15		106	%	90 - 110
		Method Blank	Hex. Chromium (Cr 6+)	2011/08/15	<0.15		mg/kg	
		RPD	Hex. Chromium (Cr 6+)	2011/08/15	NC		%	35
5093068	JR1	Matrix Spike						
		[BG1756-01]	O-TERPHENYL (sur.)	2011/08/18		57	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/18		100	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2011/08/18		102	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2011/08/18		95	%	50 - 130
		Spiked Blank	O-TERPHENYL (sur.)	2011/08/18		58	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/18		106	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2011/08/18		108	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2011/08/18		99	%	70 - 130
		Method Blank	O-TERPHENYL (sur.)	2011/08/18		94	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/18	<10		mg/kg	
			F3 (C16-C34 Hydrocarbons)	2011/08/18	<10		mg/kg	
			F4 (C34-C50 Hydrocarbons)	2011/08/18	<10		mg/kg	
		RPD [BG1755-01]	F2 (C10-C16 Hydrocarbons)	2011/08/18	NC		%	50
			F3 (C16-C34 Hydrocarbons)	2011/08/18	15.8		%	50
			F4 (C34-C50 Hydrocarbons)	2011/08/18	7.7		%	50
5093072	RC6	Matrix Spike						
		[BG1779-01]	O-TERPHENYL (sur.)	2011/08/17		95	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/17		106	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2011/08/17		110	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2011/08/17		115	%	50 - 130
		Spiked Blank	O-TERPHENYL (sur.)	2011/08/17		95	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/17		120	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2011/08/17		115	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2011/08/17		119	%	70 - 130
		Method Blank	O-TERPHENYL (sur.)	2011/08/17		87	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/17	<10		mg/kg	
			F3 (C16-C34 Hydrocarbons)	2011/08/17	<10		mg/kg	
			F4 (C34-C50 Hydrocarbons)	2011/08/17	<10		mg/kg	
		RPD [BG1778-01]	F2 (C10-C16 Hydrocarbons)	2011/08/17	NC		%	50
			F3 (C16-C34 Hydrocarbons)	2011/08/17	NC		%	50
			F4 (C34-C50 Hydrocarbons)	2011/08/17	NC		%	50
5093730	JHC	QC Standard	Saturation %	2011/08/16		102	%	88 - 112
		RPD	Saturation %	2011/08/16	1.5		%	12
5093737	CBE	QC Standard	Soluble Conductivity	2011/08/16		100	%	75 - 125
		Spiked Blank	Soluble Conductivity	2011/08/16		100	%	95 - 105
		Method Blank	Soluble Conductivity	2011/08/16	<0.02		dS/m	

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: V22101187.001
Site Location: PATCH

Quality Assurance Report (Continued)

Maxxam Job Number: EB174548

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5093737	CBE	RPD	Soluble Conductivity	2011/08/16	5.9		%	35
5093871	JB9	Method Blank	Sieve - Pan	2011/08/16	<0.2		%	
			Sieve - #200 (>0.075mm)	2011/08/16	<0.2		%	
		RPD [BG1862-01]	Sieve - Pan	2011/08/16	4.2		%	35
			Sieve - #200 (>0.075mm)	2011/08/16	0.3		%	35
5093933	ALN	Matrix Spike						
		[BG1756-01]	4-BROMOFLUOROBENZENE (sur.)	2011/08/16		98	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2011/08/16		113	%	60 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2011/08/16		99	%	60 - 140
			D8-TOLUENE (sur.)	2011/08/16		101	%	60 - 140
			Benzene	2011/08/16		109	%	60 - 140
			Toluene	2011/08/16		112	%	60 - 140
			Ethylbenzene	2011/08/16		118	%	60 - 140
			m & p-Xylene	2011/08/16		118	%	60 - 140
			o-Xylene	2011/08/16		114	%	60 - 140
			(C6-C10)	2011/08/16		98	%	60 - 140
		Spiked Blank	4-BROMOFLUOROBENZENE (sur.)	2011/08/16		98	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2011/08/16		120	%	60 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2011/08/16		104	%	60 - 140
			D8-TOLUENE (sur.)	2011/08/16		94	%	60 - 140
			Benzene	2011/08/16		104	%	60 - 140
			Toluene	2011/08/16		102	%	60 - 140
			Ethylbenzene	2011/08/16		110	%	60 - 140
			m & p-Xylene	2011/08/16		109	%	60 - 140
			o-Xylene	2011/08/16		107	%	60 - 140
			(C6-C10)	2011/08/16		101	%	60 - 140
		Method Blank	4-BROMOFLUOROBENZENE (sur.)	2011/08/16		94	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2011/08/16		104	%	60 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2011/08/16		99	%	60 - 140
			D8-TOLUENE (sur.)	2011/08/16		96	%	60 - 140
			Benzene	2011/08/16	<0.0050		mg/kg	
			Toluene	2011/08/16	<0.020		mg/kg	
			Ethylbenzene	2011/08/16	<0.010		mg/kg	
			Xylenes (Total)	2011/08/16	<0.040		mg/kg	
			m & p-Xylene	2011/08/16	<0.040		mg/kg	
			o-Xylene	2011/08/16	<0.020		mg/kg	
			F1 (C6-C10) - BTEX	2011/08/16	<12		mg/kg	
			(C6-C10)	2011/08/16	<12		mg/kg	
		RPD [BG1755-01]	Benzene	2011/08/16	NC		%	50
			Toluene	2011/08/16	NC		%	50
			Ethylbenzene	2011/08/16	NC		%	50
			Xylenes (Total)	2011/08/16	NC		%	50
			m & p-Xylene	2011/08/16	NC		%	50
			o-Xylene	2011/08/16	NC		%	50
			F1 (C6-C10) - BTEX	2011/08/16	NC		%	50
			(C6-C10)	2011/08/16	NC		%	50
5093943	YT	Matrix Spike						
		[BG1779-01]	4-BROMOFLUOROBENZENE (sur.)	2011/08/16		97	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2011/08/16		116	%	60 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2011/08/16		88	%	60 - 140
			D8-TOLUENE (sur.)	2011/08/16		105	%	60 - 140
			Benzene	2011/08/16		122	%	60 - 140
			Toluene	2011/08/16		115	%	60 - 140
			Ethylbenzene	2011/08/16		117	%	60 - 140
			m & p-Xylene	2011/08/16		114	%	60 - 140

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: V22101187.001
Site Location: PATCH

Quality Assurance Report (Continued)

Maxxam Job Number: EB174548

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5093943	YT	Matrix Spike						
		[BG1779-01]	o-Xylene	2011/08/16		115	%	60 - 140
			(C6-C10)	2011/08/16		107	%	60 - 140
		Spiked Blank	4-BROMOFLUOROBENZENE (sur.)	2011/08/17		98	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2011/08/17		99	%	60 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2011/08/17		121	%	60 - 140
			D8-TOLUENE (sur.)	2011/08/17		96	%	60 - 140
			Benzene	2011/08/17		113	%	60 - 140
			Toluene	2011/08/17		100	%	60 - 140
			Ethylbenzene	2011/08/17		95	%	60 - 140
			m & p-Xylene	2011/08/17		93	%	60 - 140
			o-Xylene	2011/08/17		97	%	60 - 140
			(C6-C10)	2011/08/17		110	%	60 - 140
		Method Blank	4-BROMOFLUOROBENZENE (sur.)	2011/08/16		99	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2011/08/16		121	%	60 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2011/08/16		91	%	60 - 140
			D8-TOLUENE (sur.)	2011/08/16		103	%	60 - 140
			Benzene	2011/08/16	<0.0050		mg/kg	
			Toluene	2011/08/16	<0.020		mg/kg	
			Ethylbenzene	2011/08/16	<0.010		mg/kg	
			Xylenes (Total)	2011/08/16	<0.040		mg/kg	
			m & p-Xylene	2011/08/16	<0.040		mg/kg	
			o-Xylene	2011/08/16	<0.020		mg/kg	
			F1 (C6-C10) - BTEX	2011/08/16	<12		mg/kg	
			(C6-C10)	2011/08/16	<12		mg/kg	
		RPD [BG1778-01]	Benzene	2011/08/16	NC		%	50
			Toluene	2011/08/16	NC		%	50
			Ethylbenzene	2011/08/16	NC		%	50
			Xylenes (Total)	2011/08/16	NC		%	50
			m & p-Xylene	2011/08/16	NC		%	50
			o-Xylene	2011/08/16	NC		%	50
			F1 (C6-C10) - BTEX	2011/08/16	NC		%	50
			(C6-C10)	2011/08/16	NC		%	50
5093945	NSE	Matrix Spike	Leachable (ZH) 4-BROMOFLUOROBENZEN	2011/08/16		102	%	60 - 140
			Leachable (ZH) D4-1,2-DICHLOROETHANE	2011/08/16		93	%	60 - 140
			Leachable (ZH) D8-TOLUENE (sur.)	2011/08/16		93	%	60 - 140
			Leachable (ZH) Benzene	2011/08/16		92	%	70 - 130
			Leachable (ZH) Toluene	2011/08/16		94	%	70 - 130
			Leachable (ZH) Ethylbenzene	2011/08/16		96	%	70 - 130
			Leachable (ZH) o-Xylene	2011/08/16		100	%	70 - 130
			Leachable (ZH) m & p-Xylene	2011/08/16		96	%	70 - 130
		Spiked Blank	Leachable (ZH) 4-BROMOFLUOROBENZEN	2011/08/16		101	%	60 - 140
			Leachable (ZH) D4-1,2-DICHLOROETHANE	2011/08/16		90	%	60 - 140
			Leachable (ZH) D8-TOLUENE (sur.)	2011/08/16		90	%	60 - 140
			Leachable (ZH) Benzene	2011/08/16		90	%	70 - 130
			Leachable (ZH) Toluene	2011/08/16		91	%	70 - 130
			Leachable (ZH) Ethylbenzene	2011/08/16		98	%	70 - 130
			Leachable (ZH) o-Xylene	2011/08/16		97	%	70 - 130
			Leachable (ZH) m & p-Xylene	2011/08/16		92	%	70 - 130
		Method Blank	Leachable (ZH) 4-BROMOFLUOROBENZEN	2011/08/16		97	%	60 - 140
			Leachable (ZH) D4-1,2-DICHLOROETHANE	2011/08/16		98	%	60 - 140
			Leachable (ZH) D8-TOLUENE (sur.)	2011/08/16		96	%	60 - 140
			Leachable (ZH) Benzene	2011/08/16	<10		ug/L	
			Leachable (ZH) Toluene	2011/08/16	<10		ug/L	
			Leachable (ZH) Ethylbenzene	2011/08/16	<10		ug/L	

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: V22101187.001
Site Location: PATCH

Quality Assurance Report (Continued)

Maxxam Job Number: EB174548

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5093945	NSE	Method Blank	Leachable (ZH) o-Xylene	2011/08/16	<10		ug/L	
			Leachable (ZH) m & p-Xylene	2011/08/16	<20		ug/L	
			Leachable (ZH) Xylenes (Total)	2011/08/16	<20		ug/L	
		RPD	Leachable (ZH) Benzene	2011/08/16	NC		%	50
			Leachable (ZH) Toluene	2011/08/16	NC		%	50
			Leachable (ZH) Ethylbenzene	2011/08/16	NC		%	50
			Leachable (ZH) o-Xylene	2011/08/16	NC		%	50
			Leachable (ZH) m & p-Xylene	2011/08/16	NC		%	50
			Leachable (ZH) Xylenes (Total)	2011/08/16	NC		%	50
5094204	BA3	Matrix Spike	Hex. Chromium (Cr 6+)	2011/08/16		75	%	75 - 125
		Spiked Blank	Hex. Chromium (Cr 6+)	2011/08/16		103	%	90 - 110
		Method Blank	Hex. Chromium (Cr 6+)	2011/08/16	<0.15		mg/kg	
		RPD	Hex. Chromium (Cr 6+)	2011/08/16	NC		%	35
5096063	NC3	Matrix Spike	Soluble Calcium (Ca)	2011/08/16		112	%	80 - 120
			Soluble Magnesium (Mg)	2011/08/16		119	%	80 - 120
			Soluble Sodium (Na)	2011/08/16		115	%	80 - 120
			Soluble Potassium (K)	2011/08/16		115	%	80 - 120
		QC Standard	Soluble Calcium (Ca)	2011/08/16		106	%	75 - 125
			Soluble Magnesium (Mg)	2011/08/16		109	%	75 - 125
			Soluble Sodium (Na)	2011/08/16		119	%	75 - 125
			Soluble Potassium (K)	2011/08/16		99	%	75 - 125
			Soluble Sulphate (SO4)	2011/08/16		98	%	75 - 125
		Spiked Blank	Soluble Calcium (Ca)	2011/08/16		95	%	80 - 120
			Soluble Magnesium (Mg)	2011/08/16		102	%	80 - 120
			Soluble Sodium (Na)	2011/08/16		91	%	80 - 120
			Soluble Potassium (K)	2011/08/16		102	%	80 - 120
		Method Blank	Soluble Calcium (Ca)	2011/08/16	<1.5		mg/L	
			Soluble Magnesium (Mg)	2011/08/16	<1.0		mg/L	
			Soluble Sodium (Na)	2011/08/16	<2.5		mg/L	
			Soluble Potassium (K)	2011/08/16	<1.3		mg/L	
			Soluble Sulphate (SO4)	2011/08/16	<5.0		mg/L	
		RPD	Soluble Calcium (Ca)	2011/08/16	5.6		%	35
			Soluble Magnesium (Mg)	2011/08/16	NC		%	35
			Soluble Sodium (Na)	2011/08/16	4.3		%	35
			Soluble Potassium (K)	2011/08/16	NC		%	35
			Soluble Sulphate (SO4)	2011/08/16	NC		%	35
5097834	LCA	QC Standard	Soluble (1:1) pH	2011/08/17		98	%	97 - 103
		Spiked Blank	Soluble (1:1) pH	2011/08/17		100	%	99 - 101
		RPD	Soluble (1:1) pH	2011/08/17	0		%	5
5098557	DMA	Matrix Spike	Soluble Chloride (Cl)	2011/08/17		103	%	75 - 125
		QC Standard	Soluble Chloride (Cl)	2011/08/17		101	%	75 - 125
		Spiked Blank	Soluble Chloride (Cl)	2011/08/17		101	%	80 - 120
		Method Blank	Soluble Chloride (Cl)	2011/08/17	<5		mg/L	
		RPD	Soluble Chloride (Cl)	2011/08/17	6.5		%	35
5099378	EO1	Matrix Spike	Total Antimony (Sb)	2011/08/17		96	%	75 - 125
			Total Arsenic (As)	2011/08/17		91	%	75 - 125
			Total Barium (Ba)	2011/08/17		NC	%	75 - 125
			Total Beryllium (Be)	2011/08/17		97	%	75 - 125
			Total Cadmium (Cd)	2011/08/17		94	%	75 - 125
			Total Chromium (Cr)	2011/08/17		99	%	75 - 125
			Total Cobalt (Co)	2011/08/17		93	%	75 - 125
			Total Copper (Cu)	2011/08/17		92	%	75 - 125
			Total Lead (Pb)	2011/08/17		94	%	75 - 125
			Total Mercury (Hg)	2011/08/17		100	%	75 - 125
			Total Molybdenum (Mo)	2011/08/17		99	%	75 - 125

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: V22101187.001
Site Location: PATCH

Quality Assurance Report (Continued)

Maxxam Job Number: EB174548

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5099378 EO1	Matrix Spike	Total Nickel (Ni)	2011/08/17		97	%	75 - 125
		Total Selenium (Se)	2011/08/17		89	%	75 - 125
		Total Silver (Ag)	2011/08/17		99	%	75 - 125
		Total Thallium (Tl)	2011/08/17		77	%	75 - 125
		Total Tin (Sn)	2011/08/17		113	%	75 - 125
		Total Uranium (U)	2011/08/17		89	%	75 - 125
		Total Vanadium (V)	2011/08/17		99	%	75 - 125
		Total Zinc (Zn)	2011/08/17		NC	%	75 - 125
	QC Standard	Total Arsenic (As)	2011/08/17		112	%	50 - 150
		Total Barium (Ba)	2011/08/17		116	%	69 - 131
		Total Chromium (Cr)	2011/08/17		113	%	41 - 159
		Total Cobalt (Co)	2011/08/17		109	%	75 - 125
		Total Copper (Cu)	2011/08/17		98	%	72 - 127
		Total Lead (Pb)	2011/08/17		102	%	54 - 146
		Total Nickel (Ni)	2011/08/17		109	%	61 - 139
		Total Vanadium (V)	2011/08/17		136	%	50 - 150
		Total Zinc (Zn)	2011/08/17		99	%	72 - 128
	Spiked Blank	Total Antimony (Sb)	2011/08/17		98	%	75 - 125
		Total Arsenic (As)	2011/08/17		89	%	75 - 125
		Total Barium (Ba)	2011/08/17		92	%	75 - 125
		Total Beryllium (Be)	2011/08/17		89	%	75 - 125
		Total Cadmium (Cd)	2011/08/17		90	%	75 - 125
		Total Chromium (Cr)	2011/08/17		92	%	75 - 125
		Total Cobalt (Co)	2011/08/17		89	%	75 - 125
		Total Copper (Cu)	2011/08/17		91	%	75 - 125
		Total Lead (Pb)	2011/08/17		92	%	75 - 125
		Total Mercury (Hg)	2011/08/17		96	%	75 - 125
		Total Molybdenum (Mo)	2011/08/17		93	%	75 - 125
		Total Nickel (Ni)	2011/08/17		92	%	75 - 125
		Total Selenium (Se)	2011/08/17		91	%	75 - 125
		Total Silver (Ag)	2011/08/17		94	%	75 - 125
		Total Thallium (Tl)	2011/08/17		75	%	75 - 125
		Total Tin (Sn)	2011/08/17		105	%	75 - 125
		Total Uranium (U)	2011/08/17		92	%	75 - 125
		Total Vanadium (V)	2011/08/17		95	%	75 - 125
		Total Zinc (Zn)	2011/08/17		92	%	75 - 125
	Method Blank	Total Antimony (Sb)	2011/08/17	<1		mg/kg	
		Total Arsenic (As)	2011/08/17	<1		mg/kg	
		Total Barium (Ba)	2011/08/17	<10		mg/kg	
		Total Beryllium (Be)	2011/08/17	<0.4		mg/kg	
		Total Cadmium (Cd)	2011/08/17	<0.1		mg/kg	
		Total Chromium (Cr)	2011/08/17	<1		mg/kg	
		Total Cobalt (Co)	2011/08/17	<1		mg/kg	
		Total Copper (Cu)	2011/08/17	<5		mg/kg	
		Total Lead (Pb)	2011/08/17	<1		mg/kg	
		Total Mercury (Hg)	2011/08/17	<0.05		mg/kg	
		Total Molybdenum (Mo)	2011/08/17	<0.4		mg/kg	
		Total Nickel (Ni)	2011/08/17	<1		mg/kg	
		Total Selenium (Se)	2011/08/17	<0.5		mg/kg	
		Total Silver (Ag)	2011/08/17	<1		mg/kg	
		Total Thallium (Tl)	2011/08/17	<0.3		mg/kg	
		Total Tin (Sn)	2011/08/17	<1		mg/kg	
		Total Uranium (U)	2011/08/17	<1		mg/kg	
		Total Vanadium (V)	2011/08/17	<1		mg/kg	
		Total Zinc (Zn)	2011/08/17	<10		mg/kg	

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: V22101187.001
Site Location: PATCH

Quality Assurance Report (Continued)

Maxxam Job Number: EB174548

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5099378	EO1	RPD	Total Antimony (Sb)	2011/08/17	NC		%	35
			Total Arsenic (As)	2011/08/17	1.6		%	35
			Total Barium (Ba)	2011/08/17	2.8		%	35
			Total Beryllium (Be)	2011/08/17	NC		%	35
			Total Cadmium (Cd)	2011/08/17	NC		%	35
			Total Chromium (Cr)	2011/08/17	2.6		%	35
			Total Cobalt (Co)	2011/08/17	2.9		%	35
			Total Copper (Cu)	2011/08/17	NC		%	35
			Total Lead (Pb)	2011/08/17	3.4		%	35
			Total Mercury (Hg)	2011/08/17	NC		%	35
			Total Molybdenum (Mo)	2011/08/17	NC		%	35
			Total Nickel (Ni)	2011/08/17	3.3		%	35
			Total Selenium (Se)	2011/08/17	NC		%	35
			Total Silver (Ag)	2011/08/17	NC		%	35
			Total Thallium (Tl)	2011/08/17	NC		%	35
			Total Tin (Sn)	2011/08/17	NC		%	35
			Total Uranium (U)	2011/08/17	NC		%	35
			Total Vanadium (V)	2011/08/17	3.8		%	35
			Total Zinc (Zn)	2011/08/17	NC		%	35
5099404	APA	Method Blank	Moisture	2011/08/17	<0.3		%	
		RPD	Moisture	2011/08/17	2.0		%	20
5099637	SV1	Matrix Spike	Soluble (Hot water) Boron (B)	2011/08/17		104	%	75 - 125
		Spiked Blank	Soluble (Hot water) Boron (B)	2011/08/17		110	%	80 - 120
		Method Blank	Soluble (Hot water) Boron (B)	2011/08/17	<0.1		mg/kg	
		RPD	Soluble (Hot water) Boron (B)	2011/08/17	NC		%	35
5101637	RJ2	Spiked Blank	F4G-SG (Heavy Hydrocarbons-Grav.)	2011/08/18		111	%	70 - 130
		Method Blank	F4G-SG (Heavy Hydrocarbons-Grav.)	2011/08/18	<500		mg/kg	
5105817	RJ2	Spiked Blank	F4G-SG (Heavy Hydrocarbons-Grav.)	2011/08/19		103	%	70 - 130
		Method Blank	F4G-SG (Heavy Hydrocarbons-Grav.)	2011/08/19	<500		mg/kg	
5106254	APA	Method Blank	Moisture	2011/08/19	<0.3		%	
		RPD	Moisture	2011/08/19	1.1		%	20
5106377	EO1	Matrix Spike	Leachable Antimony (Sb)	2011/08/19		105	%	75 - 125
			Leachable Arsenic (As)	2011/08/19		92	%	75 - 125
			Leachable Barium (Ba)	2011/08/19		NC	%	75 - 125
			Leachable Beryllium (Be)	2011/08/19		94	%	75 - 125
			Leachable Boron (B)	2011/08/19		85	%	75 - 125
			Leachable Cadmium (Cd)	2011/08/19		94	%	75 - 125
			Leachable Chromium (Cr)	2011/08/19		97	%	75 - 125
			Leachable Cobalt (Co)	2011/08/19		95	%	75 - 125
			Leachable Copper (Cu)	2011/08/19		88	%	75 - 125
			Leachable Iron (Fe)	2011/08/19		NC	%	75 - 125
			Leachable Lead (Pb)	2011/08/19		88	%	75 - 125
			Leachable Nickel (Ni)	2011/08/19		92	%	75 - 125
			Leachable Selenium (Se)	2011/08/19		95	%	75 - 125
			Leachable Silver (Ag)	2011/08/19		80	%	75 - 125
			Leachable Thallium (Tl)	2011/08/19		89	%	75 - 125
			Leachable Uranium (U)	2011/08/19		91	%	75 - 125
			Leachable Vanadium (V)	2011/08/19		106	%	75 - 125
			Leachable Zinc (Zn)	2011/08/19		85	%	75 - 125
			Leachable Zirconium (Zr)	2011/08/19		119	%	75 - 125
		Spiked Blank	Leachable Antimony (Sb)	2011/08/19		93	%	80 - 120
			Leachable Arsenic (As)	2011/08/19		92	%	80 - 120
			Leachable Barium (Ba)	2011/08/19		100	%	80 - 120
			Leachable Beryllium (Be)	2011/08/19		98	%	80 - 120
			Leachable Boron (B)	2011/08/19		98	%	80 - 120

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: V22101187.001
Site Location: PATCH

Quality Assurance Report (Continued)

Maxxam Job Number: EB174548

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5106377	EO1	Spiked Blank	Leachable Cadmium (Cd)	2011/08/19		98	%	80 - 120
			Leachable Chromium (Cr)	2011/08/19		94	%	80 - 120
			Leachable Cobalt (Co)	2011/08/19		97	%	80 - 120
			Leachable Copper (Cu)	2011/08/19		94	%	80 - 120
			Leachable Iron (Fe)	2011/08/19		99	%	80 - 120
			Leachable Lead (Pb)	2011/08/19		98	%	80 - 120
			Leachable Nickel (Ni)	2011/08/19		95	%	80 - 120
			Leachable Selenium (Se)	2011/08/19		97	%	80 - 120
			Leachable Silver (Ag)	2011/08/19		83	%	80 - 120
			Leachable Thallium (Tl)	2011/08/19		98	%	80 - 120
			Leachable Uranium (U)	2011/08/19		93	%	80 - 120
			Leachable Vanadium (V)	2011/08/19		98	%	80 - 120
			Leachable Zinc (Zn)	2011/08/19		97	%	80 - 120
			Leachable Zirconium (Zr)	2011/08/19		95	%	80 - 120
		Method Blank	Leachable Antimony (Sb)	2011/08/19	<1		mg/L	
			Leachable Arsenic (As)	2011/08/19	<0.5		mg/L	
			Leachable Barium (Ba)	2011/08/19	<1		mg/L	
			Leachable Beryllium (Be)	2011/08/19	<0.5		mg/L	
			Leachable Boron (B)	2011/08/19	<1		mg/L	
			Leachable Cadmium (Cd)	2011/08/19	<0.1		mg/L	
			Leachable Chromium (Cr)	2011/08/19	<0.5		mg/L	
			Leachable Cobalt (Co)	2011/08/19	<1		mg/L	
			Leachable Copper (Cu)	2011/08/19	<1		mg/L	
			Leachable Iron (Fe)	2011/08/19	<1		mg/L	
			Leachable Lead (Pb)	2011/08/19	<0.5		mg/L	
			Leachable Mercury (Hg)	2011/08/19	<0.02		mg/L	
			Leachable Nickel (Ni)	2011/08/19	<0.5		mg/L	
			Leachable Selenium (Se)	2011/08/19	<0.1		mg/L	
			Leachable Silver (Ag)	2011/08/19	<0.5		mg/L	
			Leachable Thallium (Tl)	2011/08/19	<0.5		mg/L	
			Leachable Uranium (U)	2011/08/19	<0.2		mg/L	
			Leachable Vanadium (V)	2011/08/19	<1		mg/L	
			Leachable Zinc (Zn)	2011/08/19	<1		mg/L	
			Leachable Zirconium (Zr)	2011/08/19	<1		mg/L	
		RPD	Leachable Antimony (Sb)	2011/08/19	NC		%	35
			Leachable Arsenic (As)	2011/08/19	NC		%	35
			Leachable Barium (Ba)	2011/08/19	NC		%	35
			Leachable Beryllium (Be)	2011/08/19	NC		%	35
			Leachable Boron (B)	2011/08/19	NC		%	35
			Leachable Cadmium (Cd)	2011/08/19	NC		%	35
			Leachable Chromium (Cr)	2011/08/19	NC		%	35
			Leachable Cobalt (Co)	2011/08/19	NC		%	35
			Leachable Copper (Cu)	2011/08/19	NC		%	35
			Leachable Iron (Fe)	2011/08/19	NC		%	35
			Leachable Lead (Pb)	2011/08/19	NC		%	35
			Leachable Mercury (Hg)	2011/08/19	NC		%	35
			Leachable Nickel (Ni)	2011/08/19	NC		%	35
			Leachable Selenium (Se)	2011/08/19	NC		%	35
			Leachable Silver (Ag)	2011/08/19	NC		%	35
			Leachable Thallium (Tl)	2011/08/19	NC		%	35
			Leachable Uranium (U)	2011/08/19	NC		%	35
			Leachable Vanadium (V)	2011/08/19	NC		%	35
			Leachable Zinc (Zn)	2011/08/19	NC		%	35
			Leachable Zirconium (Zr)	2011/08/19	NC		%	35

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: V22101187.001
Site Location: PATCH

Quality Assurance Report (Continued)

Maxxam Job Number: EB174548

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
QC Standard: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
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 spiked amount was not sufficiently significant to permit a reliable recovery calculation.
NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

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Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-8889
www.maxxamanalytics.com

08/567(2)

Chain of Custody A050086

Page: 1 of 4

	Invoice To:	C/O Report Address ☐	Report To:	Same as Invoice ☑	Report Distribution (E-Mail):
Company:	EBA				dfelske@eba.ca
Contact:	DANIELA FELSKE		SAME		bhorne@eba.ca
Address:	14940-123 AVE				mhebert@eba.ca
	Prov: EDMONTON	PC: AB	Prov:	PC:	
Contact #s:	Ph: 784-451-2121	Cell:	Ph:	Cell:	

REGULATORY GUIDELINES:
☐ AT1
☑ CCME
☐ Regulated Drinking Water
☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #: V22101187.001
Project # / Name:
Site Location: PATCH
Quote #:
Sampled By:

SERVICE REQUESTED: ☐ RUSH (Contact lab to reserve) Date Required: ☑ REGULAR (5 to 7 Days)

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4 (ALL)	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	WATER: ☐BTEX F1 ☐VOCs	☐BTEX F1-F2 ☐BTEX F1-F4	☐ Routine Water ☐ Turb ☐ F	☐ TOC ☐ DOC	Regulated Metals (CCME / AT1) Total	Dissolved	Mercury ☐ Total ☐ Dissolved	Other Analysis	HOLD - Do not Analyze	# of Containers Submitted
1	11P1-23a@10cm		S	11/08/10	X			X												2
2	11P1-30@20cm				X															
3	11P1-32@15cm					X														
4	11P1-31@10cm				X			X												
5	11P1-28@20cm																			
6	11P1-10@20cm																			
7	11P1-16b@25cm																			
8	11P1-16c@20cm					X														
9	11P1-16@20cm																			
10	11P1-03@40cm				X	X		X												
11	11P1-18@20cm																			
12	11P1-03@95cm				X			X												

Please indicate Filtered, Preserved or Both (F, P, F/P) → F/P

RPI/SK

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
D FELSKE	Aug 11, 2011	9am
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions:

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #:
AMANDA L'HIRONDELLE	2011-08-13	10:00	B174548

Lab Comments:

Custody Seal	Temperature	Ice
ABSENT	10,13,11	ABSENT
	10,8,11	

Maxxam

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Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-6889
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08/567(2)

Chain of Custody

A050089

Page: 2 of 4

	Invoice To:	C/O Report Address ☐	Report To:	Same as Invoice ☐	Report Distribution (E-Mail):
Company:					
Contact:					
Address:	See pg 1				
	Prov:	PC:	Prov:	PC:	
Contact #s:	Ph:	Cell:	Ph:	Cell:	

REGULATORY GUIDELINES:
- ☐ AT1
- ☑ CCME
- ☐ Regulated Drinking Water
- ☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #:	
Project # / Name:	
Site Location:	
Quote #:	
Sampled By:	

SERVICE REQUESTED:
- ☐ RUSH (Contact lab to reserve) Date Required:
- ☑ REGULAR (5 to 7 Days)

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	WATER: ☐VOCs ☐BTEX F1 ☐BTEX F1-F2	☐BTEX F1-F4 ☐Routine Water ☐Turb ☐F	☐TOC ☐DOC	Regulated Metals (CCME / AT1) Total	Dissolved	Mercury ☐Total ☐Dissolved	Other Analysis	HOLD - Do not Analyze	# of Containers Submitted
1	11P7-7@15cm		S	11/08/10	X														2
2	11P7-11@20cm				X														
3	11 P7-5@10cm				X	X													
4	11 P7-1@10cm				X														
5	11 P5-3@85cm				X														
6	11 P3-1 @ 10cm				X		[illegible]	[illegible]		[illegible]									3
7	11 P5-3@ 70cm				X														
8	11 P5-7@ 20cm				X	X													
9	11 P5-8@ 20cm				X														
10	11 P5-5@ 15cm				X														
11	11 P5-2@ 15cm				X	X													
12	11 P5-1@ 15cm				X														

Please indicate Filtered, Preserved or Both (F, P, F/P) → RP F/P

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
OFELSKE	AUG 11, 2011	9am
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions:

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #: B174548
AMANDA THIRONDELLE	2011-08-13	10:00	

Custody Seal	Temperature	Ice
PRESENT	10,13,11 10,8,11	PRESENT

Lab Comments:

Maxxam

Calgary: 4000 19st St. NE, T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-8889
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08/567(2)

Chain of Custody

A050090

Page: 3 of 4

	Invoice To: C/O Report Address ☐	Report To: Same as Invoice ☐
Company:		
Contact:		
Address:	Prov: PC:	Prov: PC:
Contact #s:	Ph: Cell:	Ph: Cell:

See Pg 1

Report Distribution (E-Mail):

REGULATORY GUIDELINES:
- ☐ AT1
- ☐ CCME
- ☐ Regulated Drinking Water
- ☐ Other:

All samples are held for 60 calendar days after sample receipt unless specified otherwise.

PO #:	
Project # / Name:	
Site Location:	
Quote #:	
Sampled By:	

SERVICE REQUESTED:
- ☐ **RUSH** (Contact lab to reserve) Date Required:
- ☑ REGULAR (5 to 7 Days)

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	SOIL: Sieve (75 micron)	SOIL: Regulated Metals (CCME / AT1)	SOIL: Salinity 4	SOIL: Assessment ICP Metals	SOIL: Basic Class II Landfill	WATER: ☐VOCs ☐BTEX F1-F2	WATER: ☐BTEX F1-F4	WATER: ☐ Routine Water ☐ Turb ☐ F	WATER: ☐ TOC ☐ DOC	WATER: Regulated Metals (CCME / AT1) Total	WATER: Regulated Metals (CCME / AT1) Dissolved	WATER: Mercury ☐ Total ☐ Dissolved	Other Analysis	HOLD - Do not Analyze	# of Containers Submitted
1	11P6-1@15cm		S		X															
2	11P6-3@15cm				X															
3	11P3-7@45cm				X	X														
4	11P3-1@10cm				X															
5	11P3-5@20cm				X															
6	11P3-3@15cm				X	X														
7	11P1-24@15cm				X															
8	11P1-21@10cm				X															
9	11P1-5@25cm				X															
10	11P1-18@20cm				X															
11																				
12																				

RRP/SC F/P

Please indicate Filtered, Preserved or Both (F, P, F/P)

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Special Instructions:	# of Jars Used & Not Submitted	

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #: B174548
Amanda Chirondelle	2011-08-13	10:00	

Lab Comments:	Custody Seal	Temperature	Ice
	ABSENT	10,13,11	PRESENT
		10,8,11	

Maxxam

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Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-8889
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08/567(2)

Chain of Custody

A050091

Page: 4 of 4

	Invoice To:	C/O Report Address ☐
Company:	See P61	
Contact:		
Address:		
	Prov:	PC:
Contact #s:	Ph:	Cell:

Report To:	Same as Invoice ☐
Prov:	PC:
Ph:	Cell:

Report Distribution (E-Mail):

REGULATORY GUIDELINES:
- ☐ AT1
- ☐ CCME
- ☐ Regulated Drinking Water
- ☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #:
Project # / Name:
Site Location:
Quote #:
Sampled By:

SERVICE REQUESTED:
☐ RUSH (Contact lab to reserve)
Date Required:
☐ REGULAR (5 to 7 Days)

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	SOIL: Sieve (75 micron)	SOIL: Regulated Metals (CCME / AT1)	SOIL: Salinity 4	SOIL: Assessment ICP Metals	SOIL: Basic Class II Landfill	WATER: ☐BTEX F1 ☐VOCs	WATER: ☐BTEX F1-F4	WATER: ☐ Routine Water ☐ Turb ☐ F	WATER: ☐ TOC ☐ DOC	WATER: Regulated Metals (CCME / AT1) Total	WATER: Regulated Metals (CCME / AT1) Dissolved	WATER: Mercury ☐ Total ☐ Dissolved	Other Analysis	HOLD - Do not Analyze	# of Containers Submitted
1	P3_7	15	S	Aug 10		X				X									Dang	
2	PL32@surf						X	X												
3	P2_01@surf						X	X												
4	P2_02@surf						X	X												
5	P2_03@surf						X	X												
6	P2_04@surf						X	X												
7																				
8																				
9																				
10																				
11																				
12																				

Please indicate Filtered, Preserved or Both (F, P, F/P) →

RA9/SSC F P

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions:

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #: B174548
AMANDA L'HIRONDELLE	2011-08-13	10:00	

Custody Seal	Temperature	Ice
ABSENT	10,13,11	PRESENT
	10,8,11	

Lab Comments:

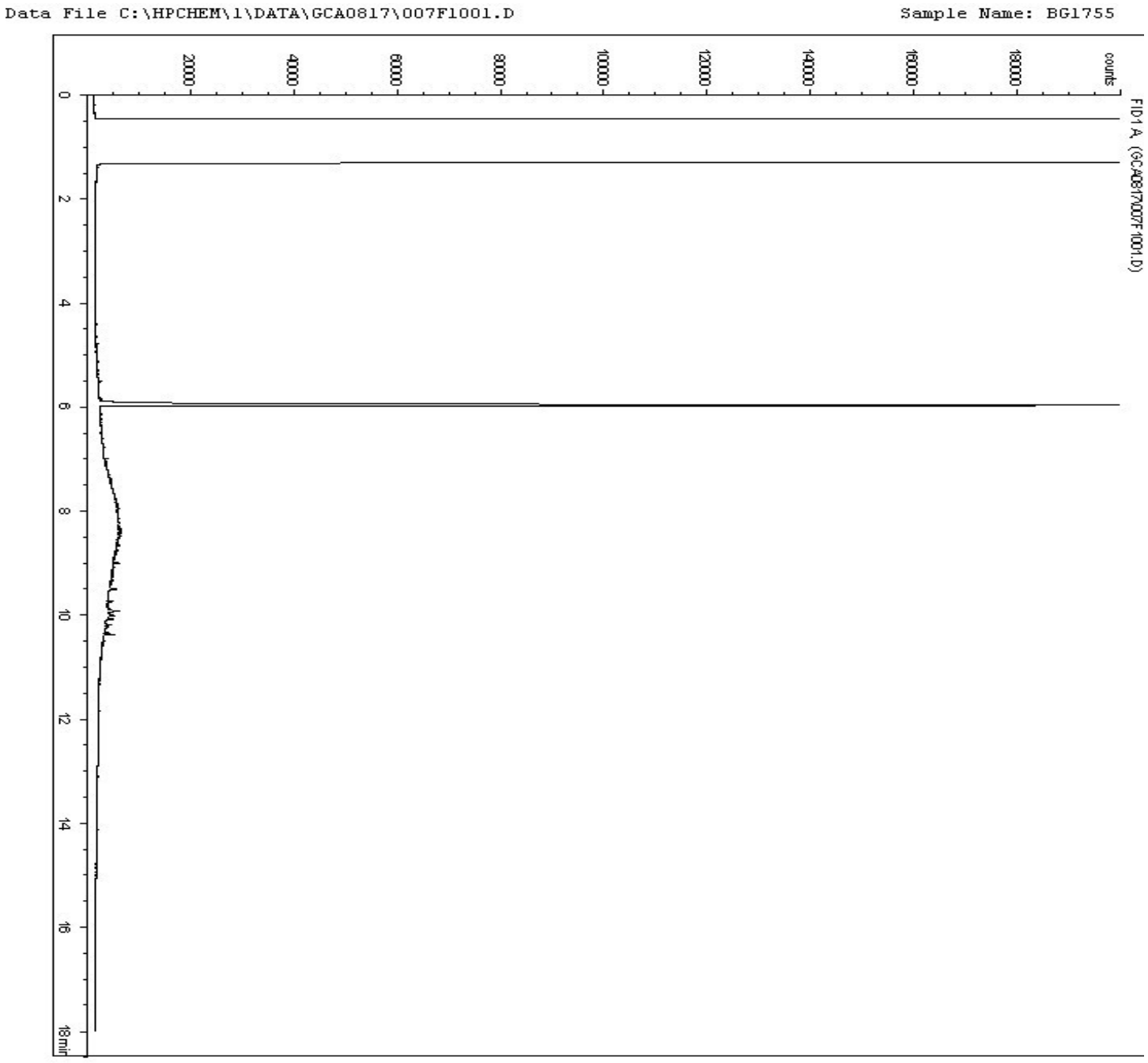
Success Through Science®

EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1755

Site Reference: PATCH
Client ID: 11P1_23A@10CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



*** End of Report ***

Instrument 1 2011/08/18 8:23:27 AM JR1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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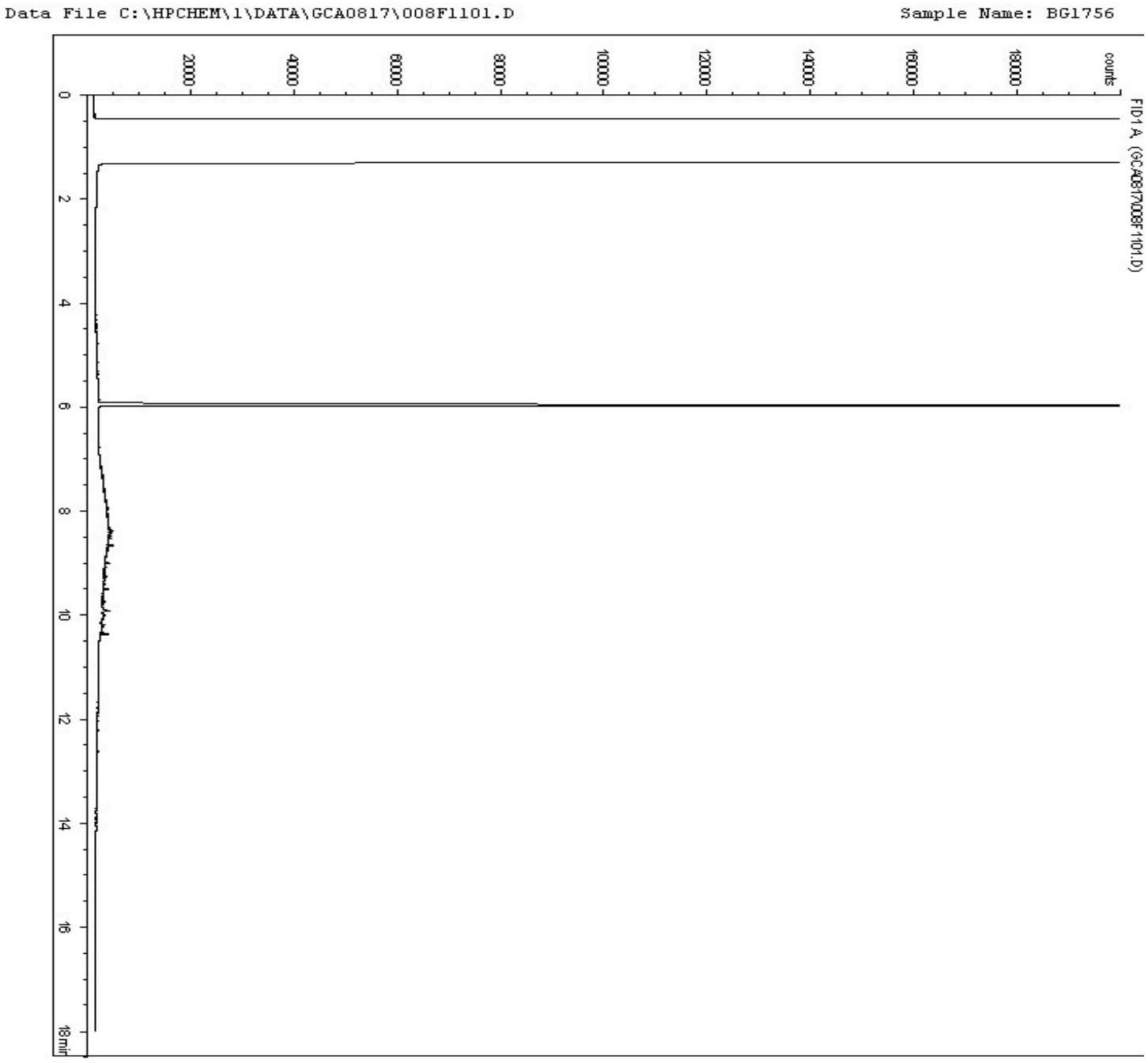
Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1756

Site Reference: PATCH
Client ID: 11P1_30@20CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



*** End of Report ***

Instrument 1 2011/08/18 8:23:29 AM JR1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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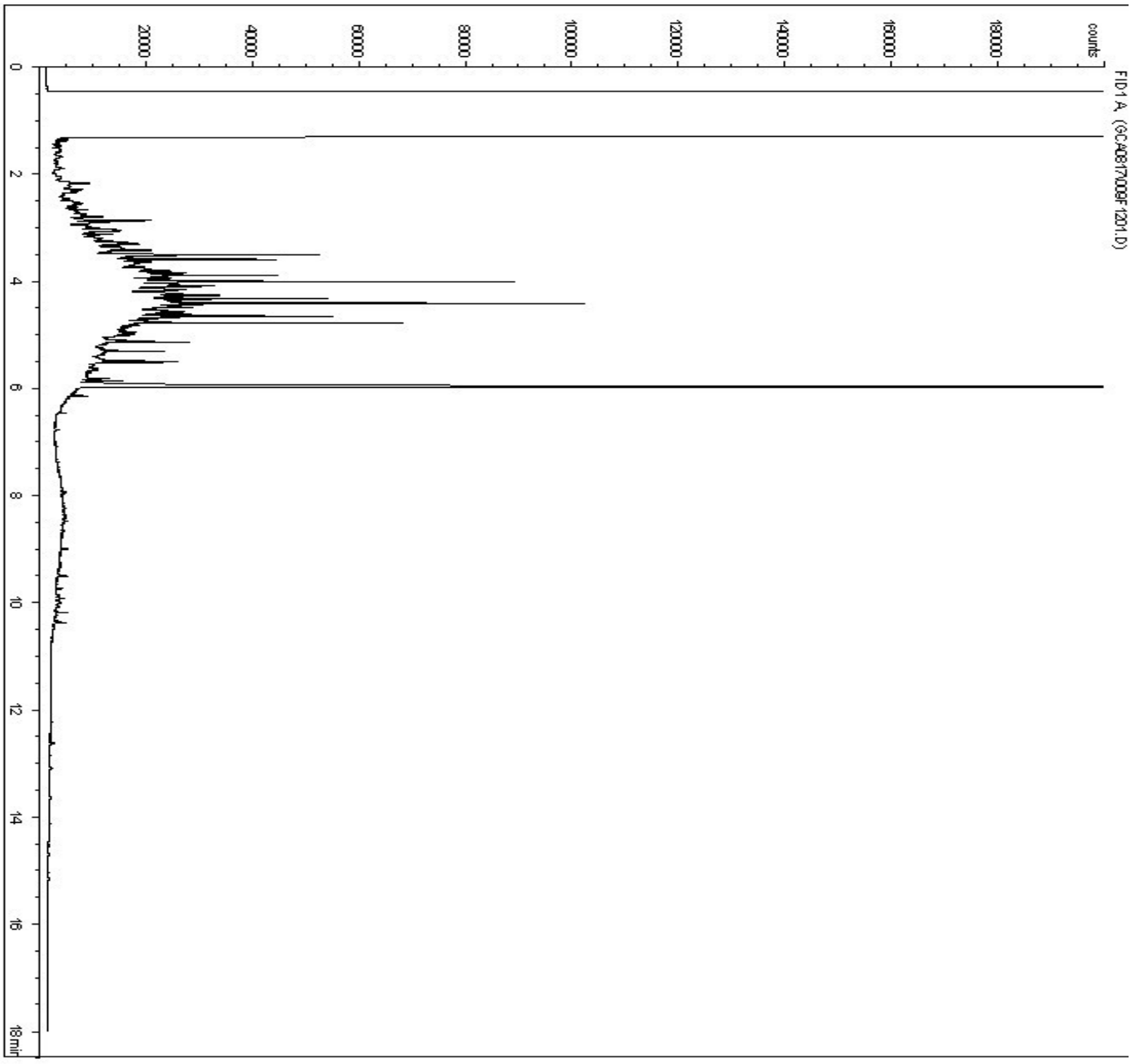
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1757

Site Reference: PATCH
Client ID: 11P1_32@15CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\HPCHEM\1\DATA\GCA0817\009F1201.D Sample Name: BG1757



*** End of Report ***

Instrument 1 2011/08/18 8:23:31 AM JR1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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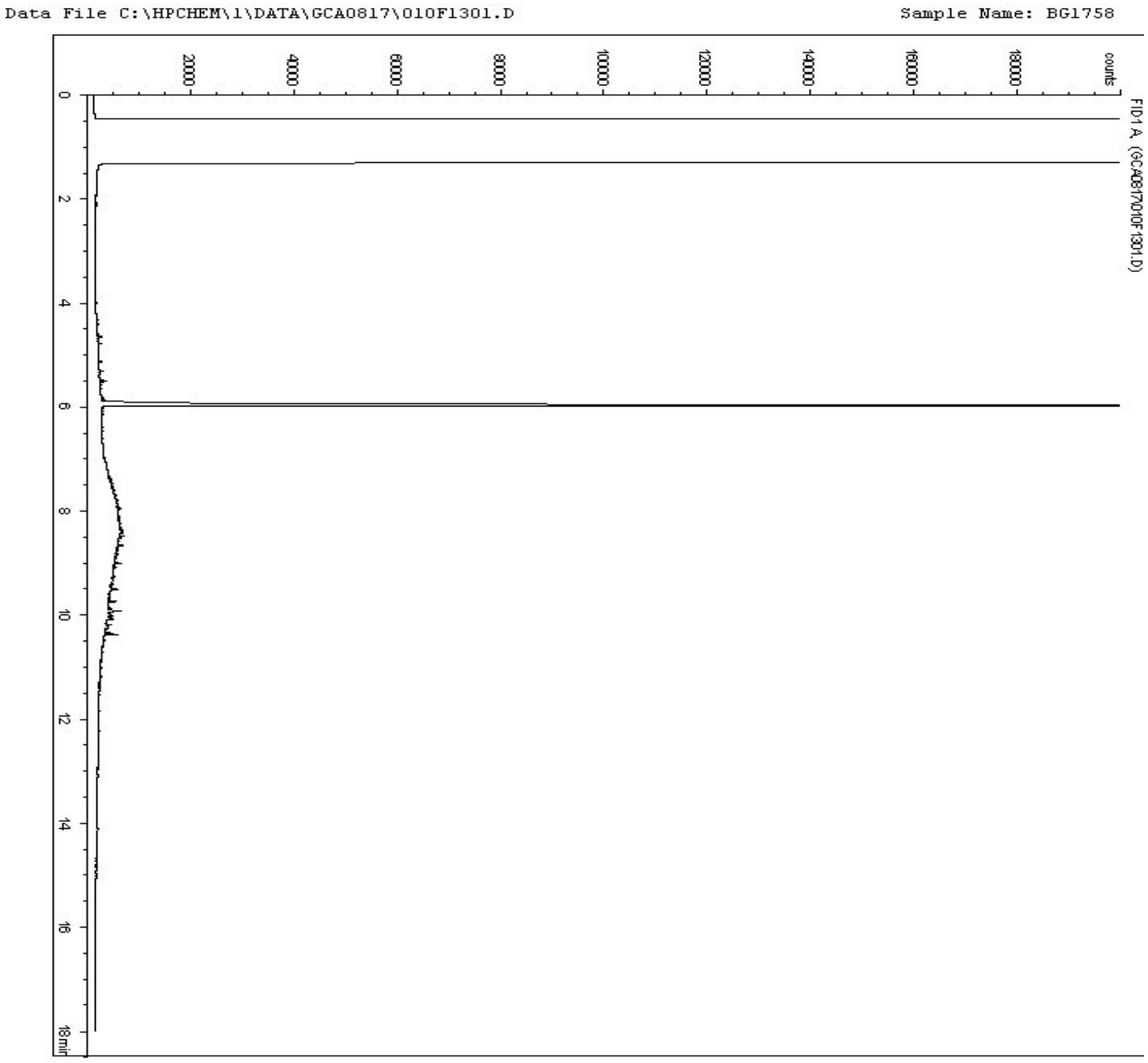
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1758

Site Reference: PATCH
Client ID: 11P1_31@10CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



*** End of Report ***

Instrument 1 2011/08/18 8:23:34 AM JR1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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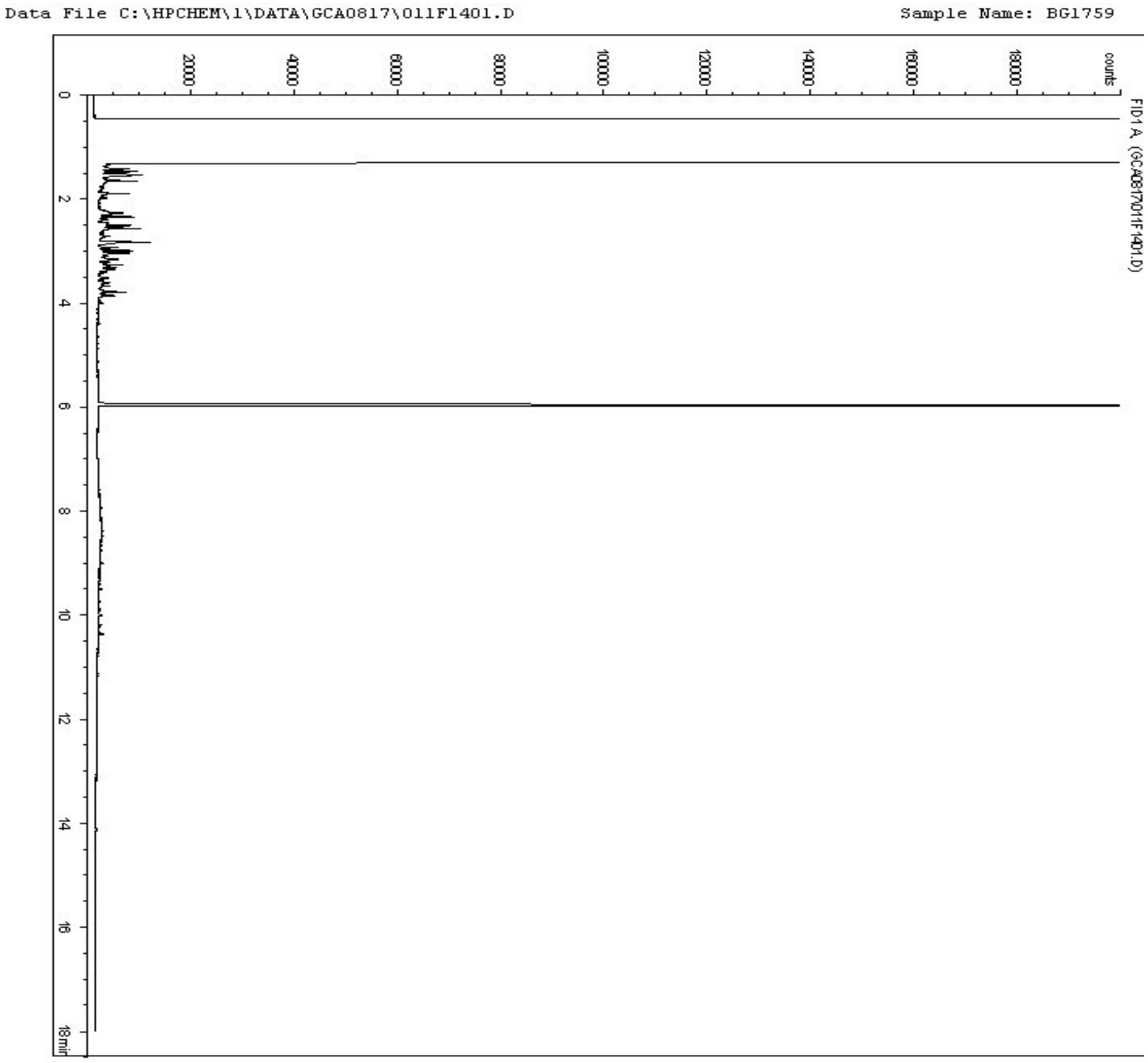
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1759

Site Reference: PATCH
Client ID: 11P1_28@20CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



*** End of Report ***

Instrument 1 2011/08/18 8:23:36 AM JR1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

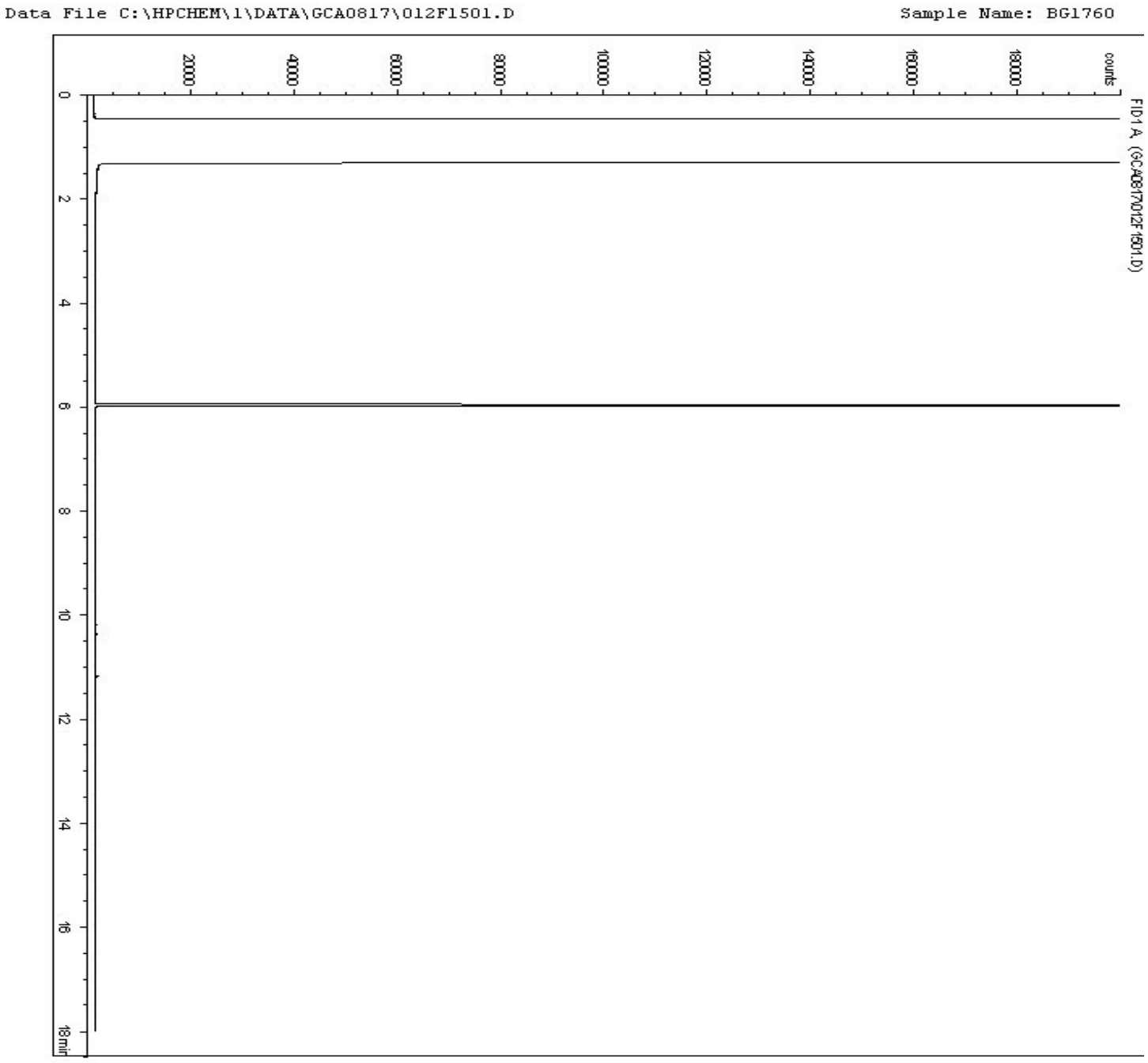
Success Through Science®

EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1760

Site Reference: PATCH
Client ID: 11P1_10@20CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



*** End of Report ***

Instrument 1 2011/08/18 8:23:39 AM JR1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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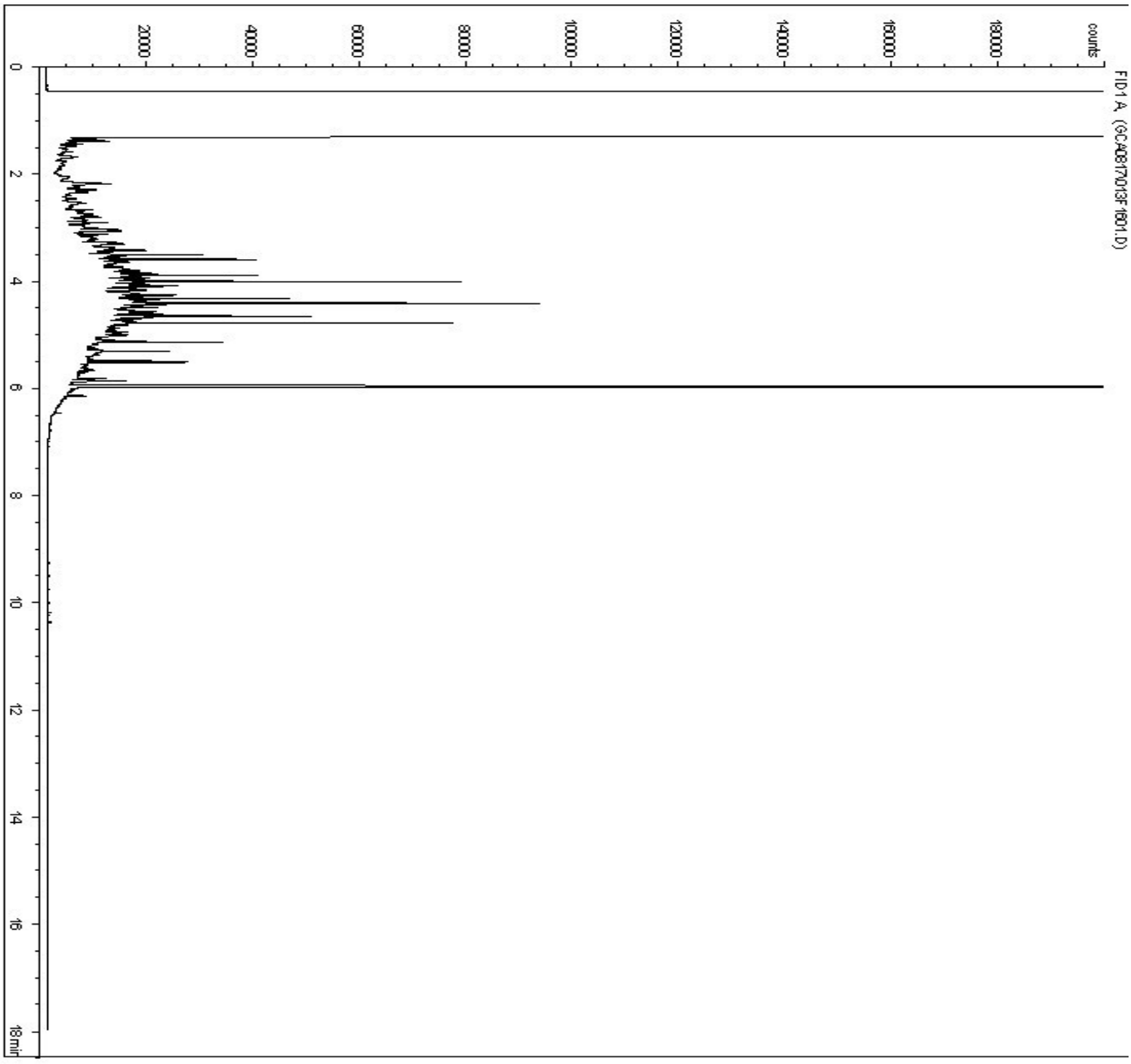
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1761

Site Reference: PATCH
Client ID: 11P1_16B@25CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\HPCHEM\1\DATA\GCA0817\013F1601.D Sample Name: BG1761



*** End of Report ***

Instrument 1 2011/08/18 8:23:41 AM JR1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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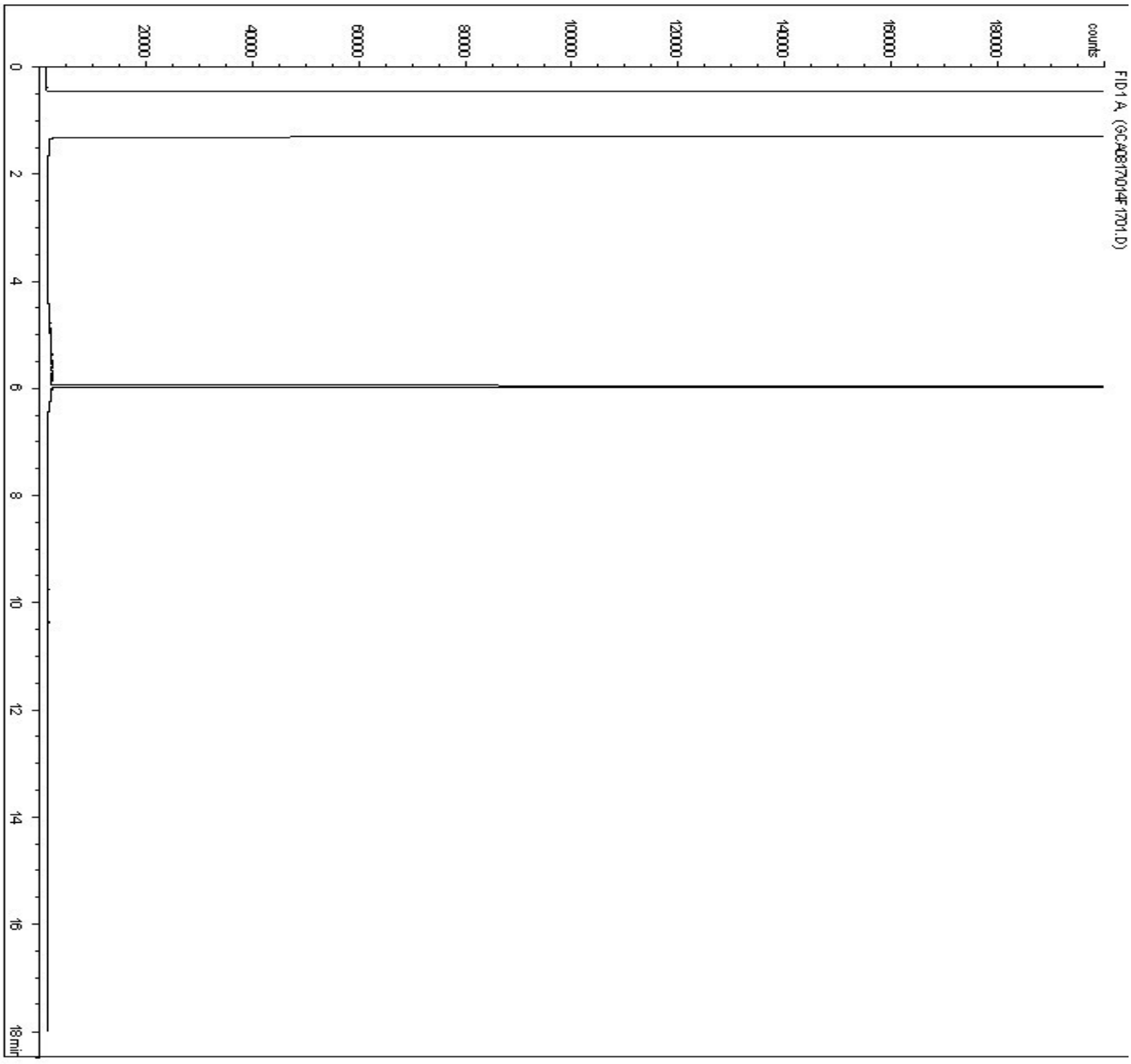
Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1762

Site Reference: PATCH
Client ID: 11P1_16C@20CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\HPCHEM\1\DATA\GCA0817\014F1701.D Sample Name: BG1762



*** End of Report ***

Instrument 1 2011/08/18 8:23:44 AM JR1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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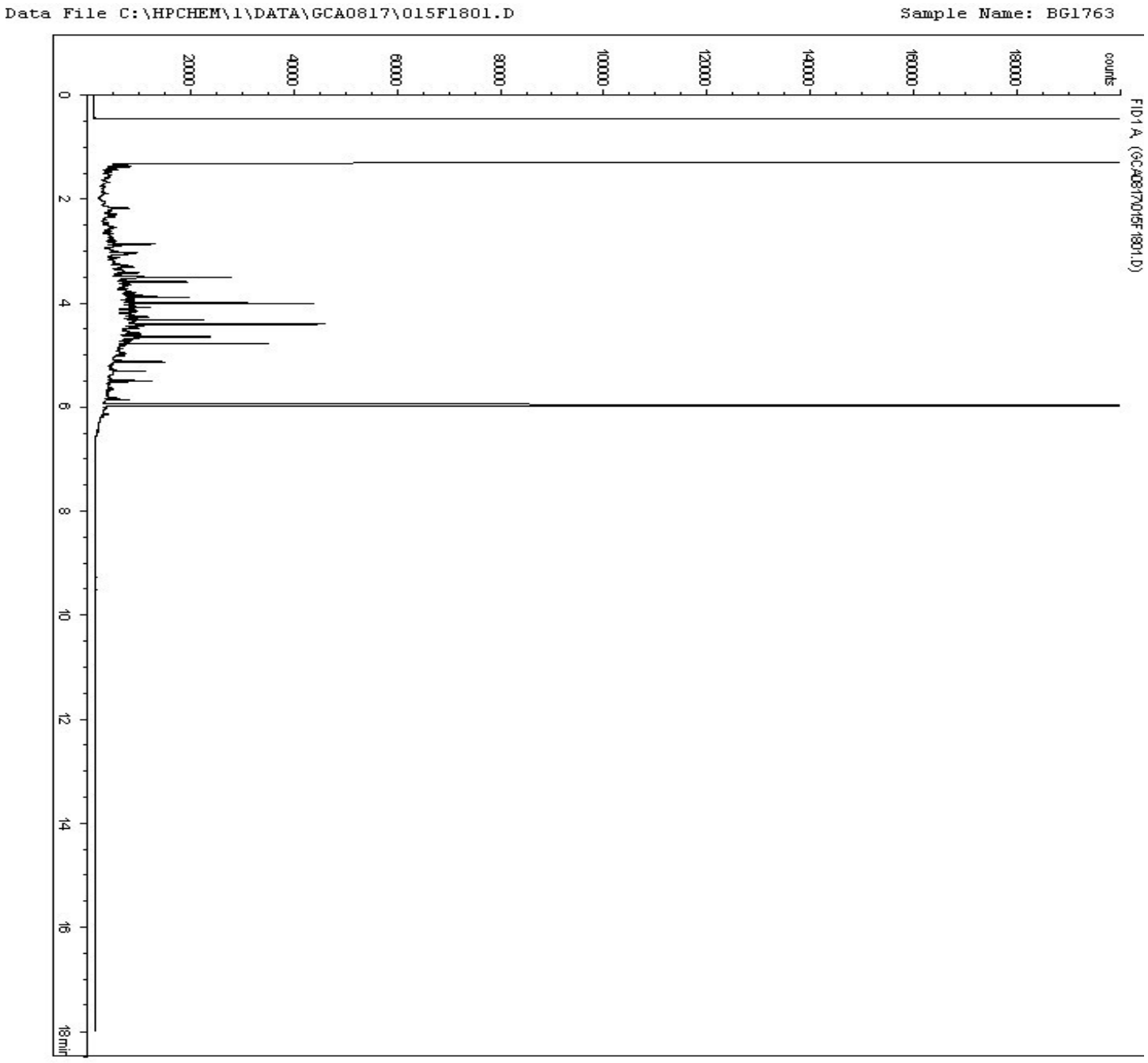
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1763

Site Reference: PATCH
Client ID: 11P1_16@20CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



*** End of Report ***

Instrument 1 2011/08/18 8:23:46 AM JR1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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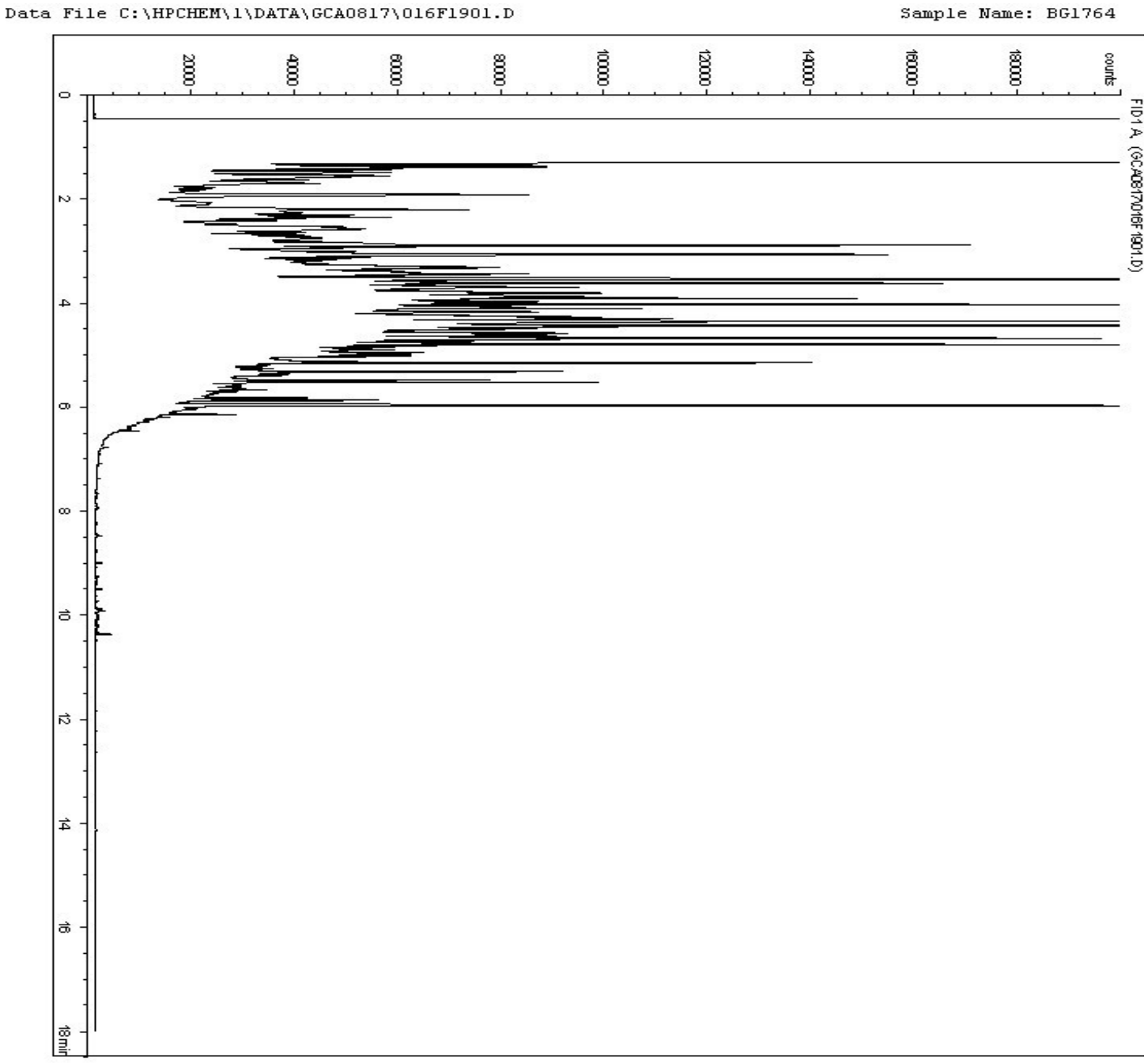
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1764

Site Reference: PATCH
Client ID: 11P1_03@40CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



*** End of Report ***

Instrument 1 2011/08/18 8:23:49 AM JR1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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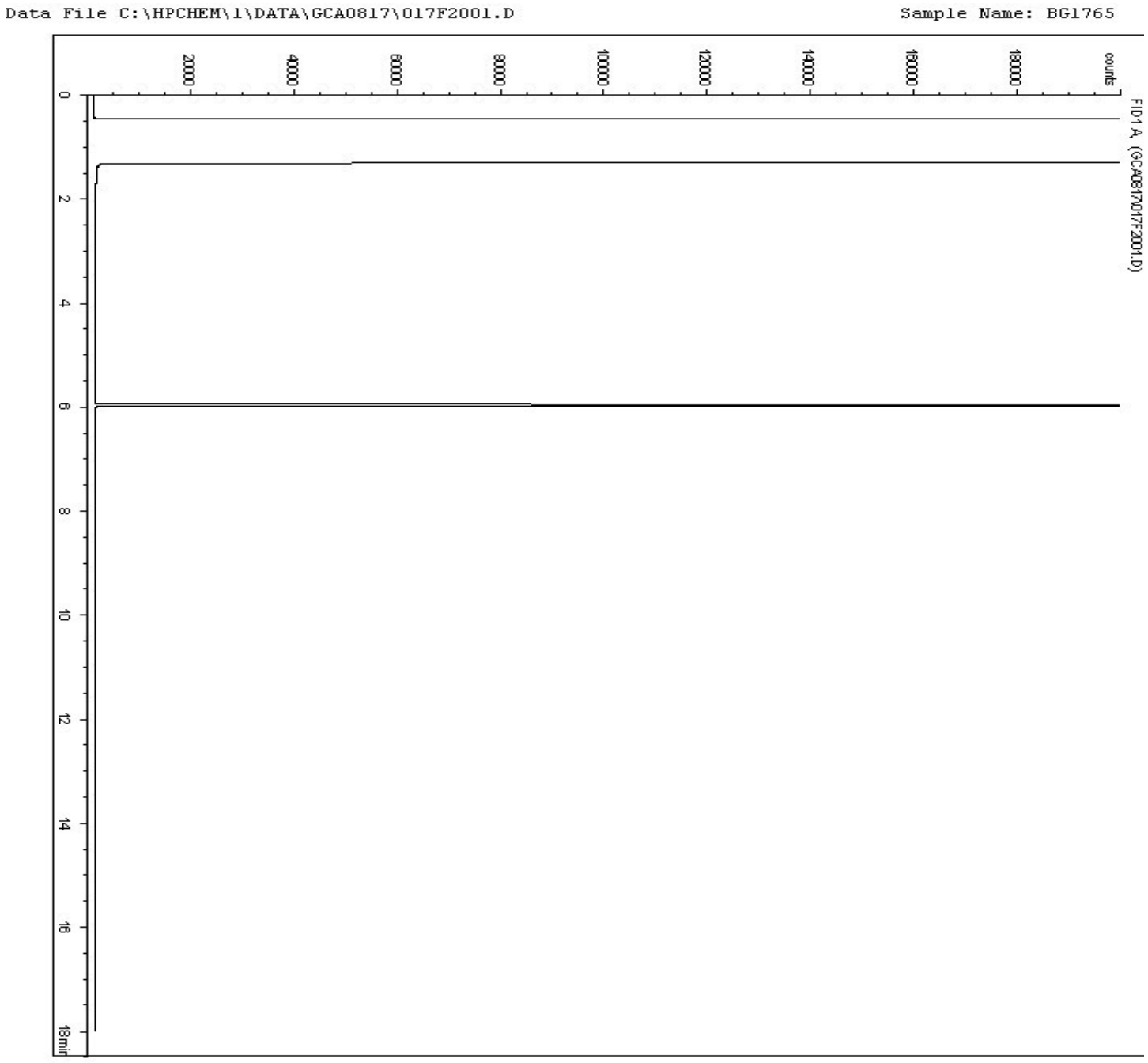
Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1765

Site Reference: PATCH
Client ID: 11P1_18A@20CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



*** End of Report ***

Instrument 1 2011/08/18 8:23:51 AM JR1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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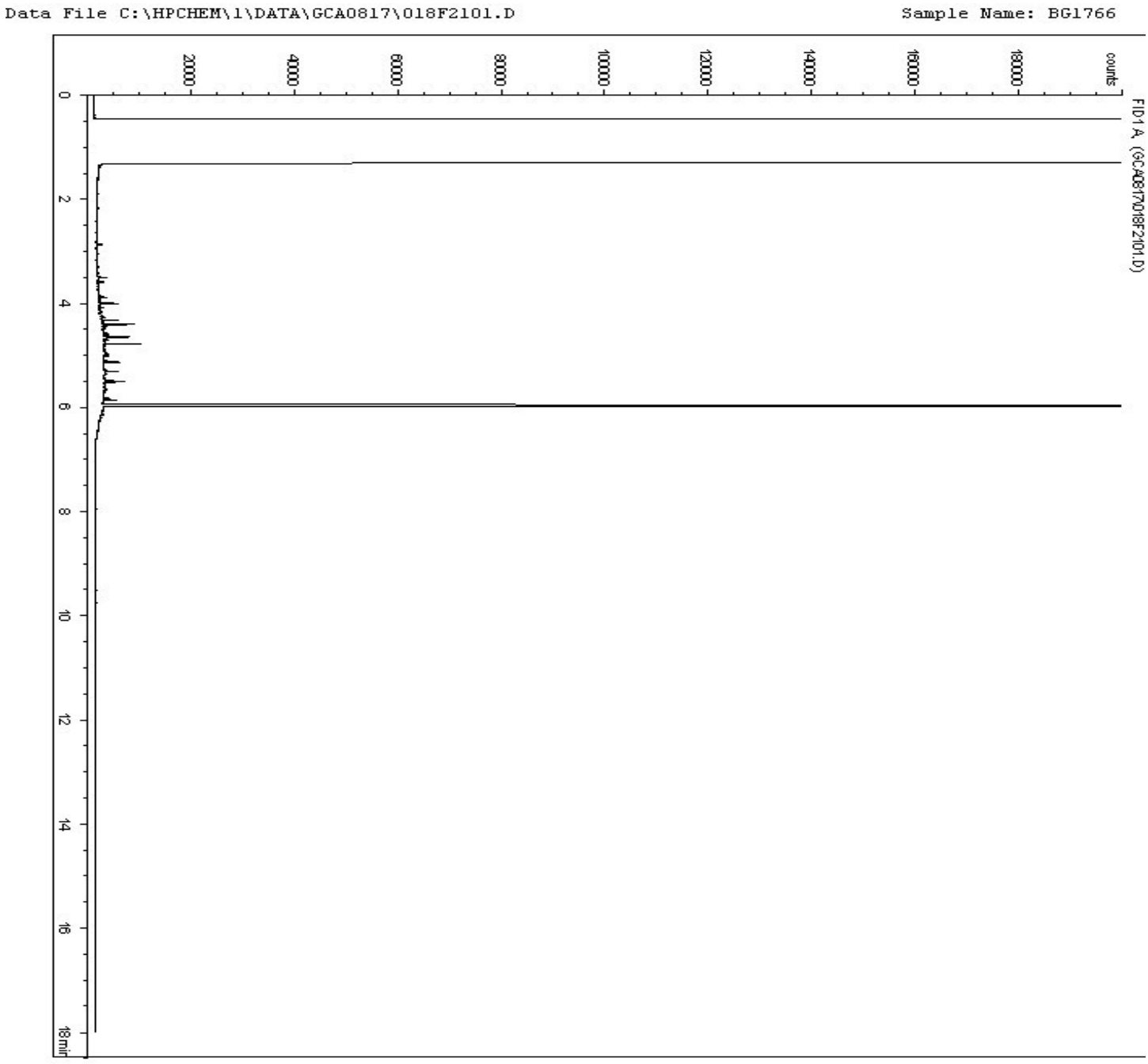
Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1766

Site Reference: PATCH
Client ID: 11P1_03@95CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



*** End of Report ***

Instrument 1 2011/08/18 8:23:53 AM JR1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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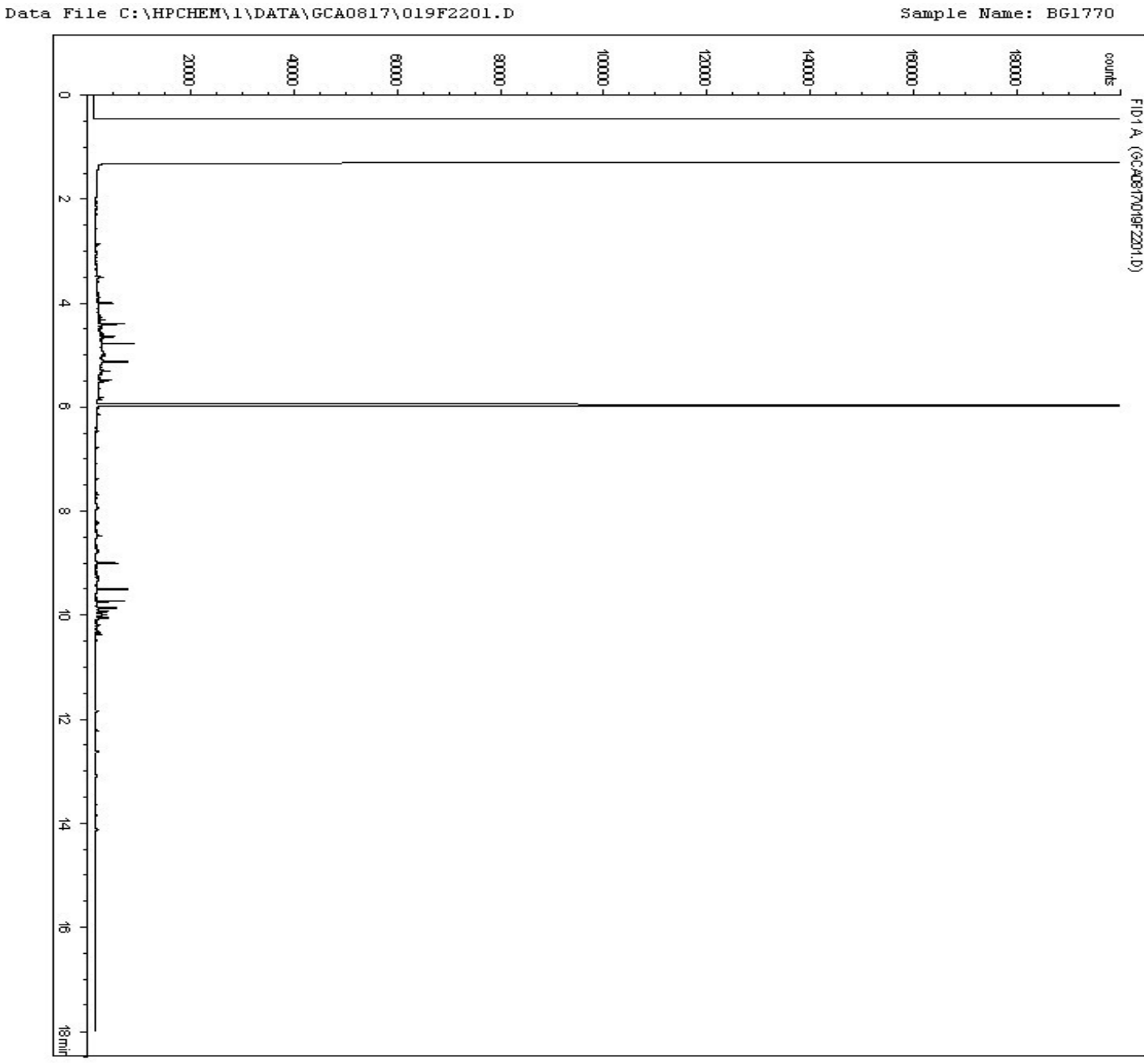
Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1770

Site Reference: PATCH
Client ID: 11P7_7@15CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



*** End of Report ***

Instrument 1 2011/08/18 8:23:56 AM JR1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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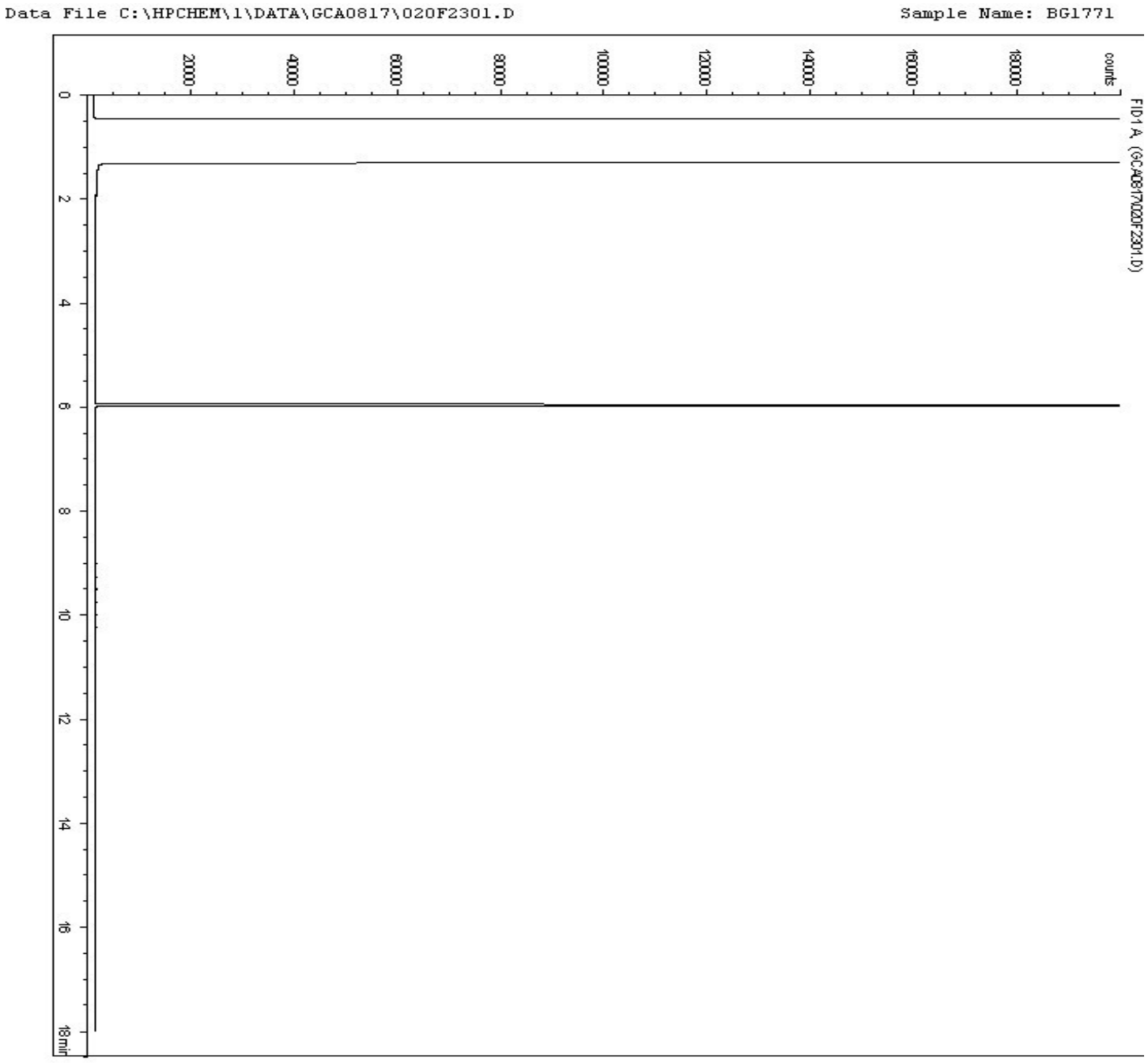
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1771

Site Reference: PATCH
Client ID: 11P7_11@20CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



*** End of Report ***

Instrument 1 2011/08/18 8:23:58 AM JR1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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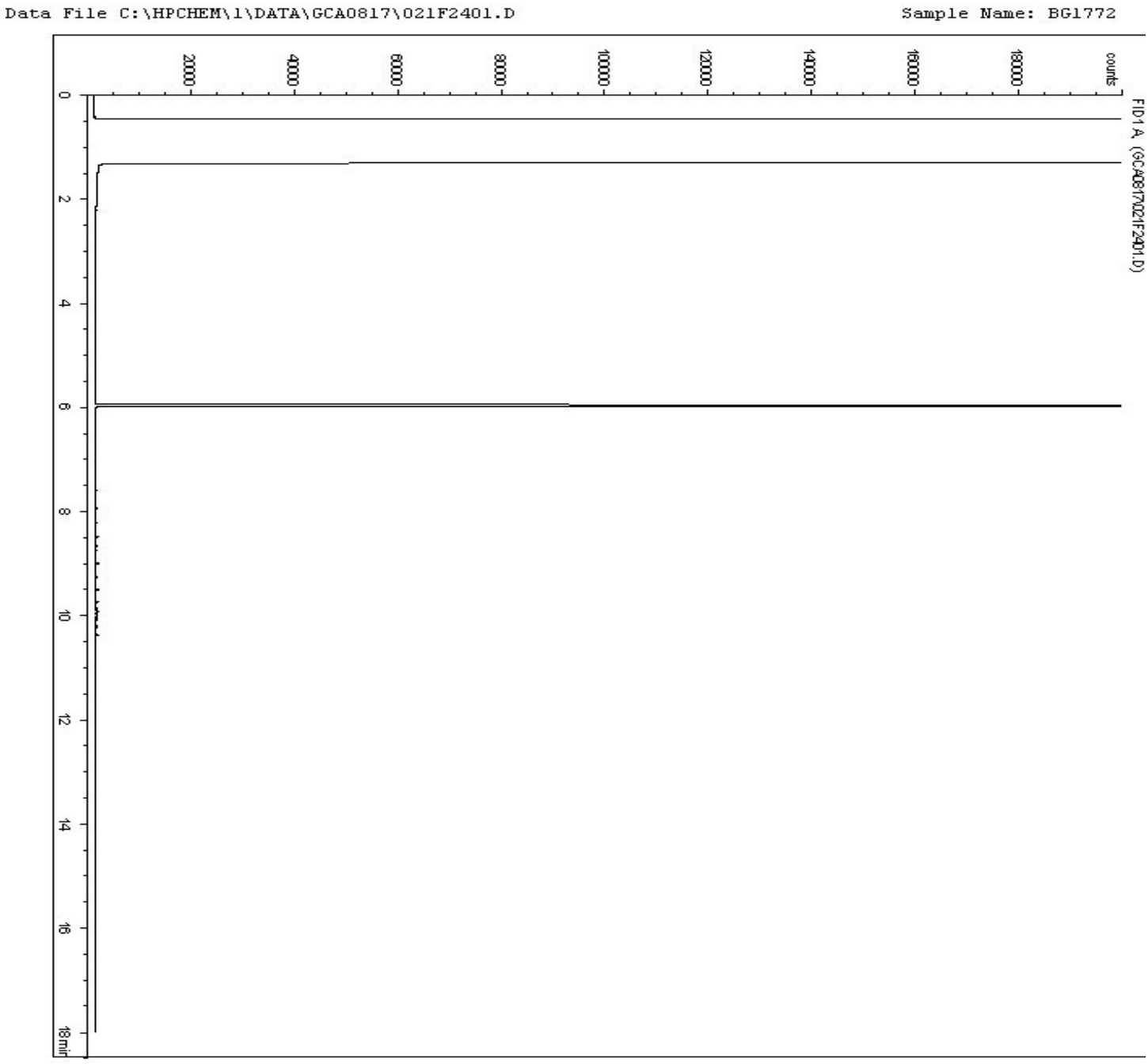
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1772

Site Reference: PATCH
Client ID: 11P7_5@10CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



*** End of Report ***

Instrument 1 2011/08/18 8:24:01 AM JR1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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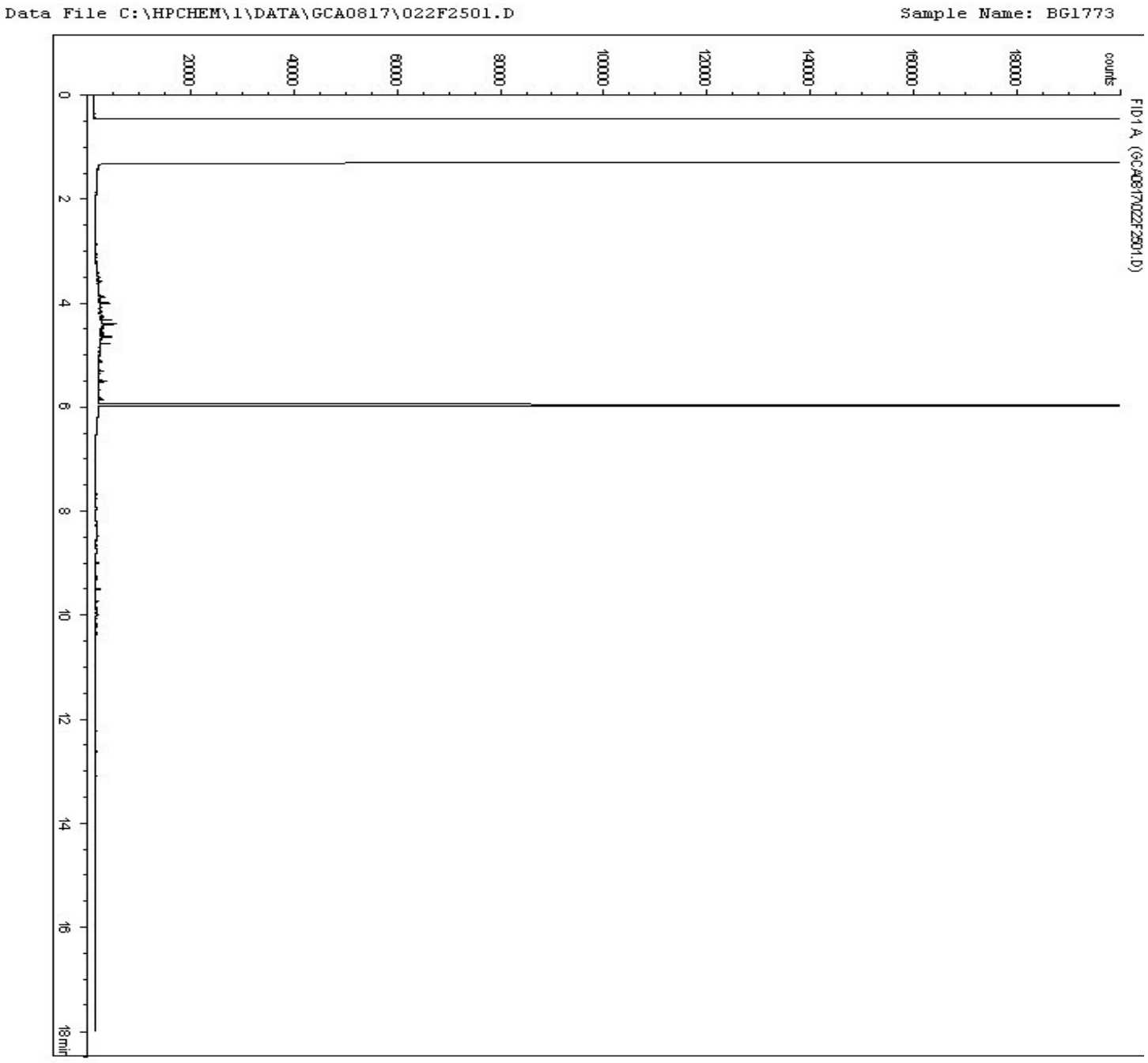
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1773

Site Reference: PATCH
Client ID: 11P7_1@10CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



*** End of Report ***

Instrument 1 2011/08/18 8:24:03 AM JR1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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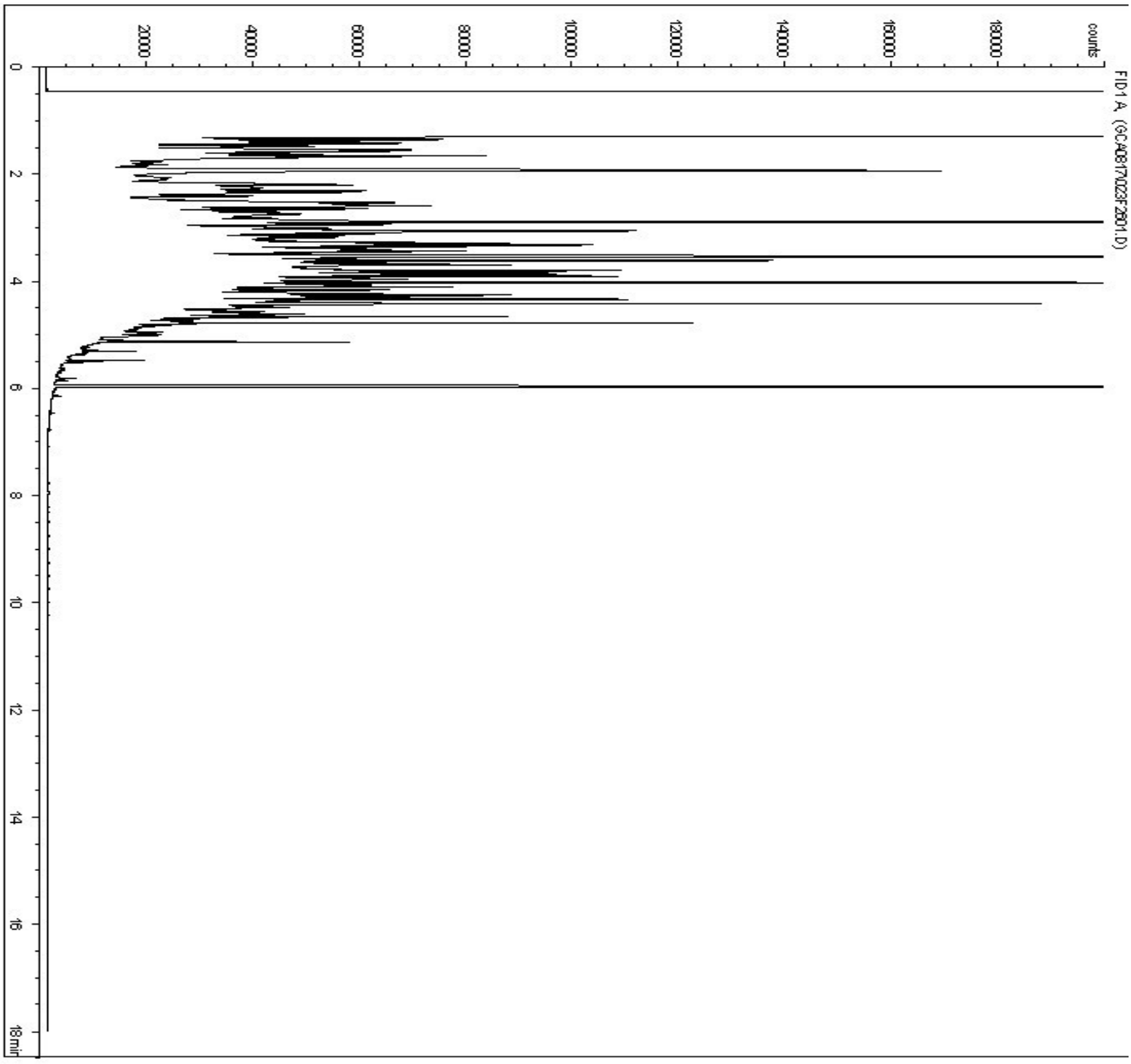
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1774

Site Reference: PATCH
Client ID: 11P5_3@85CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\HPCHEM\1\DATA\GCA0817\023F2601.D Sample Name: BG1774



*** End of Report ***

Instrument 1 2011/08/18 8:24:06 AM JR1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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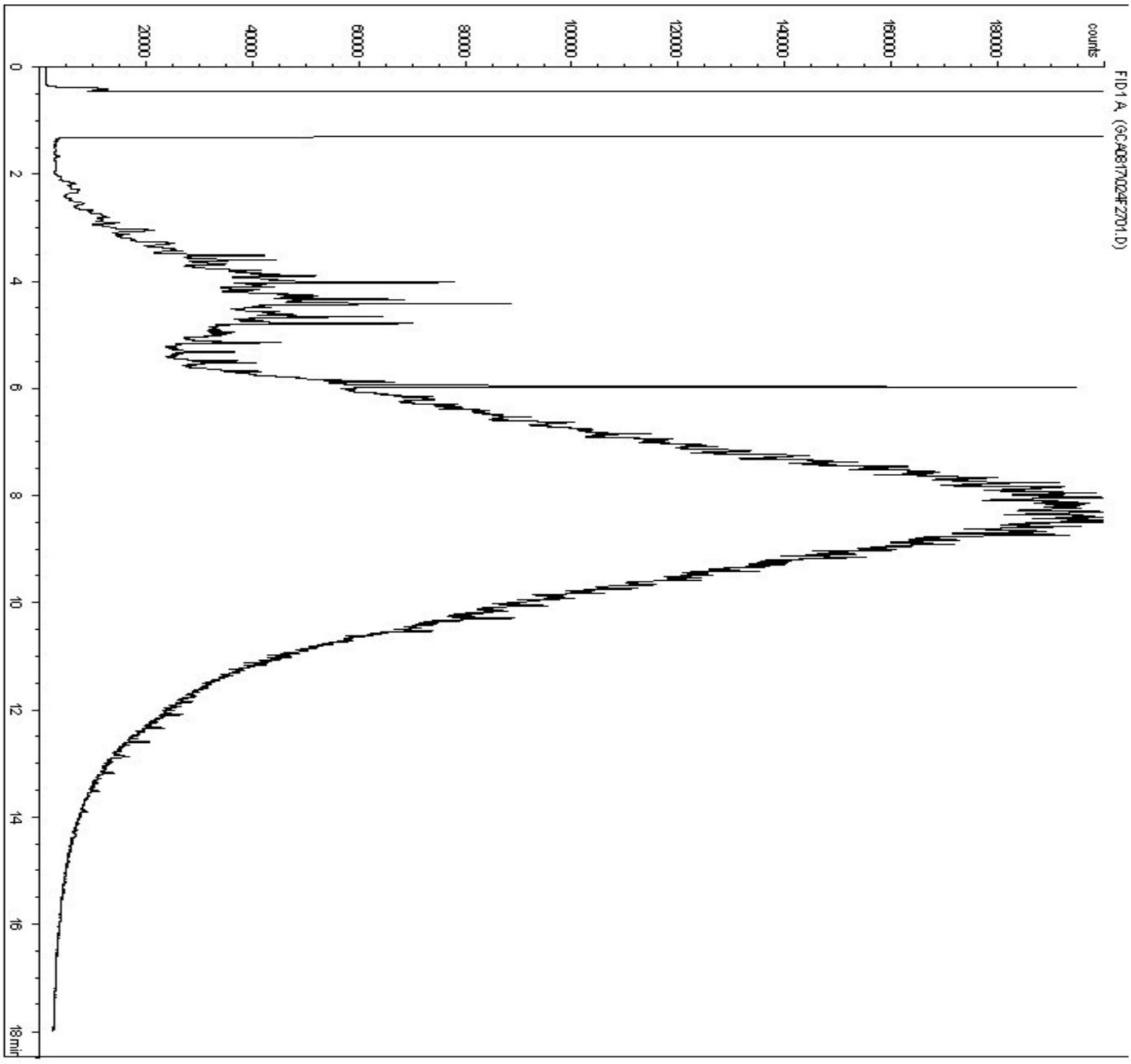
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1775

Site Reference: PATCH
Client ID: 11P3_1@10CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\HPCHEM\1\DATA\GCA0817\024F2701.D Sample Name: BG1775



*** End of Report ***

Instrument 1 2011/08/18 8:24:08 AM JR1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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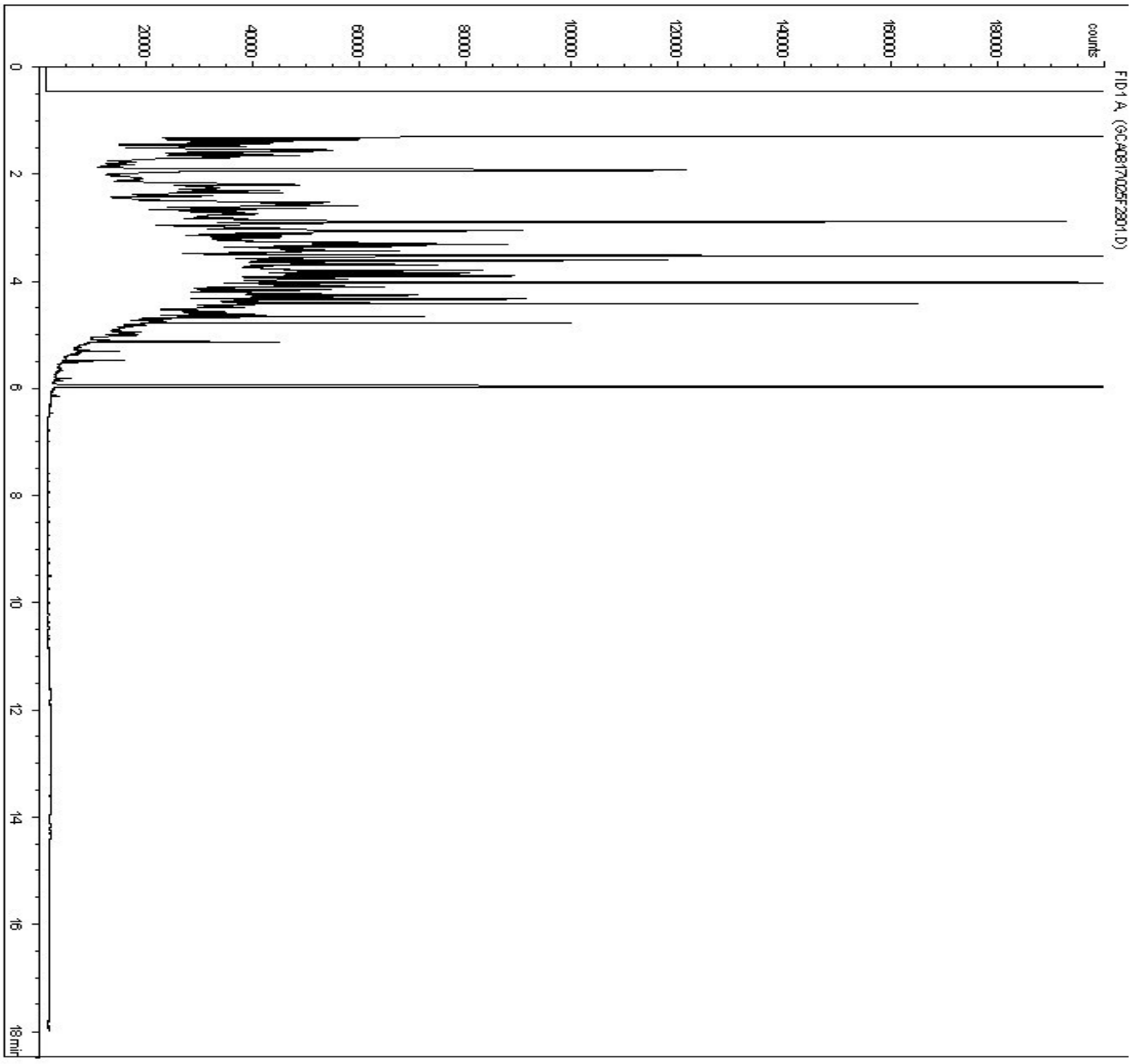
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1776

Site Reference: PATCH
Client ID: 11P5_3@70CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\HPCHEM\1\DATA\GCA0817\025F2801.D Sample Name: BG1776



*** End of Report ***

Instrument 1 2011/08/18 8:24:11 AM JR1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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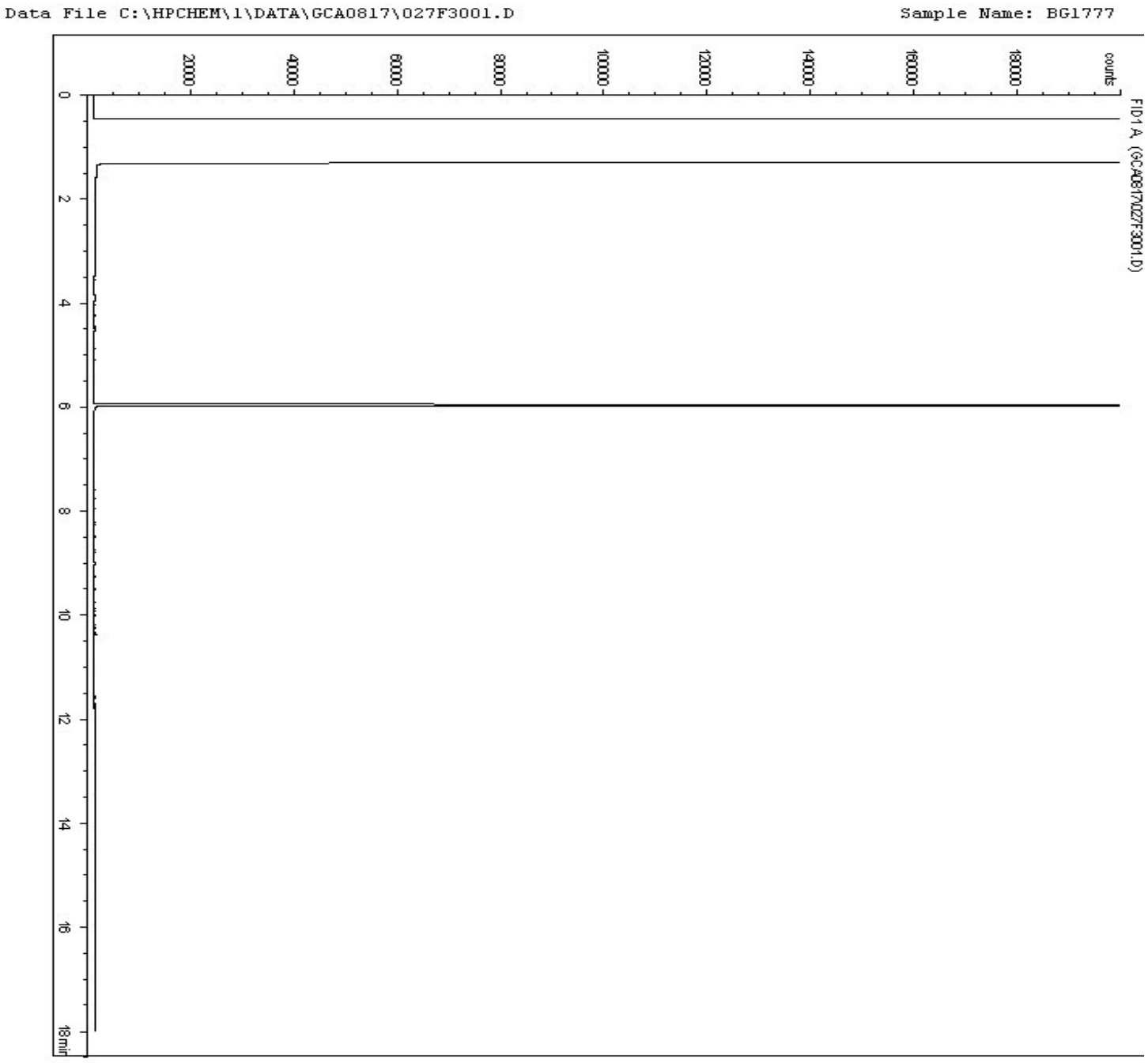
Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1777

Site Reference: PATCH
Client ID: 11P5_7@20CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



*** End of Report ***

Instrument 1 2011/08/18 8:24:16 AM JR1

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Maxxam

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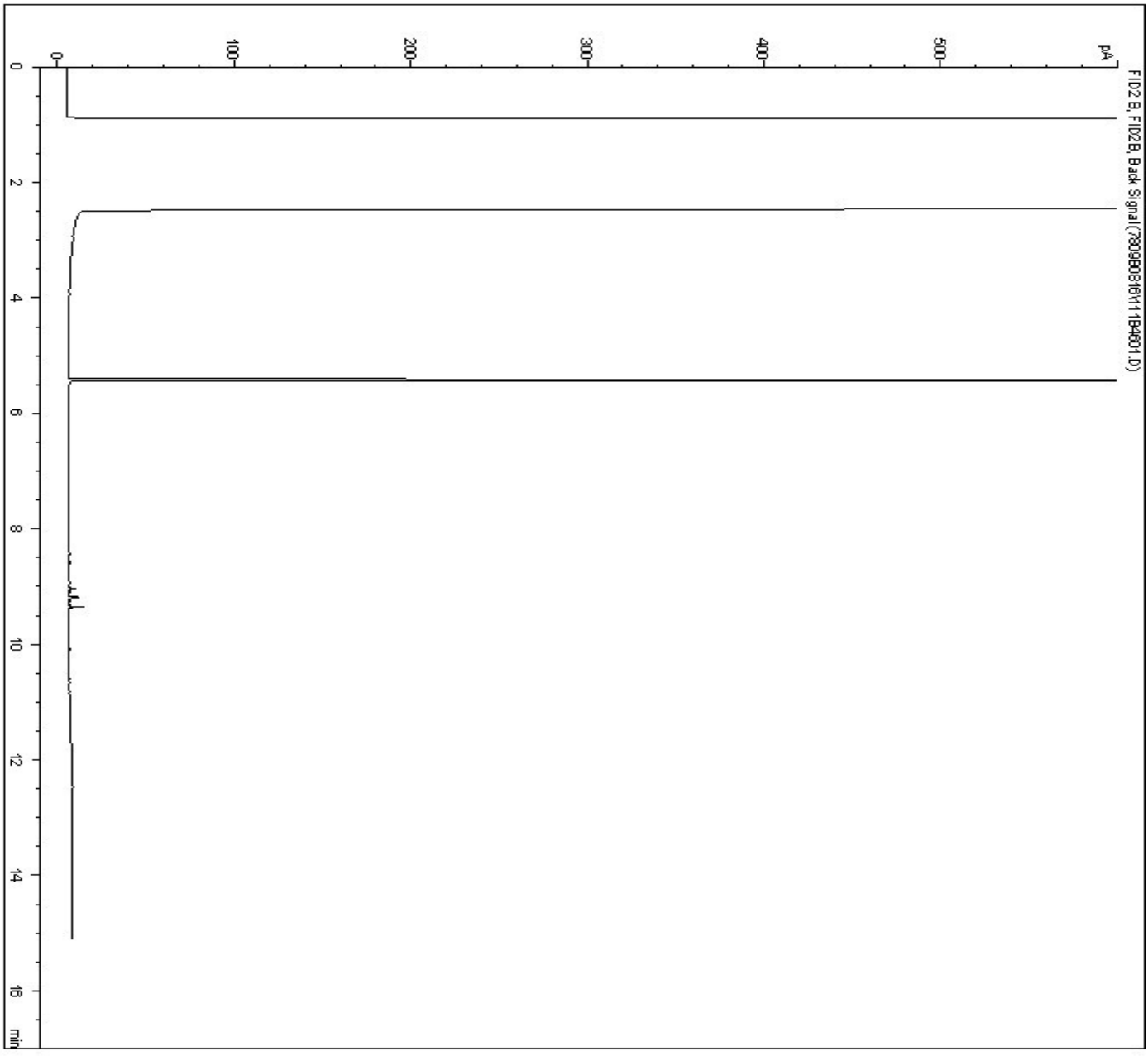
Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1778

Site Reference: PATCH
Client ID: 11P5_8@15CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7809B0816\111B4601.D
Sample Name: BG1778



*** End of Report ***

Instrument 1 2011/08/17 9:13:24 AM RC6

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Maxxam

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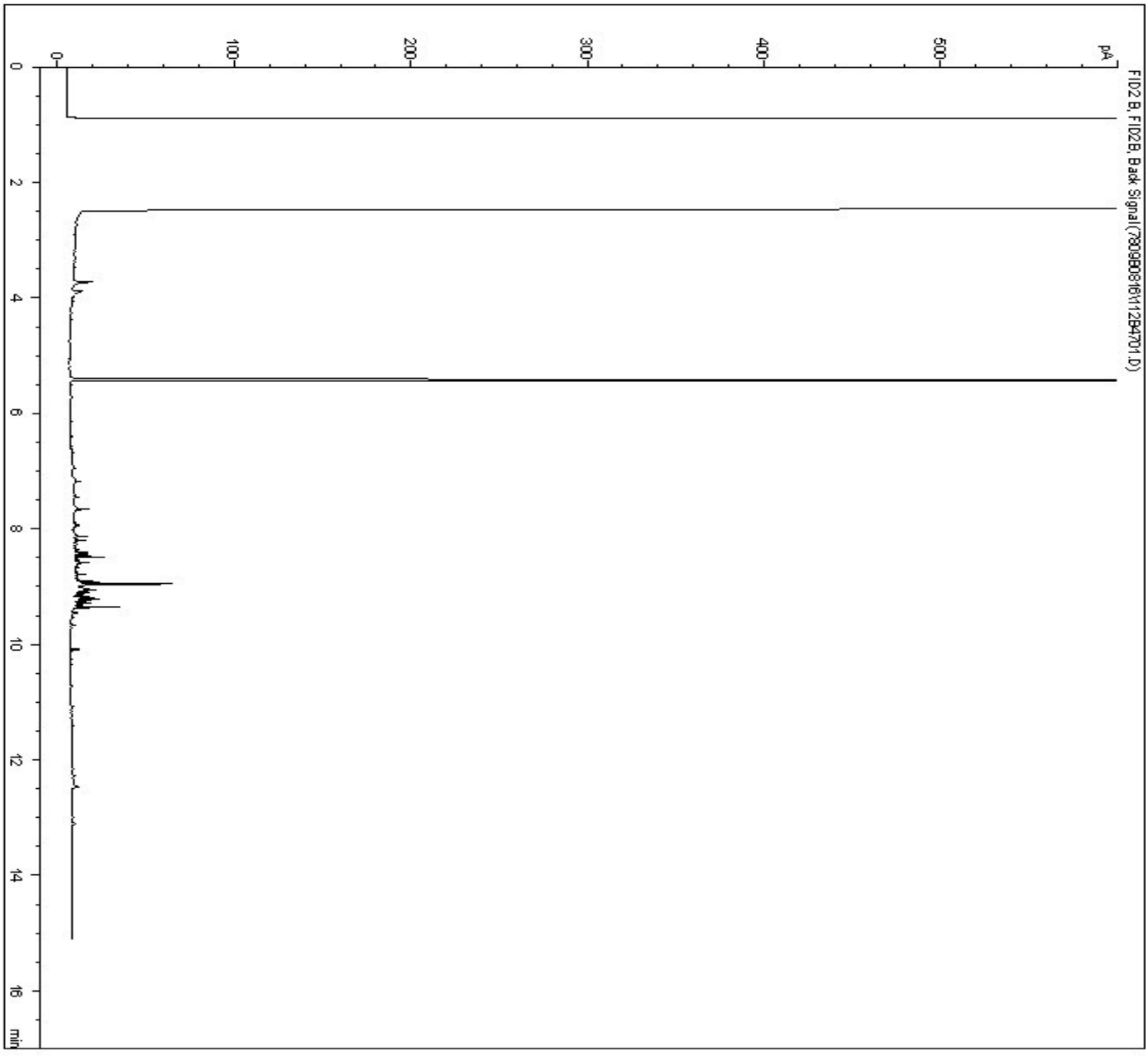
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1779

Site Reference: PATCH
Client ID: 11P5_5@15CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7809B0816\112B4701.D
Sample Name: BG1779



*** End of Report ***

Instrument 1 2011/08/17 9:13:26 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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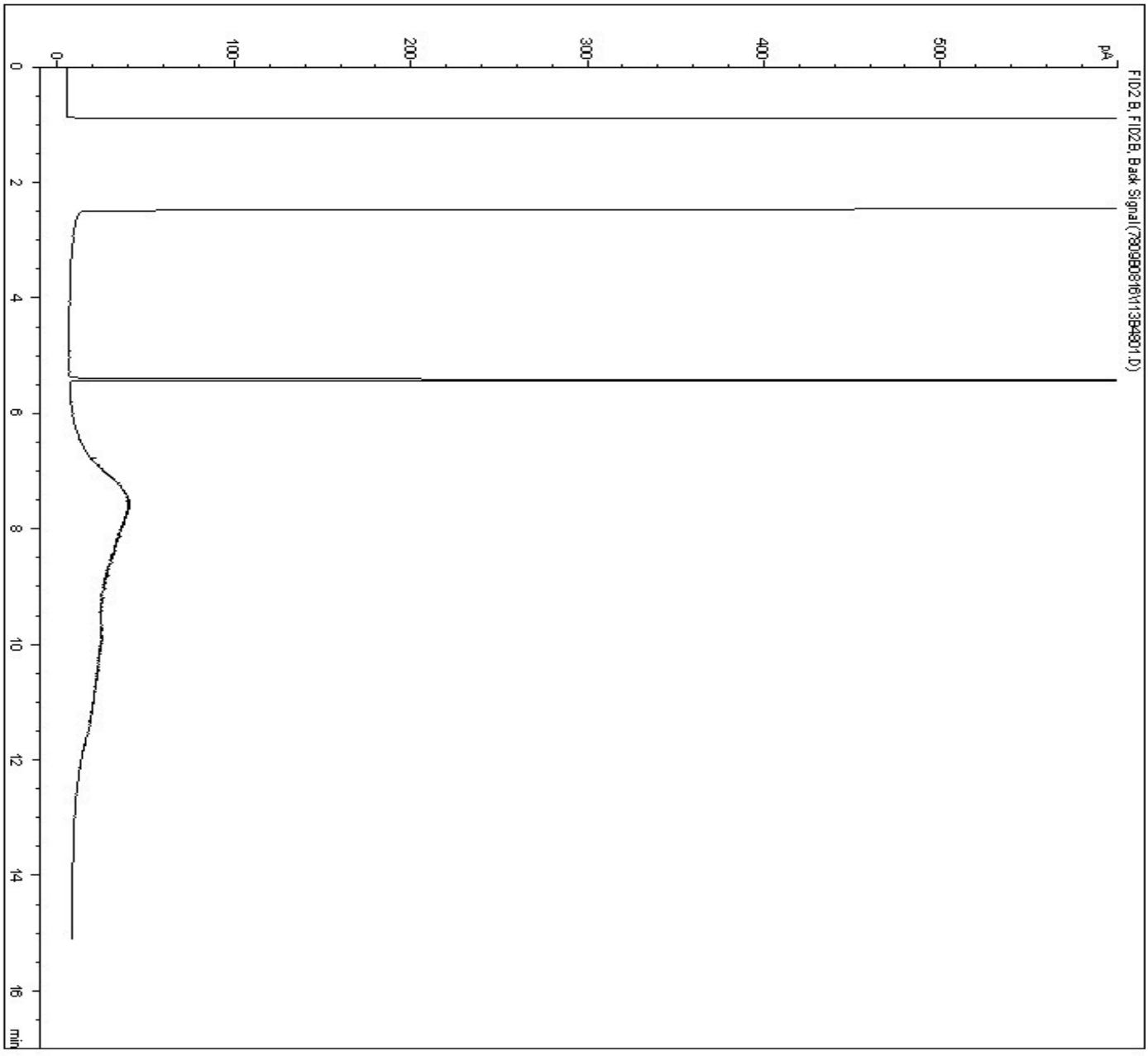
Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1780

Site Reference: PATCH
Client ID: 11P5_2@15CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7809B0816\113B4801.D
Sample Name: BG1780



*** End of Report ***

Instrument 1 2011/08/17 9:13:29 AM RC6

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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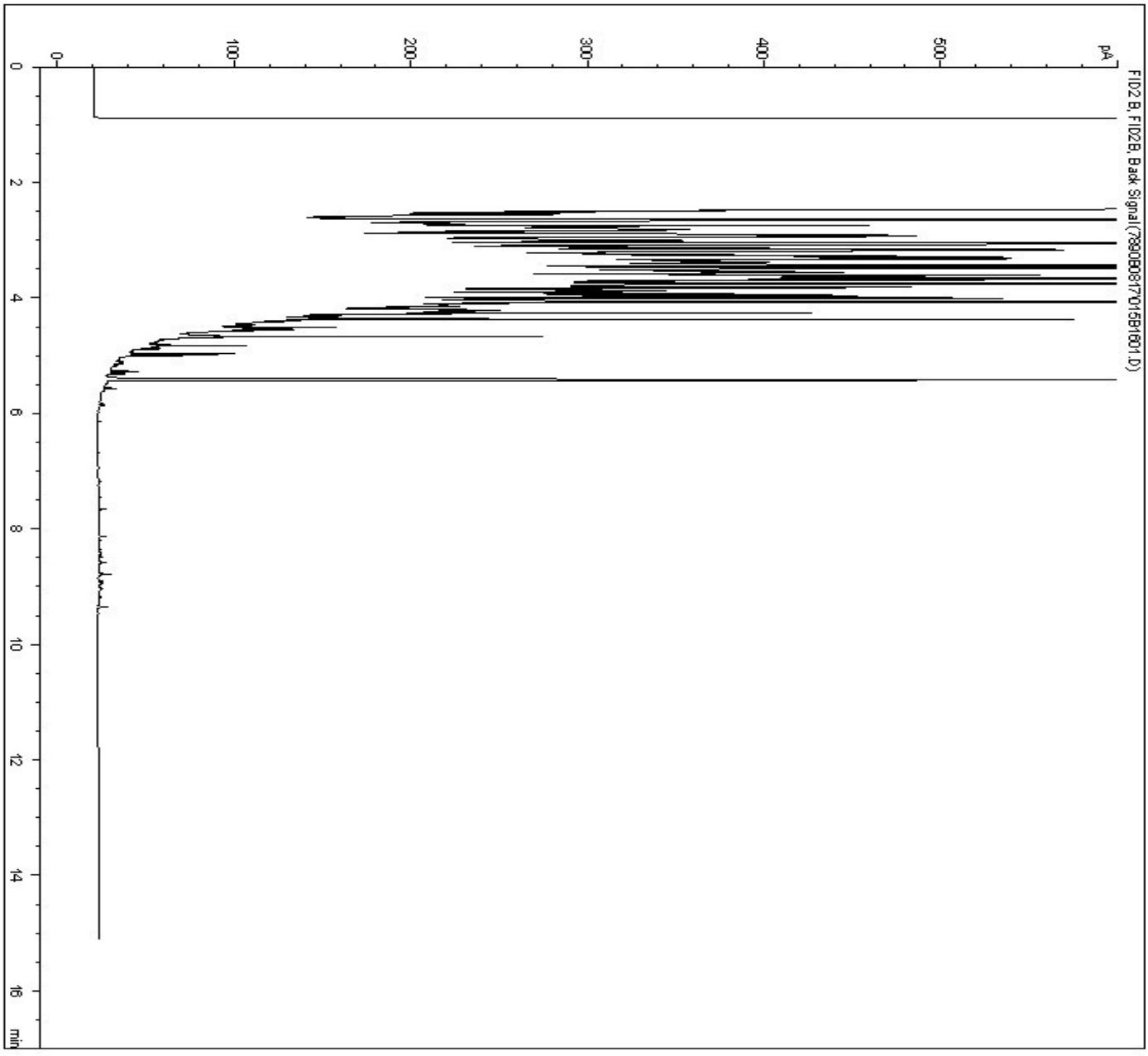
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1781

Site Reference: PATCH
Client ID: 11P5_1@15CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0817\015B1601.D
Sample Name: BG1781RR



*** End of Report ***

Instrument 1 2011/08/17 3:14:01 PM RC6

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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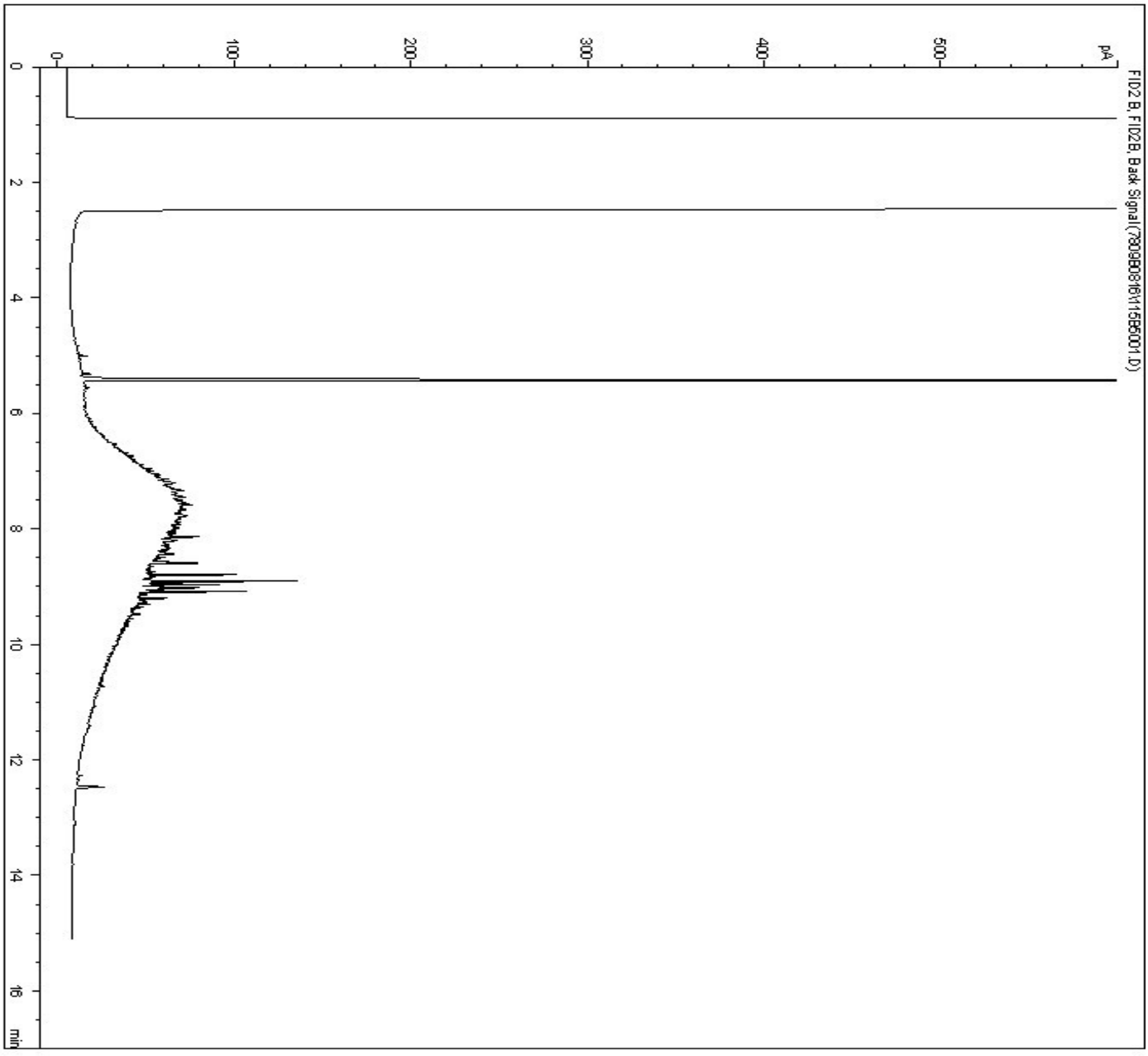
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1857

Site Reference: PATCH
Client ID: 11P6_1@15CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7809B0816\115B5001.D
Sample Name: BG1857



*** End of Report ***

Instrument 1 2011/08/17 9:13:35 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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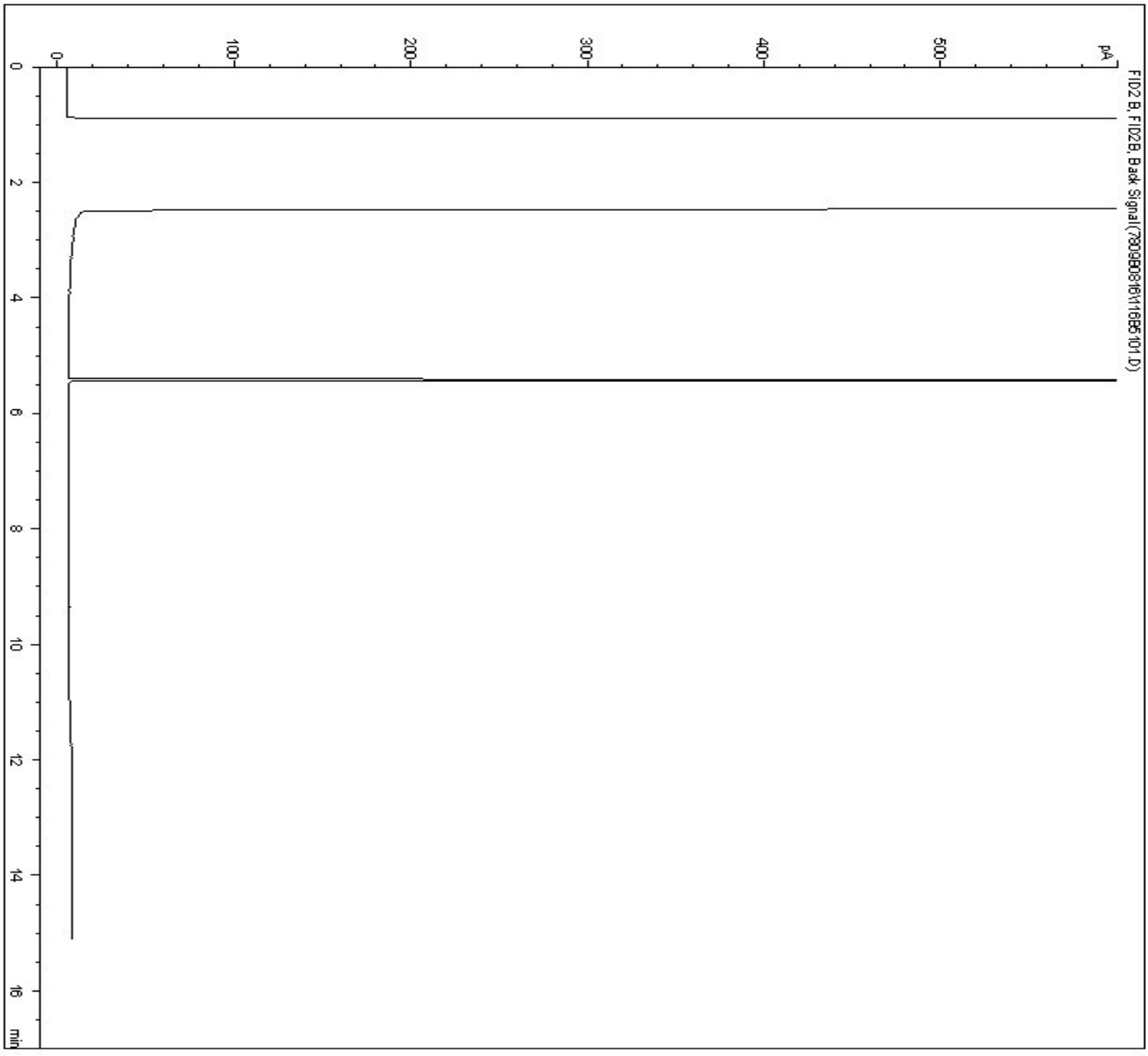
Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1858

Site Reference: PATCH
Client ID: 11P6_3@15CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7809B0816\116B5101.D
Sample Name: BG1858



*** End of Report ***

Instrument 1 2011/08/17 9:13:38 AM RC6

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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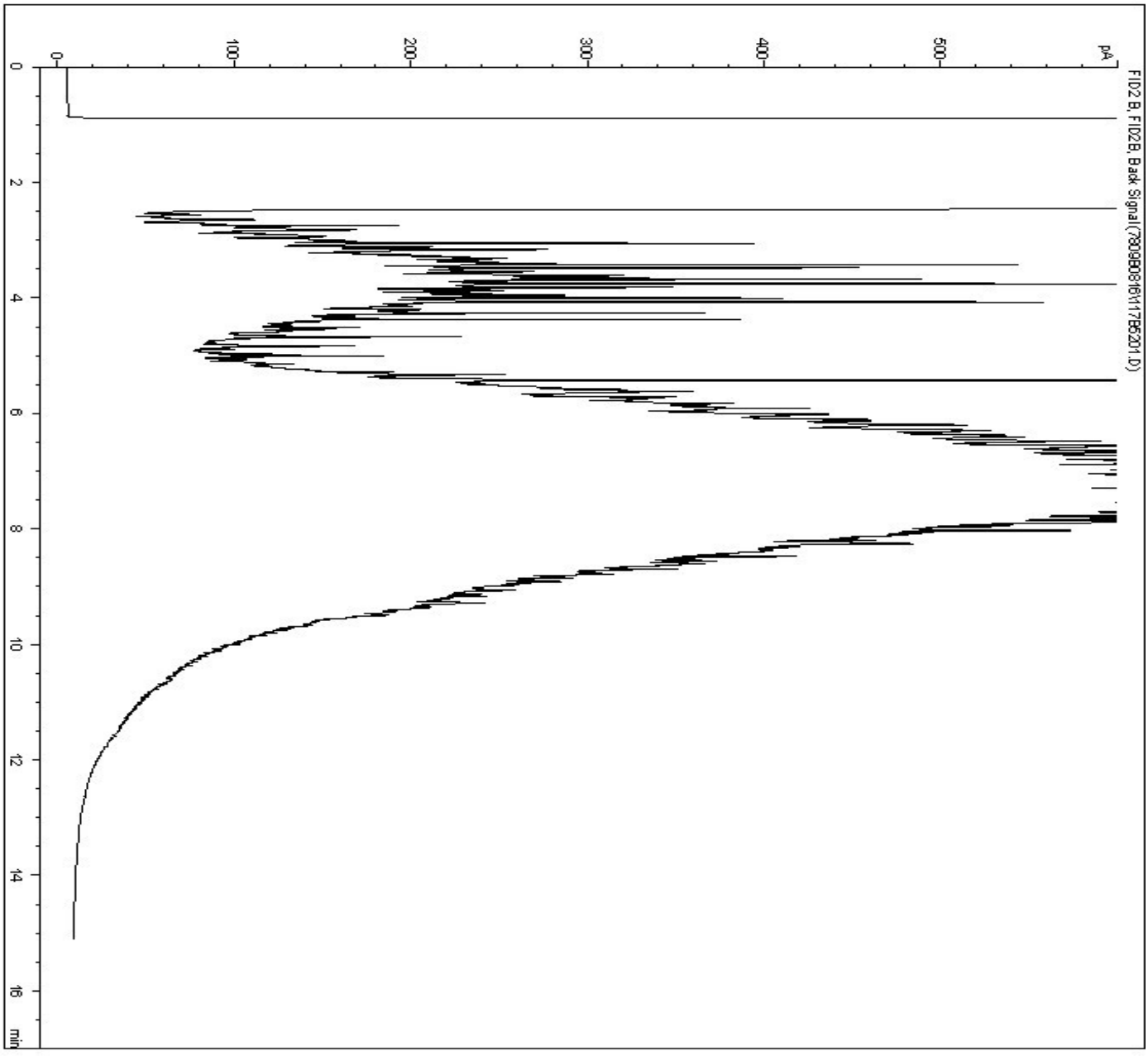
Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1859

Site Reference: PATCH
Client ID: 11P3_7@45CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7809B0816\117B5201.D
Sample Name: BG1859



*** End of Report ***

Instrument 1 2011/08/17 9:13:41 AM RC6

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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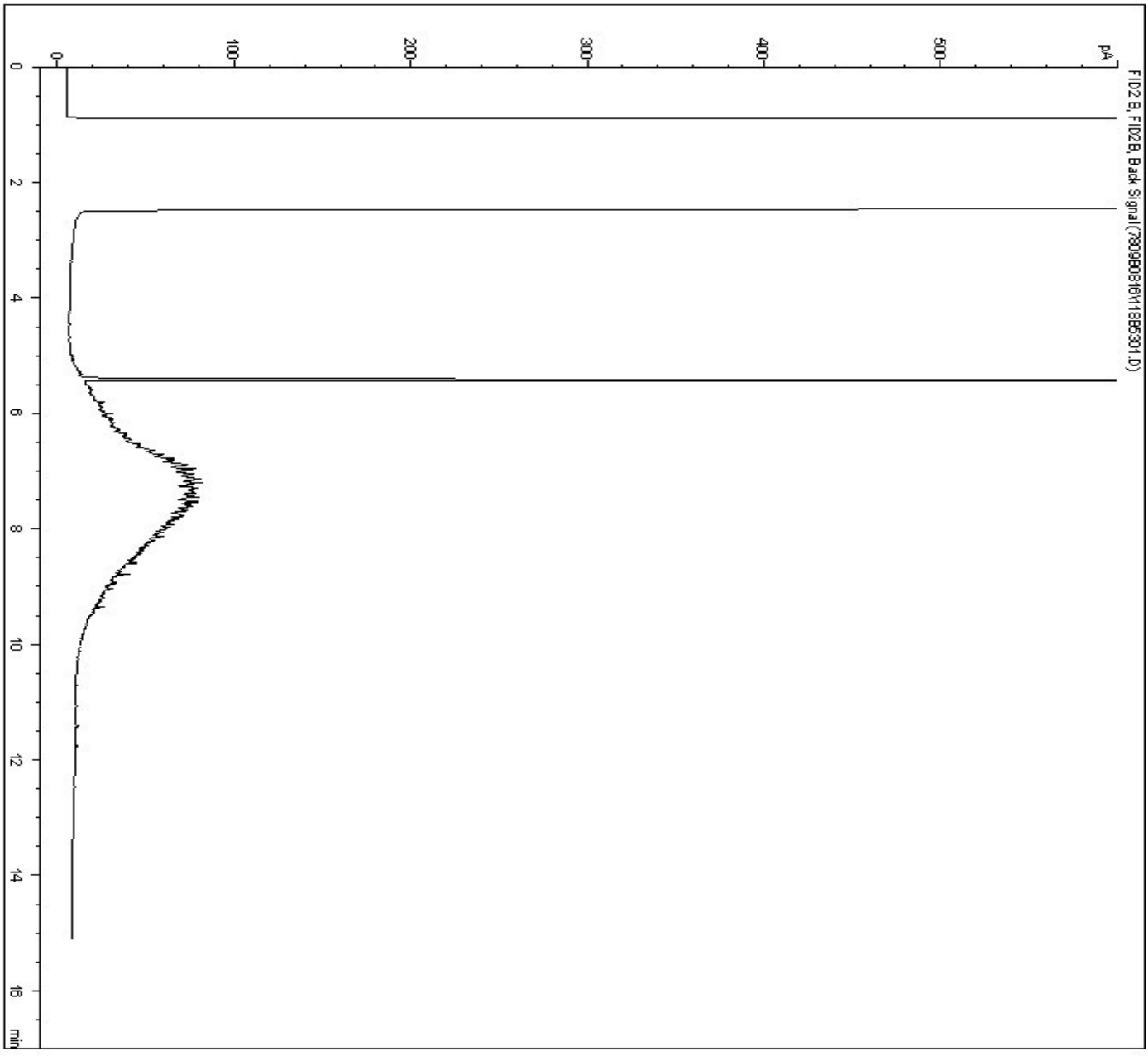
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1860

Site Reference: PATCH
Client ID: 11P8_1@10CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7809B0816\118B5301.D
Sample Name: BG1860



*** End of Report ***

Instrument 1 2011/08/17 9:13:44 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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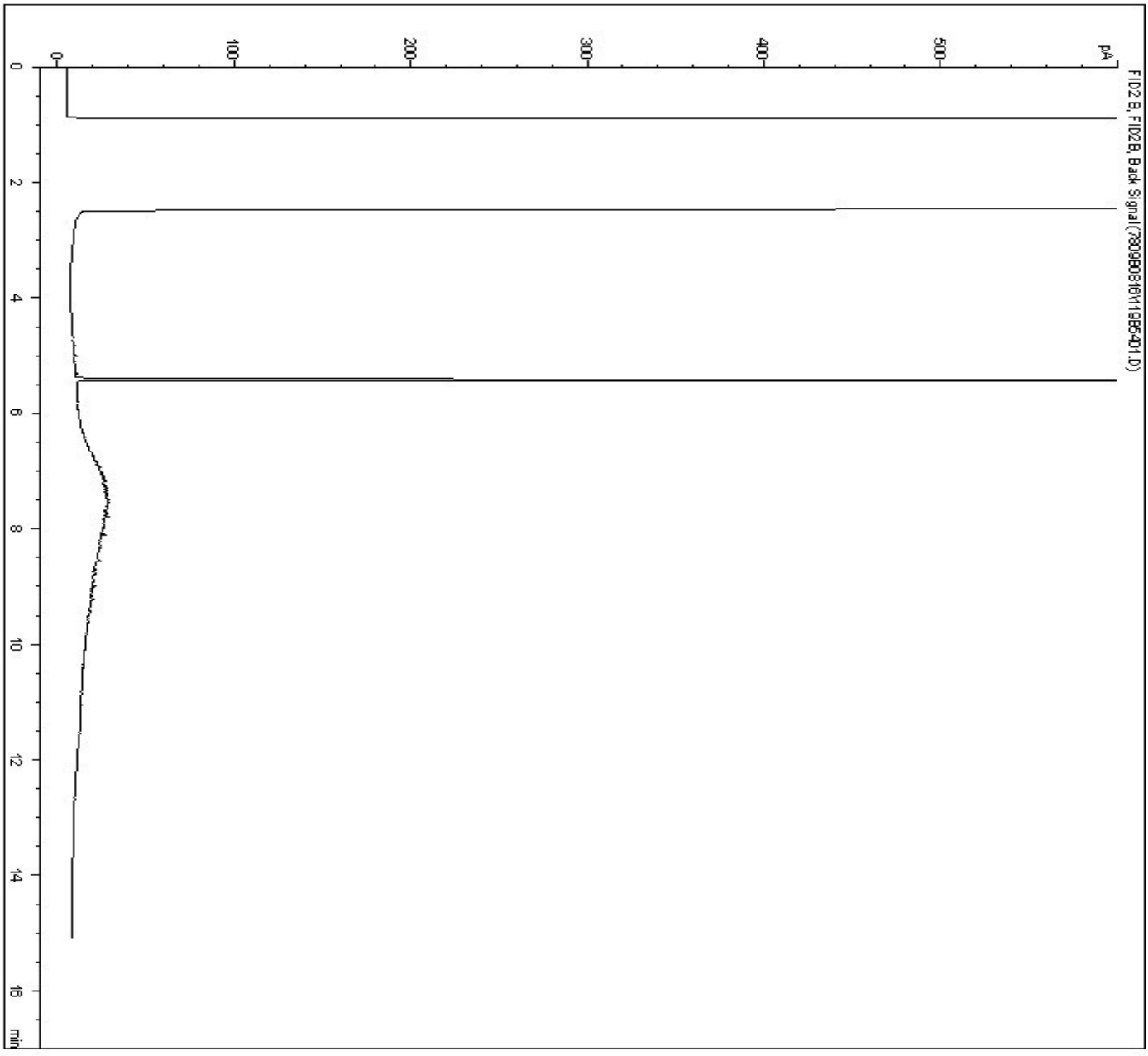
Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1861

Site Reference: PATCH
Client ID: 11P3_5@20CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7809B0816\119B5401.D
Sample Name: BG1861



*** End of Report ***

Instrument 1 2011/08/17 9:13:46 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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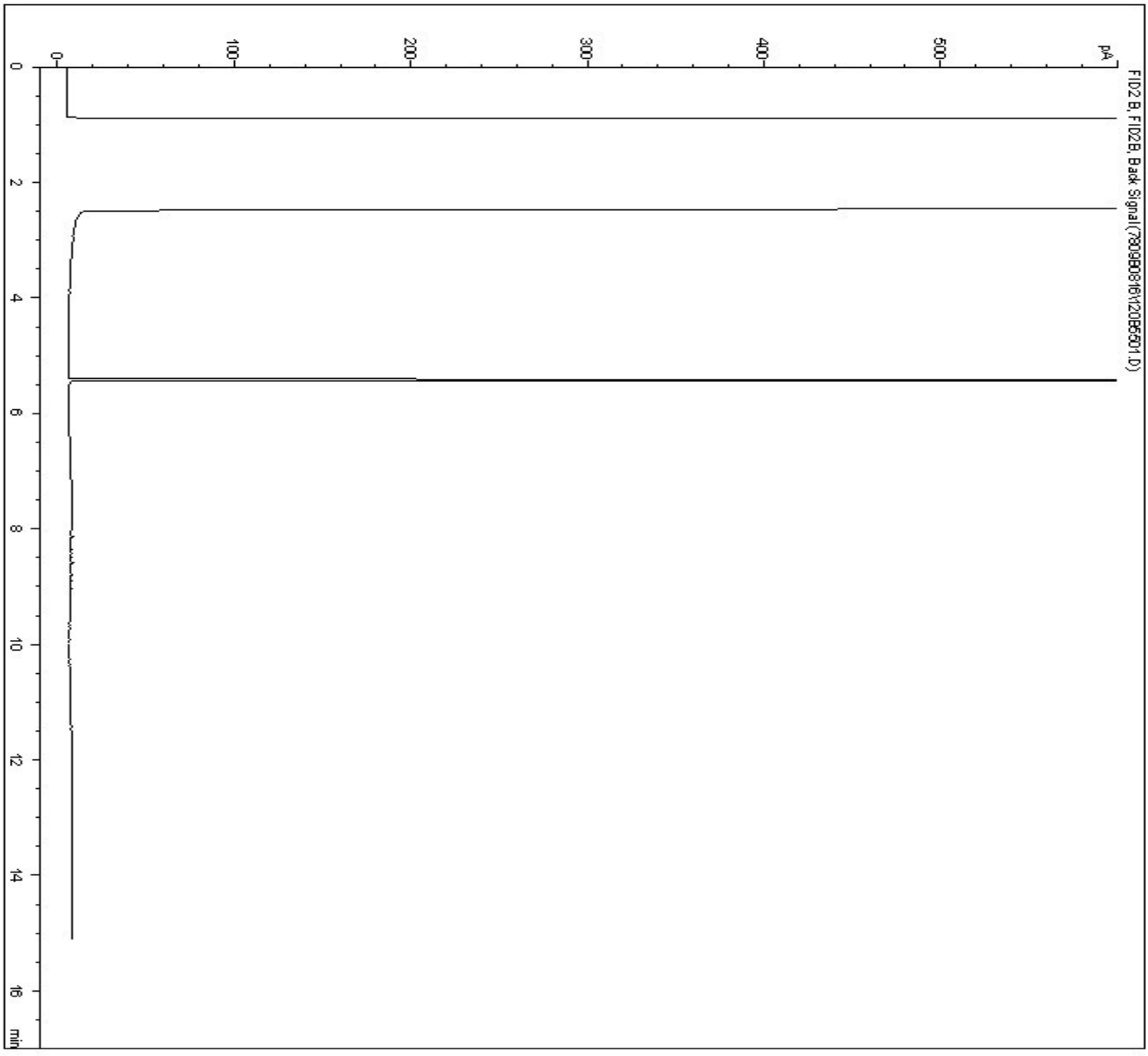
Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1862

Site Reference: PATCH
Client ID: 11P3_3@15CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7809B0816\120B5501.D
Sample Name: BG1862



*** End of Report ***

Instrument 1 2011/08/17 9:13:49 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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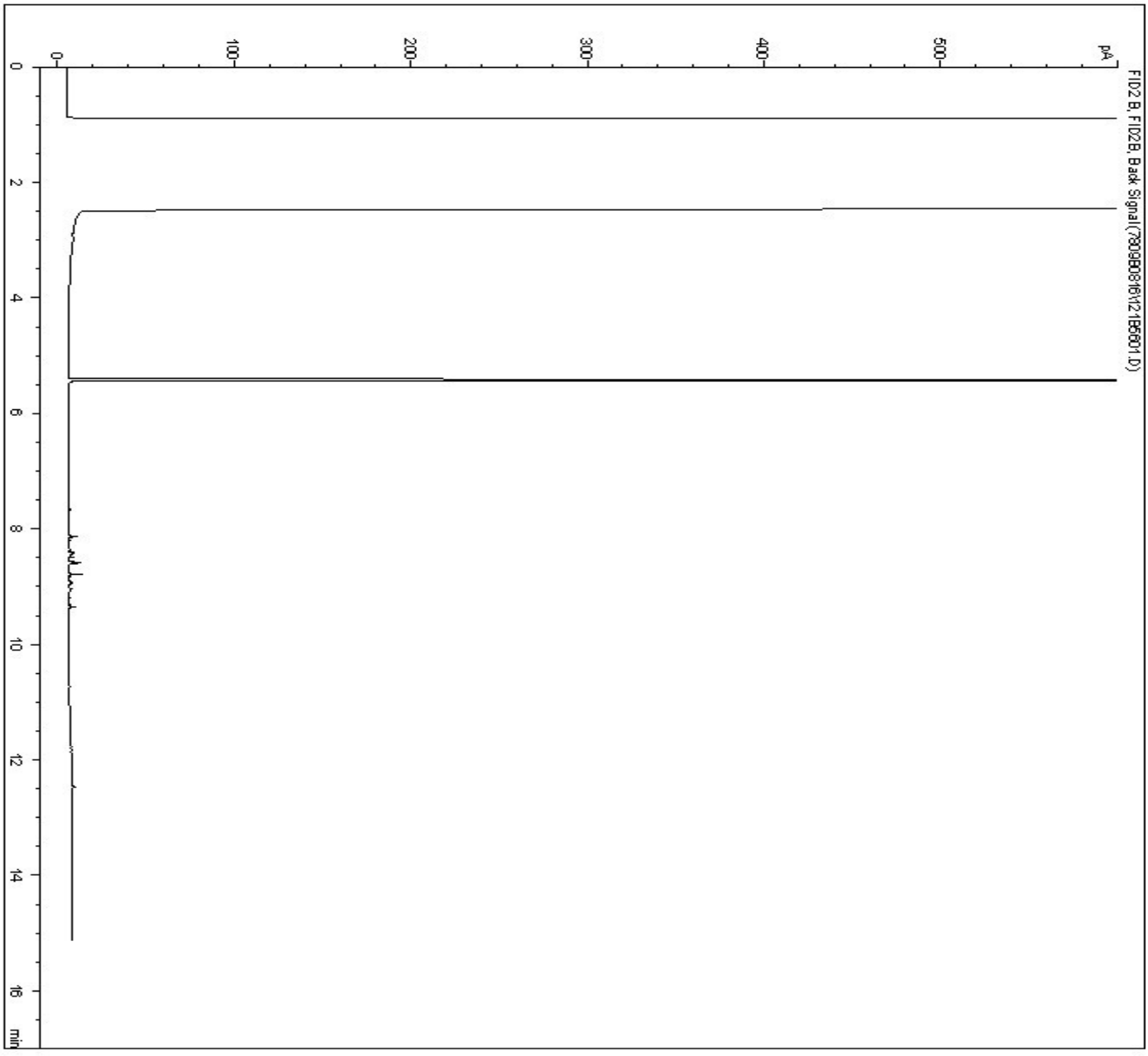
Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1863

Site Reference: PATCH
Client ID: 11P1_24@15CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7809B0816\121B5601.D
Sample Name: BG1863



*** End of Report ***

Instrument 1 2011/08/17 9:13:52 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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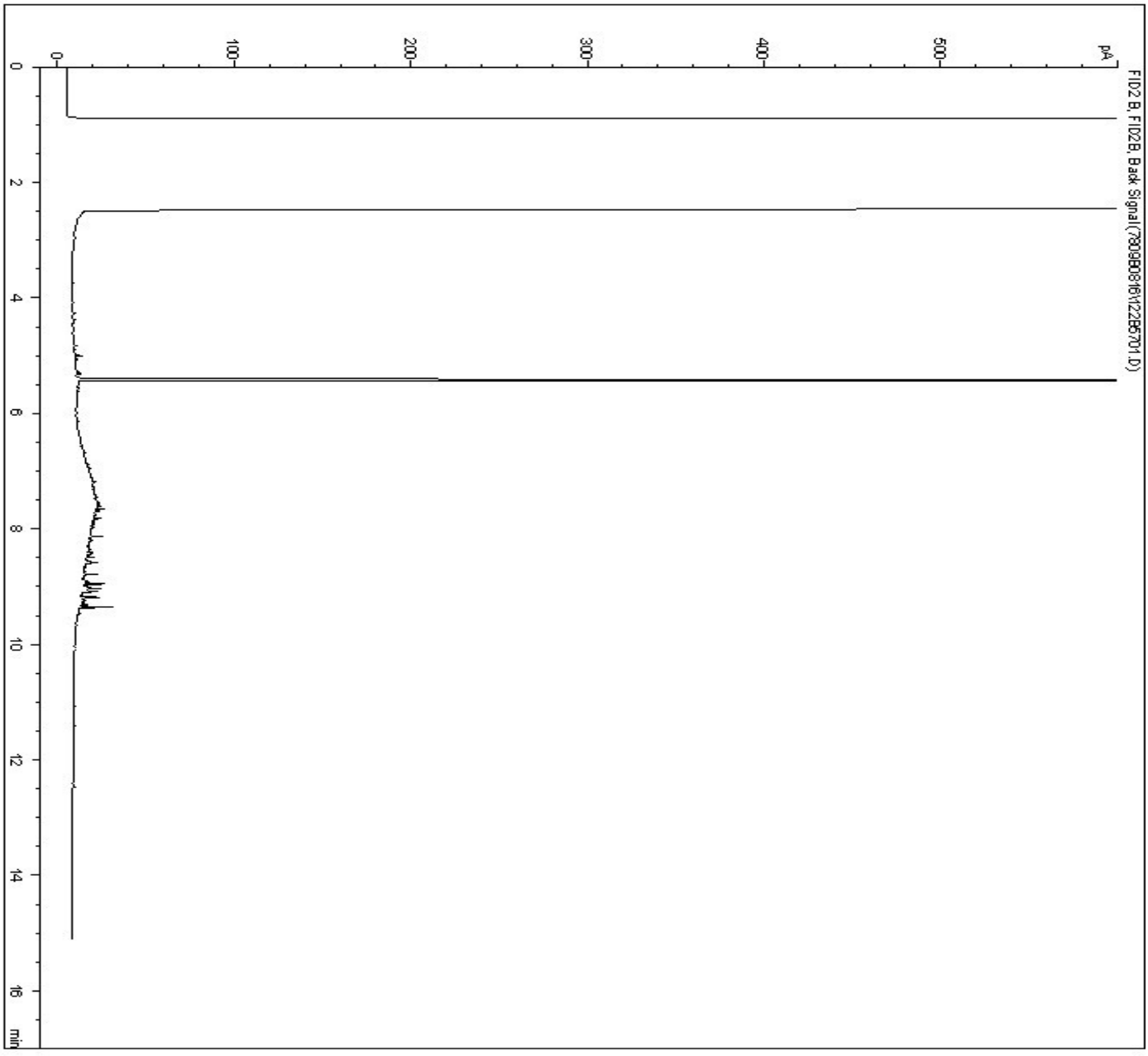
Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1864

Site Reference: PATCH
Client ID: 11P1_21@10CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7809B0816\122B5701.D
Sample Name: BG1864



*** End of Report ***

Instrument 1 2011/08/17 9:13:55 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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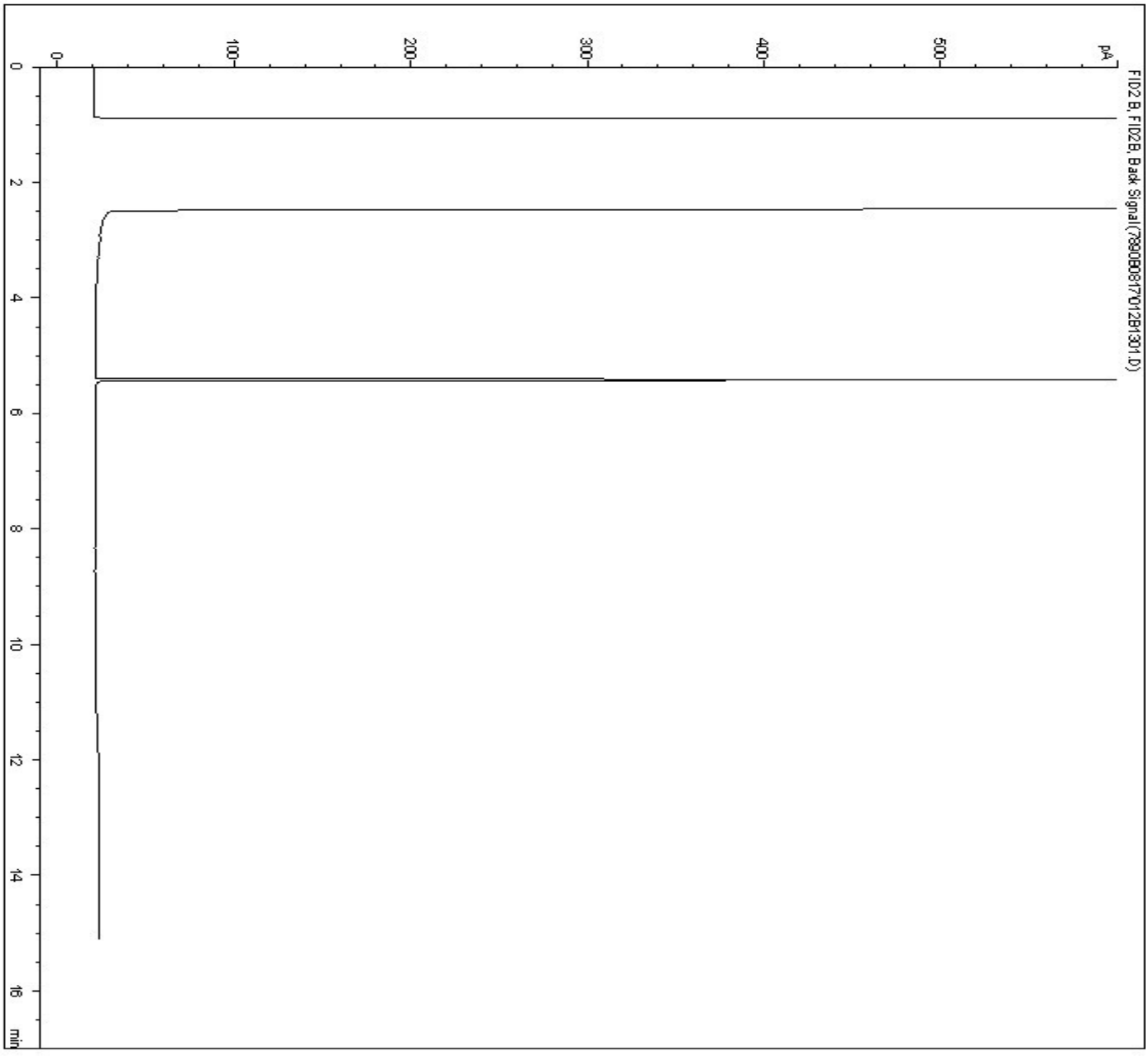
Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1865

Site Reference: PATCH
Client ID: 11P1_5@25CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0817\012B1301.D
Sample Name: BG1865RR



*** End of Report ***

Instrument 1 2011/08/17 3:13:53 PM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam

Success Through Science®

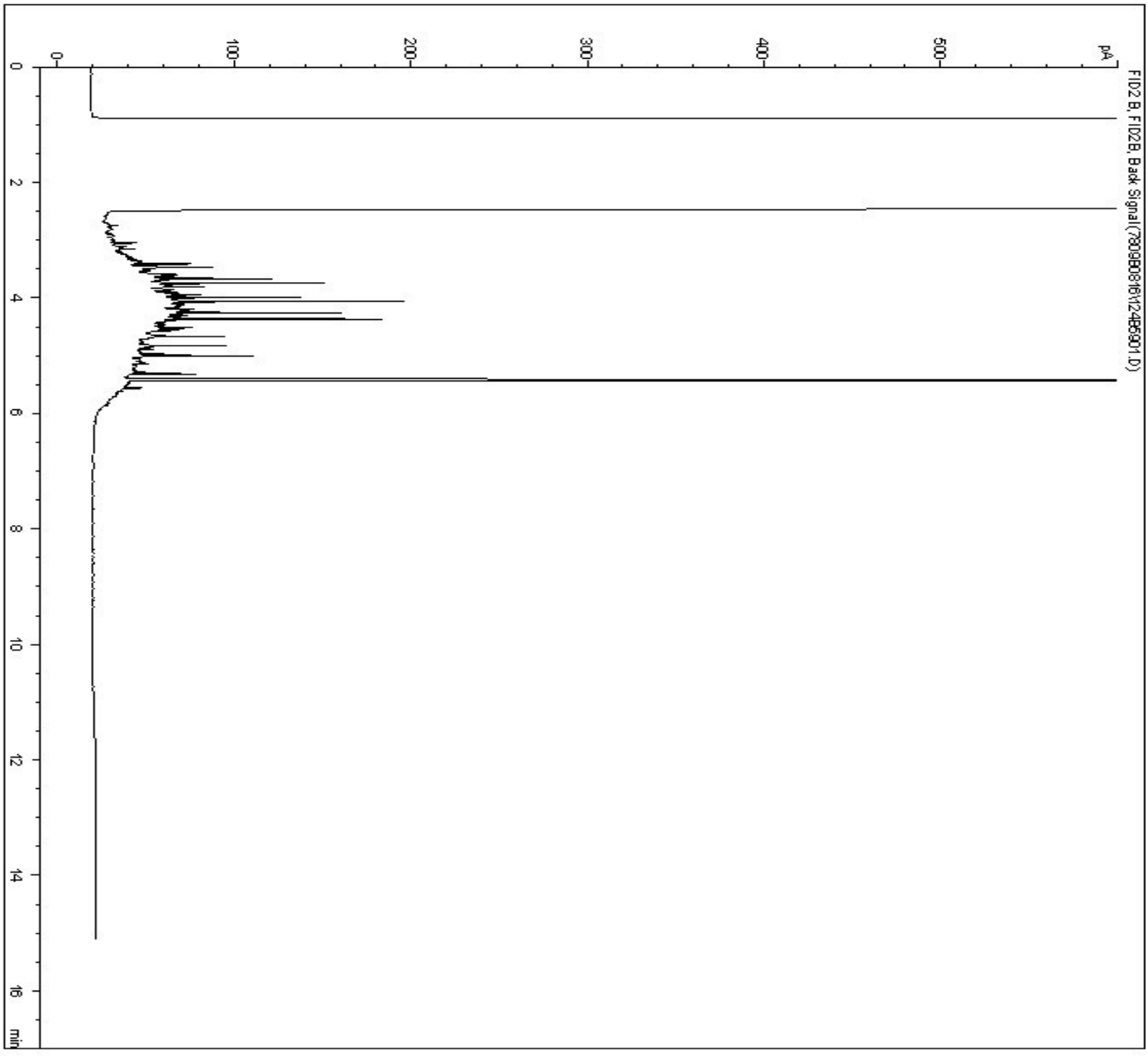
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/22
Maxxam Job #: B174548
Maxxam Sample: BG1866

Site Reference: PATCH
Client ID: 11P1_18@20CM

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Data File C:\CHEM32\1\DATA\7809B0816\124B5901.D
Sample Name: BG1866



*** End of Report ***

Instrument 1 2011/08/17 9:14:00 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam

Your P.O. #: Y22101187.001
Site Location: PATCH LAKE
Your C.O.C. #: A050088

Attention: DANIELA FELSKE
EBA ENGINEERING CONSULTANTS LTD.
EDMONTON - Rebate
14940-123 AVENUE
EDMONTON, AB
CANADA T5V 1B4

Report Date: 2011/08/19

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B174914
Received: 2011/08/13, 10:00

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	2	N/A	2011/08/17	AB SOP-00005	SM 2320-B
BTEX/F1 in Water by HS GC/MS	2	N/A	2011/08/18	EENVSOP-00004 EENVSOP-00002	EPA 8260C/5021A/CCME
Cadmium - low level CCME - Dissolved	2	N/A	2011/08/18	AB SOP-00043	EPA 200.8
Cadmium - low level CCME (Total)	3	2011/08/15	2011/08/18	AB SOP-00043	EPA 200.8
Chloride by Automated Colourimetry	3	N/A	2011/08/17	AB SOP-00020	EPA 325.2
Conductivity @25C	2	N/A	2011/08/17	AB SOP-00005	SM 2510-B
CCME Hydrocarbons in Water (F2; C10-C16)	2	2011/08/17	2011/08/18	AB SOP-00040 AB SOP-00037	EPA3510/CCME PHCCWS
Hardness	2	N/A	2011/08/18	AB WI-00065	SM 2340B
Elements by ICP - Dissolved	2	N/A	2011/08/17	AB SOP-00042	EPA 200.7
Elements by ICP - Total	3	2011/08/17	2011/08/17	AB SOP-00042	EPA 200.7
Elements by ICPMS - Dissolved	2	N/A	2011/08/18	AB SOP-00043	EPA 200.8
Elements by ICPMS - Total	3	2011/08/17	2011/08/18	AB SOP-00043	EPA 200.8
Ion Balance	2	N/A	2011/08/18	AB WI-00065	SM 1030E
Sum of cations, anions	2	N/A	2011/08/18	AB WI-00065	SM 1030E
Nitrate and Nitrite	2	N/A	2011/08/18	Calc	
Nitrate + Nitrite-N (calculated)	2	N/A	2011/08/18	AB SOP-00023	SM 4110-B
Nitrogen, (Nitrite, Nitrate) by IC	1	N/A	2011/08/17	AB SOP-00023	SM 4110-B
Nitrogen, (Nitrite, Nitrate) by IC	1	N/A	2011/08/18	AB SOP-00023	SM 4110-B
pH @25°C (Alkalinity titrator)	2	N/A	2011/08/17	AB SOP-00005	SM 4500-H+B
Sulphate by Automated Colourimetry	2	N/A	2011/08/17	AB SOP-00018	EPA 375.4
Total Dissolved Solids (Calculated)	2	N/A	2011/08/18	AB WI-00065	SM 1030E

../2

Your P.O. #: Y22101187.001
Site Location: PATCH LAKE
Your C.O.C. #: A050088

Attention: DANIELA FELSKE
EBA ENGINEERING CONSULTANTS LTD.
EDMONTON - Rebate
14940-123 AVENUE
EDMONTON, AB
CANADA T5V 1B4

Report Date: 2011/08/19

CERTIFICATE OF ANALYSIS

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Jeremy Wakaruk, B.Sc., Senior Project Manager
Email: JWakaruk@maxxam.ca
Phone# (780) 577-7105 Ext:7105

==========

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.

Total cover pages: 2

Maxxam Job #: B174914
Report Date: 2011/08/19

EBA ENGINEERING CONSULTANTS LTD.

Site Location: PATCH LAKE
Your P.O. #: Y22101187.001
Sampler Initials: MH

AT1 BTEX AND F1-F2 (WATER)

Maxxam ID		BG4091		BG4092		
Sampling Date		2011/08/10 14:10		2011/08/10 14:30		
COC Number		A050088		A050088		
	Units	**11PW-4**	**RDL**	**11PW-5**	**RDL**	**QC Batch**
Hydrocarbons						
F2 (C10-C16 Hydrocarbons)	mg/L	<0.2 (1)	0.2	<0.1	0.1	5097598
Volatiles						
Benzene	mg/L	<0.0004	0.0004	<0.0004	0.0004	5097840
Toluene	mg/L	<0.0004	0.0004	<0.0004	0.0004	5097840
Ethylbenzene	mg/L	<0.0004	0.0004	<0.0004	0.0004	5097840
o-Xylene	mg/L	<0.0004	0.0004	<0.0004	0.0004	5097840
m & p-Xylene	mg/L	<0.0008	0.0008	<0.0008	0.0008	5097840
Xylenes (Total)	mg/L	<0.0008	0.0008	<0.0008	0.0008	5097840
F1 (C6-C10) - BTEX	mg/L	<0.1	0.1	<0.1	0.1	5097840
(C6-C10)	mg/L	<0.1	0.1	<0.1	0.1	5097840
Surrogate Recovery (%)						
4-BROMOFLUOROBENZENE (sur.)	%	98	N/A	100	N/A	5097840
D4-1,2-DICHLOROETHANE (sur.)	%	92	N/A	93	N/A	5097840
D8-TOLUENE (sur.)	%	85	N/A	86	N/A	5097840
O-TERPHENYL (sur.)	%	110	N/A	103	N/A	5097598

N/A = Not Applicable
RDL = Reportable Detection Limit
(1) Detection limit raised based on sample volume used for analysis

Maxxam Job #: B174914
Report Date: 2011/08/19

EBA ENGINEERING CONSULTANTS LTD.

Site Location: PATCH LAKE
Your P.O. #: Y22101187.001
Sampler Initials: MH

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		BG4088		BG4092		
Sampling Date		2011/08/10 13:30		2011/08/10 14:30		
COC Number		A050088		A050088		
	Units	**11PW-1**	**RDL**	**11PW-5**	**RDL**	**QC Batch**
Calculated Parameters						
Anion Sum	meq/L	17	N/A	230	N/A	5092261
Cation Sum	meq/L	15	N/A	230	N/A	5092261
Hardness (CaCO3)	mg/L	500	0.5	10000	0.5	5092259
Ion Balance	N/A	0.91	0.01	0.97	0.01	5092260
Dissolved Nitrate (NO3)	mg/L	0.04	0.01	0.8	0.1	5092262
Nitrate plus Nitrite (N)	mg/L	0.010	0.003	0.19	0.03	5092263
Dissolved Nitrite (NO2)	mg/L	<0.01	0.01	<0.1	0.1	5092262
Total Dissolved Solids	mg/L	930	10	12000	10	5092264
Misc. Inorganics						
Conductivity	uS/cm	1800	1	22000	1	5097973
pH	N/A	6.46	N/A	5.53	N/A	5098009
Low Level Elements						
Dissolved Cadmium (Cd)	ug/L	0.024	0.005	0.7	0.3	5095501
Anions						
Alkalinity (PP as CaCO3)	mg/L	<0.5	0.5	<0.5	0.5	5097680
Alkalinity (Total as CaCO3)	mg/L	24	0.5	11	0.5	5097680
Bicarbonate (HCO3)	mg/L	29	0.5	13	0.5	5097680
Carbonate (CO3)	mg/L	<0.5	0.5	<0.5	0.5	5097680
Hydroxide (OH)	mg/L	<0.5	0.5	<0.5	0.5	5097680
Dissolved Sulphate (SO4)	mg/L	160	1	180	1	5097600
Dissolved Chloride (Cl)	mg/L	460 (1)	5	8100 (1)	50	5097503
Nutrients						
Dissolved Nitrite (N)	mg/L	<0.003	0.003	<0.03 (2)	0.03	5098871
Dissolved Nitrate (N)	mg/L	0.010	0.003	0.19 (2)	0.03	5098871
Elements						
Dissolved Aluminum (Al)	mg/L	0.009	0.001	0.09	0.05	5098027
Dissolved Antimony (Sb)	mg/L	<0.0006	0.0006	<0.03	0.03	5098027
Dissolved Arsenic (As)	mg/L	0.0015	0.0002	<0.01	0.01	5098027
Dissolved Barium (Ba)	mg/L	0.05	0.01	1.4	0.01	5100406
Dissolved Beryllium (Be)	mg/L	<0.001	0.001	<0.05	0.05	5098027

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.
(2) Detection limits raised due to matrix interference

Maxxam Job #: B174914
Report Date: 2011/08/19

EBA ENGINEERING CONSULTANTS LTD.

Site Location: PATCH LAKE
Your P.O. #: Y22101187.001
Sampler Initials: MH

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		BG4088		BG4092		
Sampling Date		2011/08/10 13:30		2011/08/10 14:30		
COC Number		A050088		A050088		
	Units	**11PW-1**	**RDL**	**11PW-5**	**RDL**	**QC Batch**
Dissolved Boron (B)	mg/L	0.06	0.02	0.11	0.02	5100406
Dissolved Calcium (Ca)	mg/L	120	0.3	2900 (1)	3	5100406
Dissolved Chromium (Cr)	mg/L	<0.001	0.001	<0.05	0.05	5098027
Dissolved Cobalt (Co)	mg/L	0.0098	0.0003	0.13	0.02	5098027
Dissolved Copper (Cu)	mg/L	0.0042	0.0002	0.01	0.01	5098027
Dissolved Iron (Fe)	mg/L	0.20	0.06	100	0.06	5100406
Dissolved Lead (Pb)	mg/L	<0.0002	0.0002	<0.01	0.01	5098027
Dissolved Lithium (Li)	mg/L	0.02	0.02	0.10	0.02	5100406
Dissolved Magnesium (Mg)	mg/L	47	0.2	740 (1)	2	5100406
Dissolved Manganese (Mn)	mg/L	0.96	0.004	15	0.004	5100406
Dissolved Molybdenum (Mo)	mg/L	<0.0002	0.0002	<0.01	0.01	5098027
Dissolved Nickel (Ni)	mg/L	0.0048	0.0005	0.09	0.03	5098027
Dissolved Phosphorus (P)	mg/L	0.1	0.1	0.3	0.1	5100406
Dissolved Potassium (K)	mg/L	9.1	0.3	40	0.3	5100406
Dissolved Selenium (Se)	mg/L	0.0002	0.0002	<0.01	0.01	5098027
Dissolved Silicon (Si)	mg/L	9.6	0.1	8.4	0.1	5100406
Dissolved Silver (Ag)	mg/L	<0.0001	0.0001	<0.005	0.005	5098027
Dissolved Sodium (Na)	mg/L	110	0.5	310	0.5	5100406
Dissolved Strontium (Sr)	mg/L	0.23	0.02	7.4 (1)	0.2	5100406
Dissolved Sulphur (S)	mg/L	48	0.2	55	0.2	5100406
Dissolved Thallium (Tl)	mg/L	<0.0002	0.0002	<0.01	0.01	5098027
Dissolved Tin (Sn)	mg/L	<0.001	0.001	<0.05	0.05	5098027
Dissolved Titanium (Ti)	mg/L	<0.001	0.001	<0.05	0.05	5098027
Dissolved Uranium (U)	mg/L	<0.0001	0.0001	<0.005	0.005	5098027
Dissolved Vanadium (V)	mg/L	<0.001	0.001	<0.05	0.05	5098027
Dissolved Zinc (Zn)	mg/L	0.011	0.003	<0.2	0.2	5098027

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

Maxxam Job #: B174914
Report Date: 2011/08/19

EBA ENGINEERING CONSULTANTS LTD.

Site Location: PATCH LAKE
Your P.O. #: Y22101187.001
Sampler Initials: MH

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		BG4088		BG4091		BG4092		
Sampling Date		2011/08/10 13:30		2011/08/10 14:10		2011/08/10 14:30		
COC Number		A050088		A050088		A050088		
	Units	**11PW-1**	**RDL**	**11PW-4**	**RDL**	**11PW-5**	**RDL**	**QC Batch**
Low Level Elements								
Total Cadmium (Cd)	ug/L	1.6	0.05	0.4	0.1	8.6	0.3	5096067
Elements								
Total Aluminum (Al)	mg/L	39 (1)	0.05	63 (1)	0.1	840 (1)	1	5100287
Total Antimony (Sb)	mg/L	<0.006	0.006	<0.01	0.01	<0.03	0.03	5100287
Total Arsenic (As)	mg/L	0.012	0.002	0.026	0.004	0.13	0.01	5100287
Total Barium (Ba)	mg/L	0.38	0.01	0.48	0.01	23	0.1	5100381
Total Beryllium (Be)	mg/L	<0.01	0.01	<0.02	0.02	<0.05	0.05	5100287
Total Boron (B)	mg/L	0.07	0.02	0.08	0.02	1.9	0.2	5100381
Total Calcium (Ca)	mg/L	140	0.3	200	0.3	3100	3	5100381
Total Chromium (Cr)	mg/L	0.12	0.01	0.21	0.02	2.4	0.05	5100287
Total Cobalt (Co)	mg/L	0.042	0.003	0.061	0.006	1.0	0.02	5100287
Total Copper (Cu)	mg/L	0.10	0.002	0.17	0.004	2.6	0.01	5100287
Total Iron (Fe)	mg/L	80	0.06	170	0.06	6400 (2)	6	5100381
Total Lead (Pb)	mg/L	0.021	0.002	0.030	0.004	0.70	0.01	5100287
Total Lithium (Li)	mg/L	0.09	0.02	0.11	0.02	6.2	0.2	5100381
Total Magnesium (Mg)	mg/L	75	0.2	110	0.2	3000	2	5100381
Total Manganese (Mn)	mg/L	1.7	0.004	2.5	0.004	92	0.04	5100381
Total Molybdenum (Mo)	mg/L	<0.002	0.002	<0.004	0.004	<0.01	0.01	5100287
Total Nickel (Ni)	mg/L	0.082	0.005	0.13	0.01	2.6	0.03	5100287
Total Phosphorus (P)	mg/L	0.9	0.1	2.2	0.1	120	1	5100381
Total Potassium (K)	mg/L	21	0.3	22	0.3	950	3	5100381
Total Selenium (Se)	mg/L	<0.002	0.002	<0.004	0.004	<0.01	0.01	5100287
Total Silicon (Si)	mg/L	62	0.1	71	0.1	410	1	5100381
Total Silver (Ag)	mg/L	<0.001	0.001	<0.002	0.002	<0.005	0.005	5100287
Total Sodium (Na)	mg/L	120	0.5	150	0.5	340	5	5100381
Total Strontium (Sr)	mg/L	0.29	0.02	0.46	0.02	10	0.2	5100381
Total Sulphur (S)	mg/L	48	0.2	59	0.2	60	2	5100381
Total Thallium (Tl)	mg/L	<0.002	0.002	<0.004	0.004	0.02	0.01	5100287
Total Tin (Sn)	mg/L	<0.01	0.01	<0.02	0.02	<0.05	0.05	5100287
Total Titanium (Ti)	mg/L	2.7	0.01	4.0	0.02	2.8	0.05	5100287

RDL = Reportable Detection Limit
(1) Detection limit raised due to dilution to bring analyte within the calibrated range.
(2) Detection limits raised due to dilution to bring analyte within the calibrated range.

Maxxam Job #: B174914
Report Date: 2011/08/19

EBA ENGINEERING CONSULTANTS LTD.

Site Location: PATCH LAKE
Your P.O. #: Y22101187.001
Sampler Initials: MH

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		BG4088		BG4091		BG4092		
Sampling Date		2011/08/10 13:30		2011/08/10 14:10		2011/08/10 14:30		
COC Number		A050088		A050088		A050088		
	Units	**11PW-1**	**RDL**	**11PW-4**	**RDL**	**11PW-5**	**RDL**	**QC Batch**
Total Uranium (U)	mg/L	0.004	0.001	0.007	0.002	0.12	0.005	5100287
Total Vanadium (V)	mg/L	0.11	0.01	0.21	0.02	4.0	0.05	5100287
Total Zinc (Zn)	mg/L	0.18	0.03	0.24	0.06	4.7	0.2	5100287

RDL = Reportable Detection Limit

Maxxam Job #: B174914
Report Date: 2011/08/19

EBA ENGINEERING CONSULTANTS LTD.

Site Location: PATCH LAKE
Your P.O. #: Y22101187.001
Sampler Initials: MH

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		BG4090		
Sampling Date		2011/08/10 13:50		
COC Number		A050088		
	Units	**11PW-2**	**RDL**	**QC Batch**
Anions				
Dissolved Chloride (Cl)	mg/L	1200 (1)	30	5097503

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

Maxxam Job #: B174914
Report Date: 2011/08/19

EBA ENGINEERING CONSULTANTS LTD.

Site Location: PATCH LAKE
Your P.O. #: Y22101187.001
Sampler Initials: MH

General Comments

Sample BG4088-01: Detection limits raised due to sample matrix. Parameters affected are Total Cr, Co, Cu, Pb, Sb, Mo, Ni, Se, Ag, As, Tl, Sn, Ti, U, V, Zn, Be, Cd.

Sample BG4091-01: Detection limits raised due to sample matrix. Parameters affected are Total Cr, Co, Cu, Pb, Sb, Mo, Ni, Se, Ag, As, Tl, Sn, Ti, U, V, Zn, Be, Cd.

Sample BG4092-01: Detection limits raised due to sample matrix. Parameters affected are Total Cr, Co, Cu, Pb, Sb, Mo, Ni, Se, Ag, As, Tl, Sn, Ti, U, V, Zn, Be, Cd.

Detection limits raised due to sample matrix. Parameters affected are Dissolved Al, Cr, Co, Cu, Pb, Sb, Mo, Ni, Se, Ag, As, Tl, Sn, Ti, U, V, Zn, Be, Cd.

Detection limits raised due to sample matrix. Parameters affected are Dissolved Fe, Li, Mg, Mn, K, Na, Sr, S, P, Ba, Si, B, Ca

Results relate only to the items tested.

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: Y22101187.001
Site Location: PATCH LAKE

Quality Assurance Report

Maxxam Job Number: EB174914

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5097503	BA3	Matrix Spike	Dissolved Chloride (Cl)	2011/08/17		NC	%	80 - 120
		Spiked Blank	Dissolved Chloride (Cl)	2011/08/17		110	%	80 - 120
		Method Blank	Dissolved Chloride (Cl)	2011/08/17	<1		mg/L	
		RPD	Dissolved Chloride (Cl)	2011/08/17	1.3		%	20
5097598	RC6	Matrix Spike	O-TERPHENYL (sur.)	2011/08/18		94	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/18		83	%	70 - 130
		Spiked Blank	O-TERPHENYL (sur.)	2011/08/18		98	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/18		97	%	70 - 130
		Method Blank	O-TERPHENYL (sur.)	2011/08/18		109	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/18	<0.1		mg/L	
		RPD	F2 (C10-C16 Hydrocarbons)	2011/08/18	NC		%	40
5097600	BA3	Matrix Spike	Dissolved Sulphate (SO4)	2011/08/17		NC	%	80 - 120
		Spiked Blank	Dissolved Sulphate (SO4)	2011/08/17		109	%	80 - 120
		Method Blank	Dissolved Sulphate (SO4)	2011/08/17	<1		mg/L	
		RPD	Dissolved Sulphate (SO4)	2011/08/17	3.1		%	20
5097680	KG6	Spiked Blank	Alkalinity (Total as CaCO3)	2011/08/17		98	%	80 - 120
		Method Blank	Alkalinity (PP as CaCO3)	2011/08/17	<0.5		mg/L	
			Alkalinity (Total as CaCO3)	2011/08/17	<0.5		mg/L	
			Bicarbonate (HCO3)	2011/08/17	<0.5		mg/L	
			Carbonate (CO3)	2011/08/17	<0.5		mg/L	
			Hydroxide (OH)	2011/08/17	<0.5		mg/L	
		RPD	Alkalinity (PP as CaCO3)	2011/08/17	NC		%	20
			Alkalinity (Total as CaCO3)	2011/08/17	0.2		%	20
			Bicarbonate (HCO3)	2011/08/17	0.2		%	20
			Carbonate (CO3)	2011/08/17	NC		%	20
			Hydroxide (OH)	2011/08/17	NC		%	20
5097840	NSE	Matrix Spike	4-BROMOFLUOROBENZENE (sur.)	2011/08/18		109	%	70 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2011/08/18		126	%	70 - 130
			D8-TOLUENE (sur.)	2011/08/18		80	%	70 - 130
			Benzene	2011/08/18		91	%	70 - 130
			Toluene	2011/08/18		90	%	70 - 130
			Ethylbenzene	2011/08/18		93	%	70 - 130
			o-Xylene	2011/08/18		100	%	70 - 130
			m & p-Xylene	2011/08/18		88	%	70 - 130
			(C6-C10)	2011/08/18		116	%	70 - 130
		Spiked Blank	4-BROMOFLUOROBENZENE (sur.)	2011/08/18		103	%	70 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2011/08/18		91	%	70 - 130
			D8-TOLUENE (sur.)	2011/08/18		87	%	70 - 130
			Benzene	2011/08/18		97	%	70 - 130
			Toluene	2011/08/18		100	%	70 - 130
			Ethylbenzene	2011/08/18		112	%	70 - 130
			o-Xylene	2011/08/18		109	%	70 - 130
			m & p-Xylene	2011/08/18		105	%	70 - 130
			(C6-C10)	2011/08/18		96	%	70 - 130
		Method Blank	4-BROMOFLUOROBENZENE (sur.)	2011/08/18		107	%	70 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2011/08/18		91	%	70 - 130
			D8-TOLUENE (sur.)	2011/08/18		89	%	70 - 130
			Benzene	2011/08/18	<0.0004		mg/L	
			Toluene	2011/08/18	<0.0004		mg/L	
			Ethylbenzene	2011/08/18	<0.0004		mg/L	
			o-Xylene	2011/08/18	<0.0004		mg/L	
			m & p-Xylene	2011/08/18	<0.0008		mg/L	
			Xylenes (Total)	2011/08/18	<0.0008		mg/L	
			F1 (C6-C10) - BTEX	2011/08/18	<0.1		mg/L	
			(C6-C10)	2011/08/18	<0.1		mg/L	

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: Y22101187.001
Site Location: PATCH LAKE

Quality Assurance Report (Continued)

Maxxam Job Number: EB174914

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5097840	NSE	RPD	Benzene	2011/08/18	NC		%	40
			Toluene	2011/08/18	NC		%	40
			Ethylbenzene	2011/08/18	NC		%	40
			o-Xylene	2011/08/18	NC		%	40
			m & p-Xylene	2011/08/18	NC		%	40
			Xylenes (Total)	2011/08/18	NC		%	40
			F1 (C6-C10) - BTEX	2011/08/18	NC		%	40
			(C6-C10)	2011/08/18	NC		%	40
5097973	KG6	Spiked Blank	Conductivity	2011/08/17		100	%	90 - 110
		Method Blank	Conductivity	2011/08/17	<1		uS/cm	
		RPD	Conductivity	2011/08/17	0.3		%	20
5098009	KG6	Spiked Blank	pH	2011/08/17		100	%	97 - 103
		RPD	pH	2011/08/17	0.08		%	5
5098027	EO1	Matrix Spike	Dissolved Aluminum (Al)	2011/08/18		89	%	80 - 120
			Dissolved Antimony (Sb)	2011/08/18		98	%	80 - 120
			Dissolved Arsenic (As)	2011/08/18		91	%	80 - 120
			Dissolved Beryllium (Be)	2011/08/18		96	%	80 - 120
			Dissolved Chromium (Cr)	2011/08/18		91	%	80 - 120
			Dissolved Cobalt (Co)	2011/08/18		93	%	80 - 120
			Dissolved Copper (Cu)	2011/08/18		91	%	80 - 120
			Dissolved Lead (Pb)	2011/08/18		96	%	80 - 120
			Dissolved Molybdenum (Mo)	2011/08/18		101	%	80 - 120
			Dissolved Nickel (Ni)	2011/08/18		93	%	80 - 120
			Dissolved Selenium (Se)	2011/08/18		100	%	80 - 120
			Dissolved Silver (Ag)	2011/08/18		82	%	80 - 120
			Dissolved Thallium (Tl)	2011/08/18		96	%	80 - 120
			Dissolved Tin (Sn)	2011/08/18		115	%	80 - 120
			Dissolved Titanium (Ti)	2011/08/18		93	%	80 - 120
			Dissolved Uranium (U)	2011/08/18		98	%	80 - 120
			Dissolved Vanadium (V)	2011/08/18		100	%	80 - 120
			Dissolved Zinc (Zn)	2011/08/18		85	%	80 - 120
		Spiked Blank	Dissolved Aluminum (Al)	2011/08/18		98	%	80 - 120
			Dissolved Antimony (Sb)	2011/08/18		88	%	80 - 120
			Dissolved Arsenic (As)	2011/08/18		92	%	80 - 120
			Dissolved Beryllium (Be)	2011/08/18		94	%	80 - 120
			Dissolved Chromium (Cr)	2011/08/18		91	%	80 - 120
			Dissolved Cobalt (Co)	2011/08/18		94	%	80 - 120
			Dissolved Copper (Cu)	2011/08/18		95	%	80 - 120
			Dissolved Lead (Pb)	2011/08/18		95	%	80 - 120
			Dissolved Molybdenum (Mo)	2011/08/18		95	%	80 - 120
			Dissolved Nickel (Ni)	2011/08/18		95	%	80 - 120
			Dissolved Selenium (Se)	2011/08/18		94	%	80 - 120
			Dissolved Silver (Ag)	2011/08/18		81	%	80 - 120
			Dissolved Thallium (Tl)	2011/08/18		96	%	80 - 120
			Dissolved Tin (Sn)	2011/08/18		111	%	80 - 120
			Dissolved Titanium (Ti)	2011/08/18		93	%	80 - 120
			Dissolved Uranium (U)	2011/08/18		95	%	80 - 120
			Dissolved Vanadium (V)	2011/08/18		98	%	80 - 120
			Dissolved Zinc (Zn)	2011/08/18		95	%	80 - 120
		Method Blank	Dissolved Aluminum (Al)	2011/08/18	<0.001		mg/L	
			Dissolved Antimony (Sb)	2011/08/18	<0.0006		mg/L	
			Dissolved Arsenic (As)	2011/08/18	<0.0002		mg/L	
			Dissolved Beryllium (Be)	2011/08/18	<0.001		mg/L	
			Dissolved Chromium (Cr)	2011/08/18	<0.001		mg/L	
			Dissolved Cobalt (Co)	2011/08/18	<0.0003		mg/L	

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: Y22101187.001
Site Location: PATCH LAKE

Quality Assurance Report (Continued)

Maxxam Job Number: EB174914

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5098027	EO1	Method Blank	Dissolved Copper (Cu)	2011/08/18	<0.0002		mg/L	
			Dissolved Lead (Pb)	2011/08/18	<0.0002		mg/L	
			Dissolved Molybdenum (Mo)	2011/08/18	<0.0002		mg/L	
			Dissolved Nickel (Ni)	2011/08/18	<0.0005		mg/L	
			Dissolved Selenium (Se)	2011/08/18	<0.0002		mg/L	
			Dissolved Silver (Ag)	2011/08/18	<0.0001		mg/L	
			Dissolved Thallium (Tl)	2011/08/18	<0.0002		mg/L	
			Dissolved Tin (Sn)	2011/08/18	<0.001		mg/L	
			Dissolved Titanium (Ti)	2011/08/18	<0.001		mg/L	
			Dissolved Uranium (U)	2011/08/18	<0.0001		mg/L	
			Dissolved Vanadium (V)	2011/08/18	<0.001		mg/L	
			Dissolved Zinc (Zn)	2011/08/18	<0.003		mg/L	
		RPD	Dissolved Aluminum (Al)	2011/08/18	1.6		%	20
			Dissolved Antimony (Sb)	2011/08/18	NC		%	20
			Dissolved Arsenic (As)	2011/08/18	NC		%	20
			Dissolved Beryllium (Be)	2011/08/18	NC		%	20
			Dissolved Chromium (Cr)	2011/08/18	NC		%	20
			Dissolved Cobalt (Co)	2011/08/18	NC		%	20
			Dissolved Copper (Cu)	2011/08/18	1.4		%	20
			Dissolved Lead (Pb)	2011/08/18	NC		%	20
			Dissolved Molybdenum (Mo)	2011/08/18	NC		%	20
			Dissolved Nickel (Ni)	2011/08/18	NC		%	20
			Dissolved Selenium (Se)	2011/08/18	NC		%	20
			Dissolved Silver (Ag)	2011/08/18	NC		%	20
			Dissolved Thallium (Tl)	2011/08/18	NC		%	20
			Dissolved Tin (Sn)	2011/08/18	NC		%	20
			Dissolved Titanium (Ti)	2011/08/18	NC		%	20
			Dissolved Uranium (U)	2011/08/18	NC		%	20
			Dissolved Vanadium (V)	2011/08/18	NC		%	20
			Dissolved Zinc (Zn)	2011/08/18	NC		%	20
5098871	KU	Matrix Spike	Dissolved Nitrite (N)	2011/08/17		102	%	80 - 120
			Dissolved Nitrate (N)	2011/08/17		NC	%	80 - 120
		Spiked Blank	Dissolved Nitrite (N)	2011/08/17		99	%	80 - 120
			Dissolved Nitrate (N)	2011/08/17		102	%	90 - 110
		Method Blank	Dissolved Nitrite (N)	2011/08/17	<0.003		mg/L	
			Dissolved Nitrate (N)	2011/08/17	<0.003		mg/L	
		RPD	Dissolved Nitrite (N)	2011/08/17	NC		%	20
			Dissolved Nitrate (N)	2011/08/17	0.1		%	20
5100287	EO1	Matrix Spike	Total Aluminum (Al)	2011/08/18		NC	%	80 - 120
			Total Antimony (Sb)	2011/08/18		108	%	80 - 120
			Total Arsenic (As)	2011/08/18		89	%	80 - 120
			Total Beryllium (Be)	2011/08/18		90	%	80 - 120
			Total Chromium (Cr)	2011/08/18		103	%	80 - 120
			Total Cobalt (Co)	2011/08/18		100	%	80 - 120
			Total Copper (Cu)	2011/08/18		100	%	80 - 120
			Total Lead (Pb)	2011/08/18		98	%	80 - 120
			Total Molybdenum (Mo)	2011/08/18		114	%	80 - 120
			Total Nickel (Ni)	2011/08/18		105	%	80 - 120
			Total Selenium (Se)	2011/08/18		83	%	80 - 120
			Total Silver (Ag)	2011/08/18		103	%	80 - 120
			Total Thallium (Tl)	2011/08/18		99	%	80 - 120
			Total Titanium (Ti)	2011/08/18		108	%	80 - 120
			Total Uranium (U)	2011/08/18		105	%	80 - 120
			Total Vanadium (V)	2011/08/18		110	%	80 - 120
			Total Zinc (Zn)	2011/08/18		82	%	80 - 120

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: Y22101187.001
Site Location: PATCH LAKE

Quality Assurance Report (Continued)

Maxxam Job Number: EB174914

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5100287	EO1	Spiked Blank	Total Aluminum (Al)	2011/08/18		93	%	80 - 120
			Total Antimony (Sb)	2011/08/18		104	%	80 - 120
			Total Arsenic (As)	2011/08/18		88	%	80 - 120
			Total Beryllium (Be)	2011/08/18		88	%	80 - 120
			Total Chromium (Cr)	2011/08/18		101	%	80 - 120
			Total Cobalt (Co)	2011/08/18		100	%	80 - 120
			Total Copper (Cu)	2011/08/18		103	%	80 - 120
			Total Lead (Pb)	2011/08/18		102	%	80 - 120
			Total Molybdenum (Mo)	2011/08/18		105	%	80 - 120
			Total Nickel (Ni)	2011/08/18		105	%	80 - 120
			Total Selenium (Se)	2011/08/18		81	%	80 - 120
			Total Silver (Ag)	2011/08/18		103	%	80 - 120
			Total Thallium (Tl)	2011/08/18		101	%	80 - 120
			Total Tin (Sn)	2011/08/18		119	%	80 - 120
			Total Titanium (Ti)	2011/08/18		103	%	80 - 120
			Total Uranium (U)	2011/08/18		102	%	80 - 120
			Total Vanadium (V)	2011/08/18		106	%	80 - 120
			Total Zinc (Zn)	2011/08/18		86	%	80 - 120
		Method Blank	Total Aluminum (Al)	2011/08/18	0.002, RDL=0.001		mg/L	
			Total Antimony (Sb)	2011/08/18	0.0008, RDL=0.0006		mg/L	
			Total Arsenic (As)	2011/08/18	0.0003, RDL=0.0002		mg/L	
			Total Beryllium (Be)	2011/08/18	<0.001		mg/L	
			Total Chromium (Cr)	2011/08/18	<0.001		mg/L	
			Total Cobalt (Co)	2011/08/18	<0.0003		mg/L	
			Total Copper (Cu)	2011/08/18	0.0003, RDL=0.0002		mg/L	
			Total Lead (Pb)	2011/08/18	<0.0002		mg/L	
			Total Molybdenum (Mo)	2011/08/18	<0.0002		mg/L	
			Total Nickel (Ni)	2011/08/18	<0.0005		mg/L	
			Total Selenium (Se)	2011/08/18	<0.0002		mg/L	
			Total Silver (Ag)	2011/08/18	<0.0001		mg/L	
			Total Thallium (Tl)	2011/08/18	<0.0002		mg/L	
			Total Tin (Sn)	2011/08/18	<0.001		mg/L	
			Total Titanium (Ti)	2011/08/18	<0.001		mg/L	
			Total Uranium (U)	2011/08/18	<0.0001		mg/L	
			Total Vanadium (V)	2011/08/18	<0.001		mg/L	
			Total Zinc (Zn)	2011/08/18	<0.003		mg/L	
		RPD	Total Aluminum (Al)	2011/08/18	8.9		%	20
			Total Antimony (Sb)	2011/08/18	NC		%	20
			Total Arsenic (As)	2011/08/18	0.2		%	20
			Total Beryllium (Be)	2011/08/18	NC		%	20
			Total Chromium (Cr)	2011/08/18	NC		%	20
			Total Cobalt (Co)	2011/08/18	NC		%	20
			Total Copper (Cu)	2011/08/18	3.4		%	20
			Total Lead (Pb)	2011/08/18	NC		%	20
			Total Molybdenum (Mo)	2011/08/18	NC		%	20
			Total Nickel (Ni)	2011/08/18	NC		%	20
			Total Selenium (Se)	2011/08/18	NC		%	20
			Total Silver (Ag)	2011/08/18	NC		%	20
			Total Thallium (Tl)	2011/08/18	NC		%	20
			Total Tin (Sn)	2011/08/18	NC		%	20
			Total Titanium (Ti)	2011/08/18	NC		%	20
			Total Uranium (U)	2011/08/18	NC		%	20
			Total Vanadium (V)	2011/08/18	NC		%	20
			Total Zinc (Zn)	2011/08/18	NC		%	20
5100381	NC3	Matrix Spike	Total Barium (Ba)	2011/08/17		84	%	80 - 120

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: Y22101187.001
Site Location: PATCH LAKE

Quality Assurance Report (Continued)

Maxxam Job Number: EB174914

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5100381	NC3	Matrix Spike	Total Boron (B)	2011/08/17		94	%	80 - 120
			Total Calcium (Ca)	2011/08/17		NC	%	80 - 120
			Total Iron (Fe)	2011/08/17		NC	%	80 - 120
			Total Lithium (Li)	2011/08/17		90	%	80 - 120
			Total Magnesium (Mg)	2011/08/17		90	%	80 - 120
			Total Manganese (Mn)	2011/08/17		92	%	80 - 120
			Total Phosphorus (P)	2011/08/17		94	%	80 - 120
			Total Potassium (K)	2011/08/17		89	%	80 - 120
			Total Silicon (Si)	2011/08/17		94	%	80 - 120
			Total Sodium (Na)	2011/08/17		99	%	80 - 120
			Total Strontium (Sr)	2011/08/17		84	%	80 - 120
		Spiked Blank	Total Barium (Ba)	2011/08/17		84	%	80 - 120
			Total Boron (B)	2011/08/17		93	%	80 - 120
			Total Calcium (Ca)	2011/08/17		91	%	80 - 120
			Total Iron (Fe)	2011/08/17		99	%	80 - 120
			Total Lithium (Li)	2011/08/17		89	%	80 - 120
			Total Magnesium (Mg)	2011/08/17		89	%	80 - 120
			Total Manganese (Mn)	2011/08/17		91	%	80 - 120
			Total Phosphorus (P)	2011/08/17		91	%	80 - 120
			Total Potassium (K)	2011/08/17		89	%	80 - 120
			Total Silicon (Si)	2011/08/17		91	%	80 - 120
			Total Sodium (Na)	2011/08/17		94	%	80 - 120
			Total Strontium (Sr)	2011/08/17		84	%	80 - 120
			Total Sulphur (S)	2011/08/17		100	%	80 - 120
		Method Blank	Total Barium (Ba)	2011/08/17	<0.01		mg/L	
			Total Boron (B)	2011/08/17	<0.02		mg/L	
			Total Calcium (Ca)	2011/08/17	<0.3		mg/L	
			Total Iron (Fe)	2011/08/17	<0.06		mg/L	
			Total Lithium (Li)	2011/08/17	<0.02		mg/L	
			Total Magnesium (Mg)	2011/08/17	<0.2		mg/L	
			Total Manganese (Mn)	2011/08/17	<0.004		mg/L	
			Total Phosphorus (P)	2011/08/17	<0.1		mg/L	
			Total Potassium (K)	2011/08/17	<0.3		mg/L	
			Total Silicon (Si)	2011/08/17	<0.1		mg/L	
			Total Sodium (Na)	2011/08/17	<0.5		mg/L	
			Total Strontium (Sr)	2011/08/17	<0.02		mg/L	
			Total Sulphur (S)	2011/08/17	<0.2		mg/L	
		RPD	Total Barium (Ba)	2011/08/17	NC		%	20
			Total Boron (B)	2011/08/17	1.7		%	20
			Total Calcium (Ca)	2011/08/17	0.8		%	20
			Total Iron (Fe)	2011/08/17	0.3		%	20
			Total Lithium (Li)	2011/08/17	NC		%	20
			Total Magnesium (Mg)	2011/08/17	1.2		%	20
			Total Manganese (Mn)	2011/08/17	0.7		%	20
			Total Phosphorus (P)	2011/08/17	NC		%	20
			Total Potassium (K)	2011/08/17	2.1		%	20
			Total Silicon (Si)	2011/08/17	1		%	20
			Total Sodium (Na)	2011/08/17	2.3		%	20
			Total Strontium (Sr)	2011/08/17	NC		%	20
			Total Sulphur (S)	2011/08/17	2.8		%	20
5100406	NC3	Matrix Spike	Dissolved Barium (Ba)	2011/08/17		104	%	80 - 120
			Dissolved Boron (B)	2011/08/17		117	%	80 - 120
			Dissolved Calcium (Ca)	2011/08/17		NC	%	80 - 120
			Dissolved Iron (Fe)	2011/08/17		NC	%	80 - 120
			Dissolved Lithium (Li)	2011/08/17		96	%	80 - 120

EBA ENGINEERING CONSULTANTS LTD.
Attention: DANIELA FELSKE
Client Project #:
P.O. #: Y22101187.001
Site Location: PATCH LAKE

Quality Assurance Report (Continued)

Maxxam Job Number: EB174914

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
5100406	NC3	Matrix Spike	Dissolved Magnesium (Mg)	2011/08/17		116	%	80 - 120
			Dissolved Manganese (Mn)	2011/08/17		117	%	80 - 120
			Dissolved Phosphorus (P)	2011/08/17		106	%	80 - 120
			Dissolved Potassium (K)	2011/08/17		108	%	80 - 120
			Dissolved Silicon (Si)	2011/08/17		104	%	80 - 120
			Dissolved Sodium (Na)	2011/08/17		92	%	80 - 120
			Dissolved Strontium (Sr)	2011/08/17		105	%	80 - 120
		Spiked Blank	Dissolved Barium (Ba)	2011/08/17		95	%	80 - 120
			Dissolved Boron (B)	2011/08/17		103	%	80 - 120
			Dissolved Calcium (Ca)	2011/08/17		106	%	80 - 120
			Dissolved Iron (Fe)	2011/08/17		109	%	80 - 120
			Dissolved Lithium (Li)	2011/08/17		85	%	80 - 120
			Dissolved Magnesium (Mg)	2011/08/17		107	%	80 - 120
			Dissolved Manganese (Mn)	2011/08/17		95	%	80 - 120
			Dissolved Phosphorus (P)	2011/08/17		106	%	80 - 120
			Dissolved Potassium (K)	2011/08/17		98	%	80 - 120
			Dissolved Silicon (Si)	2011/08/17		91	%	80 - 120
			Dissolved Sodium (Na)	2011/08/17		88	%	80 - 120
			Dissolved Strontium (Sr)	2011/08/17		93	%	80 - 120
			Dissolved Sulphur (S)	2011/08/17		98	%	80 - 120
		Method Blank	Dissolved Barium (Ba)	2011/08/17	<0.01		mg/L	
			Dissolved Boron (B)	2011/08/17	<0.02		mg/L	
			Dissolved Calcium (Ca)	2011/08/17	<0.3		mg/L	
			Dissolved Iron (Fe)	2011/08/17	<0.06		mg/L	
			Dissolved Lithium (Li)	2011/08/17	<0.02		mg/L	
			Dissolved Magnesium (Mg)	2011/08/17	<0.2		mg/L	
			Dissolved Manganese (Mn)	2011/08/17	<0.004		mg/L	
			Dissolved Phosphorus (P)	2011/08/17	<0.1		mg/L	
			Dissolved Potassium (K)	2011/08/17	<0.3		mg/L	
			Dissolved Silicon (Si)	2011/08/17	<0.1		mg/L	
			Dissolved Sodium (Na)	2011/08/17	<0.5		mg/L	
			Dissolved Strontium (Sr)	2011/08/17	<0.02		mg/L	
			Dissolved Sulphur (S)	2011/08/17	<0.2		mg/L	
		RPD	Dissolved Barium (Ba)	2011/08/17	NC		%	20
			Dissolved Boron (B)	2011/08/17	0.8		%	20
			Dissolved Calcium (Ca)	2011/08/17	1.0		%	20
			Dissolved Iron (Fe)	2011/08/17	0.002		%	20
			Dissolved Lithium (Li)	2011/08/17	NC		%	20
			Dissolved Magnesium (Mg)	2011/08/17	0.9		%	20
			Dissolved Manganese (Mn)	2011/08/17	0.2		%	20
			Dissolved Phosphorus (P)	2011/08/17	NC		%	20
			Dissolved Potassium (K)	2011/08/17	0.9		%	20
			Dissolved Silicon (Si)	2011/08/17	0.2		%	20
			Dissolved Sodium (Na)	2011/08/17	2.1		%	20
			Dissolved Strontium (Sr)	2011/08/17	0.9		%	20
			Dissolved Sulphur (S)	2011/08/17	0.3		%	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 to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
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 spiked amount was not sufficiently significant to permit a reliable recovery calculation.
NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

Maxxam

Calgary: 4000 19st St. NE, T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-8889
www.maxxamanalytics.com

08/567(3)

Chain of Custody

A050088

Page: 1 of 1

	Invoice To: C/O Report Address ☐	Report To: Same as Invoice ☑	Report Distribution (E-Mail):
Company:	EBA		
Contact:	Daniela Fekske		DFelske@eba.ca
Address:	14940-123Ave		mhebert@eba.ca
	Prov: AB PC: T5V 1B4	Prov: PC:	
Contact #s:	Ph: 780-451-2121 Cell:	Ph: Cell:	

REGULATORY GUIDELINES:
- ☐ AT1
- ☑ CCME
- ☐ Regulated Drinking Water
- ☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #: A22101187.001
Project # / Name:
Site Location: Patch Lake
Quote #:
Sampled By: Michel Hebert

SERVICE REQUESTED: ☐ RUSH (Contact lab to reserve) Date Required: ☑ REGULAR (5 to 7 Days)

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	WATER: ☐BTEX F1 ☐VOCs	☐BTEX F1-F2 ☐BTEX F1-F4	☐Routine Water ☐Turb ☐F	☐TOC ☐DOC	Regulated Metals (CCME / AT1) Total	Dissolved	☐Total ☐Dissolved Mercury	Other Analysis: Chloride	HOLD - Do not Analyze	# of Containers Submitted
1	11 PW-1		W	11/08/10 13:30									X		X	X		X		3
2	11 PW-2		W	11/08/10 13:50														X		1
3	11 PW-4		W	11/08/10 14:10								X			X	X				7
4	11 PW-5		W	11/08/10 14:30								X	X		X	X		X		8
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				

Please indicate Filtered, Preserved or Both (F, P, F/P) → P F/P

ID/RPT F P

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Michel Hebert / Michel Hebert	11/08/11	9:00
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions:

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #: B174914
AMANDA / CHRISTINE	2011.08.13	10:00	

Lab Comments:	Custody Seal	Temperature	Ice
	ABSENT	10,13,11	PRESENT
		10,8,11	

Success Through Science®

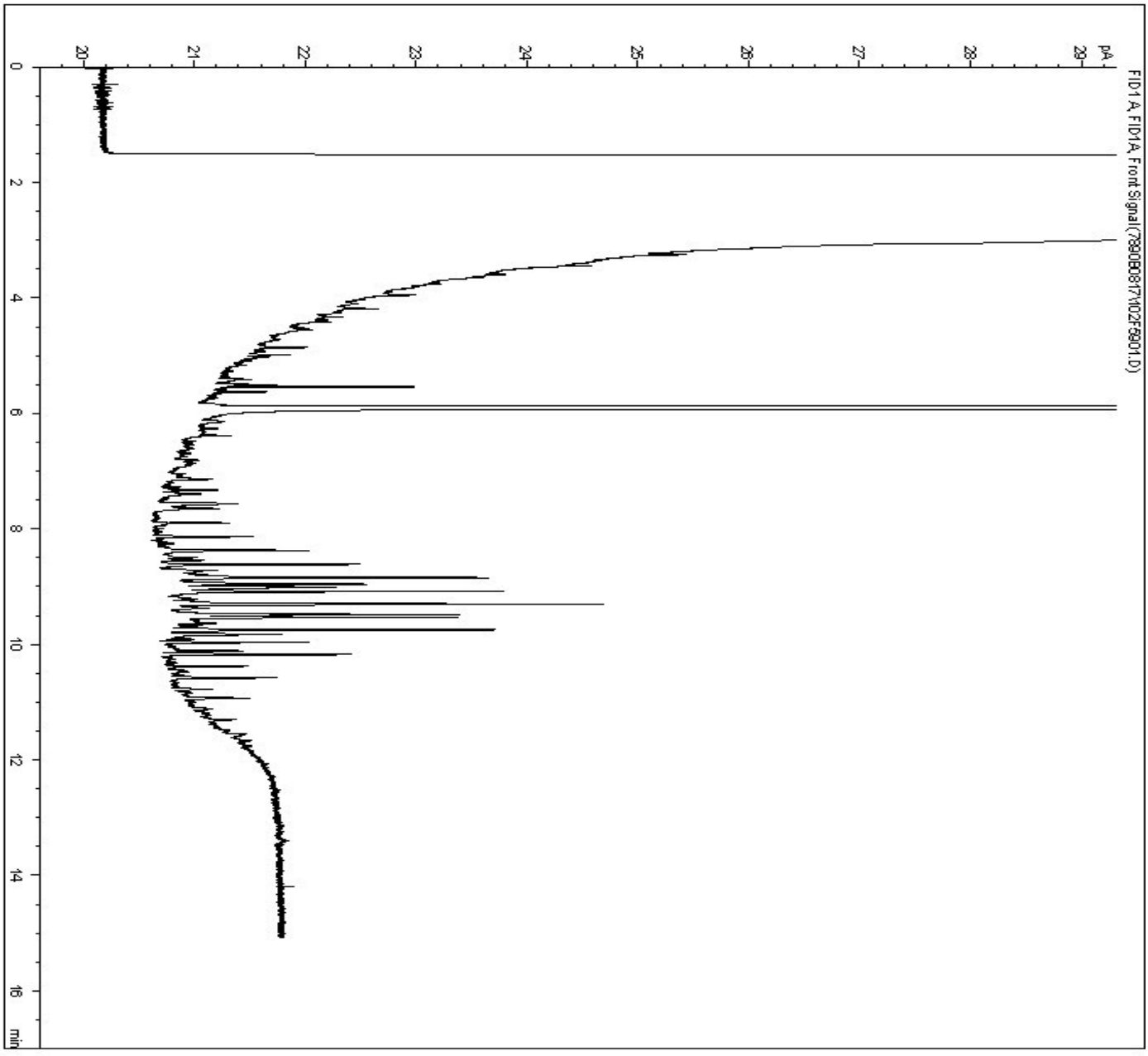
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/19
Maxxam Job #: B174914
Maxxam Sample: BG4091

Site Reference: PATCH LAKE
Client ID: 11PW-4

CCME Hydrocarbons in Water (F2; C10-C16) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0817\102F5901.D
Sample Name: BG4091-02



*** End of Report ***

Instrument 1 2011/08/18 10:08:36 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam

Success Through Science®

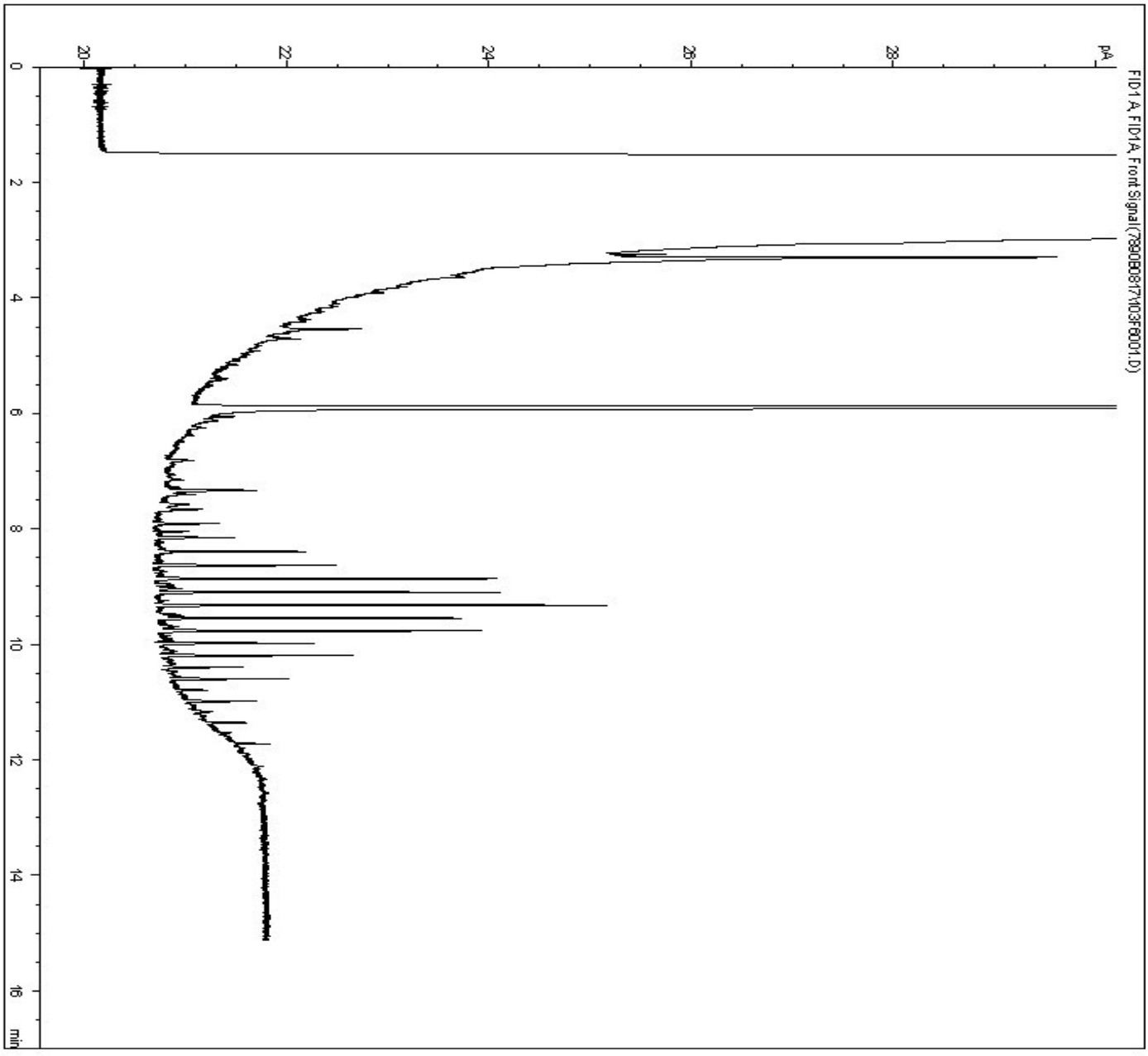
EBA ENGINEERING CONSULTANTS LTD.

Report Date: 2011/08/19
Maxxam Job #: B174914
Maxxam Sample: BG4092

Site Reference: PATCH LAKE
Client ID: 11PW-5

CCME Hydrocarbons in Water (F2; C10-C16) Chromatogram

Data File C:\CHEM32\1\DATA\7890B0817\103F6001.D
Sample Name: BG4092-02



*** End of Report ***

Instrument 1 2011/08/18 10:08:39 AM RC6

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

APPENDIX B

APPENDIX B SIREM BIOTREATABILITY PROPOSAL

SiREM
Site Recovery & Management
130 Research Lane, Suite 2
Guelph, Ontario N1G 5G3
Phone: (519) 822-2265
Fax: (519) 822-3151
www.siremlab.com

1 March 2011 SiREM Ref: Si-1274-030111

Daniela Felske
EBA Engineering
A Tetra Tech Company
Environment Practice
14940 - 123 Avenue
Edmonton, AB T5V 1B4

via email: dfelske@eba.ca

Reference: Proposal for Laboratory Biotreatability Study to Assess Biodegradation of Petroleum Hydrocarbons,

Dear Daniela:

Further to your request, SiREM has prepared this proposal that presents a scope of work and estimate of costs to conduct a laboratory biotreatability study to assess the potential for *in situ* bioremediation of petroleum hydrocarbons (PH) in soil from a site in northern Canada (the Site).

The proposed study will evaluate the natural and enhanced aerobic degradation processes for PH using geologic material (i.e., soil) from two locations (Patch and Windy) at the Site. These materials will be used to construct the treatment and control microcosms. The Patch area target PHs are the F3 fraction and the Windy area target PHs are the F2 fraction.

Aerobic and anaerobic treatments will be constructed to assess the rate and extent of biodegradation that can be achieved at the Site by the indigenous microbial populations under natural aerobic *in situ* conditions (intrinsic controls), through the addition of moisture and nutrients separately.

The remainder of this proposal presents: the study approach and methodology (Section 1); the proposed schedule (Section 2); and a cost estimate for the biotreatability study (Section 3).

1. BIOTREATABILITY STUDY APPROACH & METHODOLOGY

The biotreatability study will consist of the following three tasks:

- Microcosm construction (Task 1);
- Microcosm incubation, sampling and analysis (Task 2); and
- Reporting (Task 3).

Geologic materials (soil) for the microcosms will be provided to SiREM by EBA Engineering (EBA). Sampling protocols, shipping requirements and required sample volumes will be provided by SiREM upon acceptance of this proposal.

Task 1 – Microcosm Construction

Site geologic materials will be homogenized under aerobic conditions in a chemical fume hood for the Patch area and under anaerobic conditions in a disposable anaerobic glove bag for the Windy area prior to microcosm construction. Samples will be collected for preliminary analysis of PH (submitted to Maxxam Analytics, Mississauga, ON), nutrients (nitrogen and phosphorus) (Soil and Nutrient Laboratory, University of Guelph, Guelph, ON), moisture, water holding capacity and soil pH. The homogenized materials will be tightly wrapped and stored at 4°C until required for microcosm construction.

Microcosms will be constructed by filling 250 milliliter (mL) (nominal volume) wide-mouth glass bottles with Site geologic material leaving a nominal headspace for gas production (e.g., carbon dioxide). All treatments will be prepared in duplicate as detailed in Table 1 and sufficient replicate samples will be prepared for up to four sacrificial sample events plus an additional set of replicates for an optional additional sampling event.

All treatments and controls will be amended with water to reach approximately one half of the water holding capacity at the start of the study. The microcosms will be weighed weekly and the microcosms will be amended with water (as required) to maintain consistent moisture content. The nutrient treatment amendments will be amended with standard soil nutrients (nitrogen and phosphorus) at a 100:10:1 carbon: nitrogen: phosphorus ratio (concentrations to be determined based on TP analysis).

Intrinsic control microcosms will be used to measure intrinsic biodegradation activity. The Patch area intrinsic controls will be incubated under aerobic conditions and the Windy area intrinsic controls will be incubated under anaerobic conditions.

For the Patch location microcosms, to maintain aerobic conditions and to mimic tilling action, the microcosms will be stirred with a glass rod two to three times per week. The aerobic treatments will be amended with a commercial oxygen releasing compound (to be selected). The nutrient treatment amendments will be amended with standard soil nutrients (nitrogen and phosphorus) at a 100:10:1 carbon: nitrogen: phosphorus ratio (concentrations to be determined based on TP analysis).

The Windy area microcosms will not be mixed due to the proximity of the Site location to permafrost.

Table 1: **Treatments and Controls for Biotreatability Study**

	Treatment/Control	Description	Patch location	Windy location
1	Intrinsic Control	Unamended	2	2
2	Aerobic Treatment	Amended with oxygen releasing compound	2	2
3	Aerobic Nutrient Amended	Amended with oxygen releasing compound plus nitrogen and phosphorus	2	--
4	Nitrate Treatment	Amended with nitrate as electron acceptor	--	2
5	Wastewater	Amended with wastewater as electron acceptor	--	2
		Number of Microcosms	**6**	**8**

Losses in target compounds and changes in degradation compound concentrations will be compared. Averages from the duplicates of each treatment will be calculated and standard deviations provided.

Task 2 - Microcosm Incubation, Sampling and Analysis

Table 2 summarizes the sampling schedule for this study. Baseline samples of the soil will be taken from the homogenized geologic material and analyzed for the applicable PH fraction, nitrogen, phosphorus, moisture, water holding capacity and soil pH.

Biotreatability study microcosms will be incubated for a period up to twelve weeks. Sacrificial soil samples for analysis of PH will be taken at time zero and three time periods (time 0, weeks 4, 8 and 12). Samples of the geologic material will be analyzed at time 0, weeks 4 and 12 for analysis of nitrogen, phosphorus and soil pH. PH analysis by Maxxam Analytics will include two fractions: the F2 and F3 fractions.

Table 2: Scope of Microcosm Sampling and Analysis

Analyte	Number of Microcosms	Matrix	Number of Sample Events	Total Number of Samples
Moisture and water holding capacity	--	Soil	baseline	2
PH – F2 fraction	8	Soil	3 + 2 baseline	26
PH – F3 fraction	6	Soil	3 + 2 baseline	20
Nitrogen and phosphorus	14	Soil	3 + 2 baseline	44
pH	14	Soil	3 +2 baseline	44

Sampling intervals for individual treatments may be modified (either shorter or longer intervals) during the biotreatability study based on observed microbial activity and degradation rates.

Task 3 – Reporting

SiREM will provide monthly updates to EBA via email. SiREM will tabulate the study data and will prepare a report containing the methodology and all data generated from the microcosm study. A draft report will be provided to EBA for review and comment, and a final report will be provided after receipt of the comments on the draft version.

2. SCHEDULE

SiREM is prepared to commence work upon award of contract. Construction of microcosms will commence within two weeks of receiving the geologic materials. A draft report will be submitted within two weeks of receipt of final analytical data and the final report will be provided within two weeks after receipt of comments from EBA on the draft version.

3. COST ESTIMATE AND ASSUMPTIONS

SiREM is prepared to conduct the proposed scope of work for the biotreatability study for a fixed-fee of $12,196 plus applicable taxes. These costs include set-up and analysis of all microcosms, reporting, all professional time, general laboratory disbursements and associated standard analyses.

This cost estimate is based on the following assumptions:

1. No Workplan, other than this proposal will be required for submittal/approval by regulatory agencies.

2. Geologic materials and groundwater sample collection and shipment to SiREM are paid for by customer (costs not included herein).

3. TPH analyses are paid for by customer (costs not included herein).

The contract terms and conditions applicable to laboratory research studies are unique. To minimize the administrative efforts between our firms and to facilitate this business transaction, SiREM recommends, that this proposal be governed by the attached terms and conditions (Attachment A). Your signature below will confirm your acceptance of SiREM's terms and conditions. If you desire to use your own contract form, please forward it to my attention. As soon as we have reached agreement on the terms, SiREM will proceed with its services.

Please note that SiREM is a division of Geosyntec Consultants, Inc, a corporation organized under the laws of the State of Florida.

If SiREM's proposal is acceptable, please indicate agreement by having an authorized representative sign in the space provided below and returning a complete copy of this proposal and attachments to my attention. Should you have any questions or need additional information regarding this quotation, please contact me at 1-866-251-1747 extension 236.

Sincerely,

Sandra Dworatzek, M.Sc.
Senior Manager

Attachment A: Terms and Conditions for Research Studies

Agreed and Accepted By:

SiREM Proposal: Si-1274-030111		Proposal Amount:$ 12,196
Authorized Signature		Date:
Printed Name		
Email Address		
Purchase Order	PO #	☐ No PO will be issued
Prime Contract	☐ Applies, Copy Attached	☐ No Prime Contract Applies

Attachment A: Research Study Terms and Conditions

Order for Research Study. These Terms and Conditions (T&Cs) apply to any research study ("Research Study") performed by SiREM. Such Research Study is initiated by a purchase order, quote or acceptance of a proposal ("Order").

Invoicing and Payment. SiREM, in order to cover the material cost to set up the Research Study, will invoice Client 50% of the total budget for the Research Study established in the Order upon receipt of the Order. Thereafter, SiREM will invoice Client on a time and materials basis up to the total authorized cost. The balance shall be invoiced upon submission of the Research Study report. Payment is due within 30 days of receipt of SiREM's invoice. In the event the Research Study is pursuant to a prime contract between Client and its client, payment for a Research Study greater than $5,000 shall be made the earlier of Client's receipt of payment from its client or 90 days from receipt of SiREM's invoice. Client shall pay an additional charge of one percent (1%) of the amount of the invoice per month or the maximum percentage allowed by law, whichever is the lesser, for any payment received by SiREM beyond the payment terms set forth herein.

Samples and Reporting. Unless otherwise set forth in the Order, Client will obtain samples and ship to SiREM at Client's expense. At Client's request, SiREM will provide sample containers at no cost. SiREM is responsible for resampling costs while samples are in its care, custody and control only to the extent loss or damage to the samples arises out of SiREM's negligence or willful misconduct. The results of the Research Study will be delivered to Client in SiREM's standard report format. In the event that Client desires a different report format, Client agrees to provide a sample to SiREM prior to the performance of the Research Study. Client understands and agrees that the unit prices in the Order assume standard report format and may be adjusted in the event such special reporting format results in an increased level of effort.

Standard of Care and Indemnity. SiREM will perform the Research Study and will dispose of samples in accordance with the schedule (if any) set forth in the Order, and applicable federal, provincial, state or local laws and regulations. The Research Study will be in accordance with SiREM's general operating quality assurance and control program. SiREM will defend, indemnify and hold harmless Client for losses, claims or causes of action to the extent arising out of SiREM's professional negligence or willful misconduct.

Confidentiality. SiREM will maintain as confidential any documents or information provided by Client and Research Study reports and will not release, distribute or publish the same to any third party without prior permission from Client, unless compelled by law or order of a court or regulatory body of competent jurisdiction. In such event, SiREM will provide advance written notice to Client prior to release.

Force Majeure/Consequential Damages. Neither party will hold the other responsible for damages or delays in performance caused by force majeure, acts of God, or other events beyond the reasonable control of the delayed party. In no event will either party be liable to the other for any incidental or consequential damages arising in connection with the Research Study.

Termination. Client may terminate the Order prior to the commencement of the Research Study by written notice to SiREM.

Assignments. The Order is non-assignable by either party without the prior written consent of the other party.

Validity. These T&Cs will be enforced to the fullest extent permitted by law. If any provision is found to be invalid or unenforceable, the provision will be construed and applied in a way that comes as close as possible to expressing the intention of the parties and that saves the validity and enforceability of the provision.

No Third Party Rights. These T&Cs will not create any rights or benefits to parties other than Client and SiREM, provided, however, that if Client is a prime contractor, then Client's client shall be entitled to rely upon the Research Study reports to the same extent as Client, subject to these T&Cs.

Notices: Any information or notices required or permitted under the Order will be deemed to have been sufficiently given if in writing and delivered either personally or by mail to the representatives of the parties as set forth in the Order or as otherwise designated by the parties. Notice given by mail will also be transmitted by facsimile or email at the time of mailing.

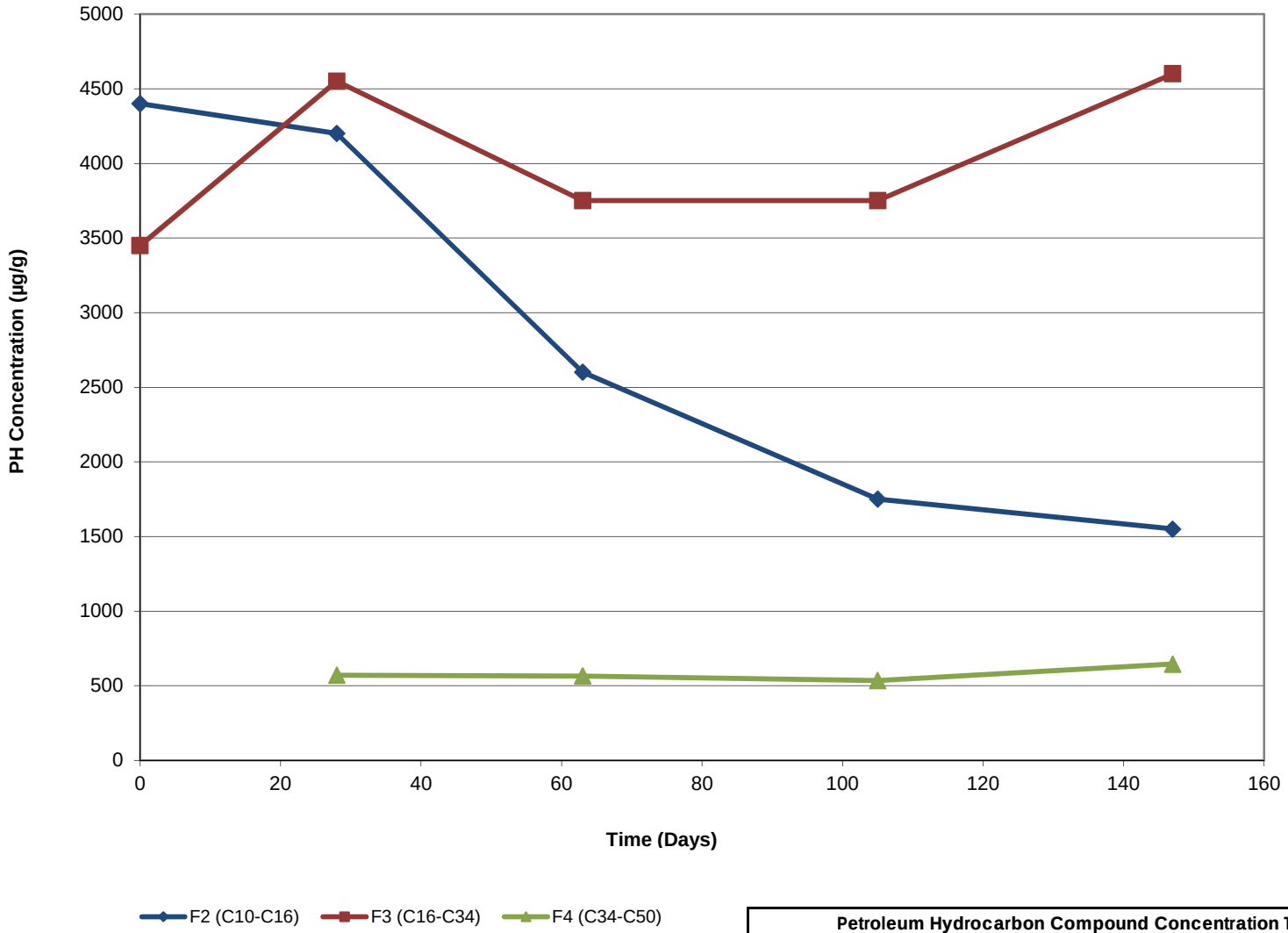
Client's Prime Contract. In the event that Client is obligated to flow down the provisions of its prime contract, Client shall provide a copy to SiREM concurrent with its execution of this document to which these T&Cs are attached. SiREM reserves the right to review and accept the mandatory flow down provisions of the prime contract prior to its performance. SiREM shall be bound to the Terms and conditions of the prime contract only to the extent that they are expressly imposed upon Client's subcontractors. SiREM's signature on the document to which these T&Cs are attached shall evidence its acceptance of the prime contract flow down requirements.

Integrated Writing. The Order and these T&Cs, together with any Supplemental T&Cs attached hereto, constitute a final and complete repository of the agreements between Client and SiREM and supersede all prior or contemporaneous communications, representations, or agreements, whether oral or written and shall only be modified through a mutually acceptable written addendum hereto. It is expressly agreed by the parties that if Client issues a Purchase Order or similar document, it shall be solely for financial authorization purposes and any terms and conditions contained therein shall not modify these T&Cs.

APPENDIX C

APPENDIX C SIREM BIOTREATABILITY STUDY GRAPHS

Graph 1

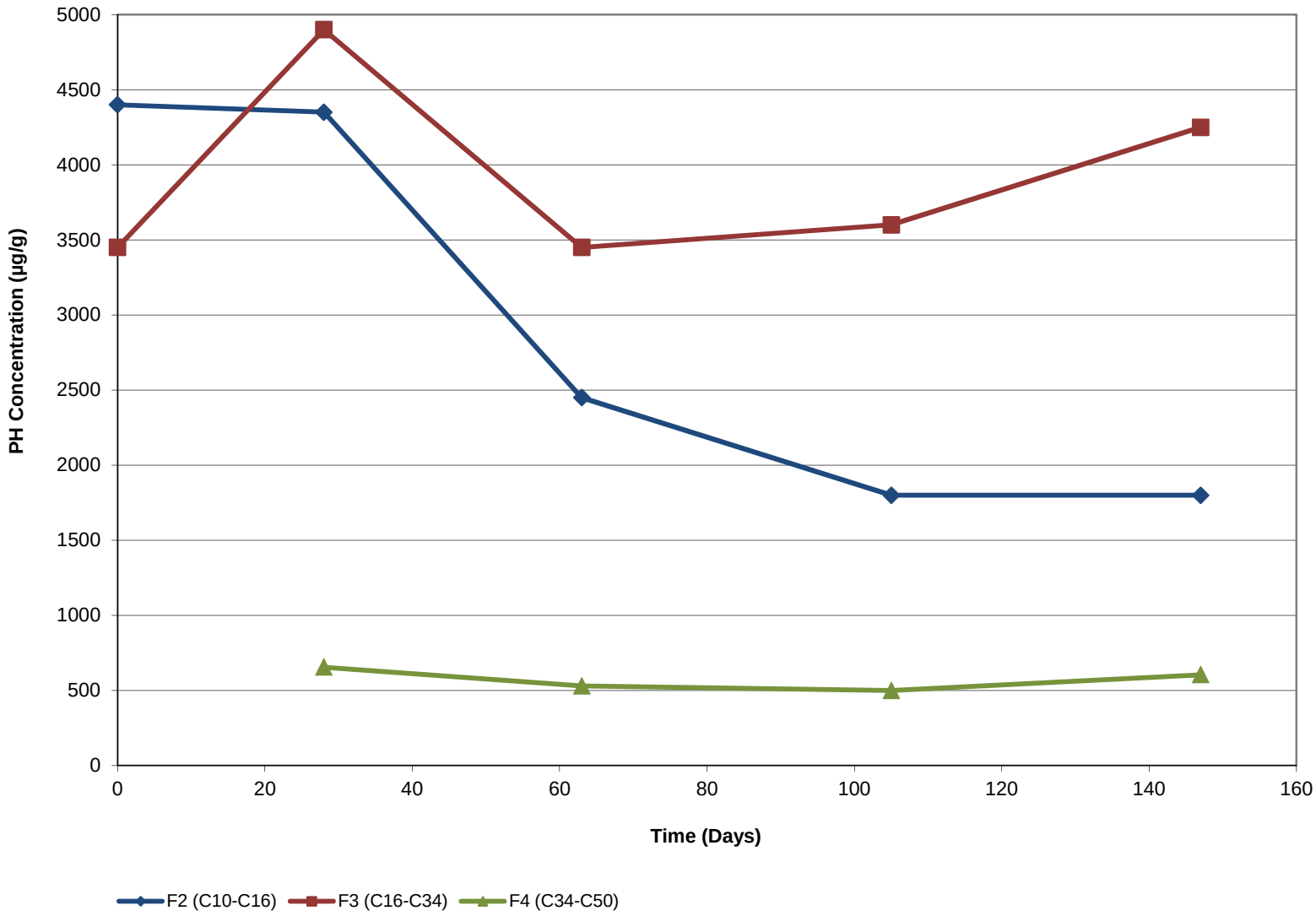


Petroleum Hydrocarbon Compound Concentration Trends in Aerobic Active Control Microcosms (Patch Location)

Hope Bay, Northern Canada

4-Jun-12	Figure: **1**	SiREM

Graph 2

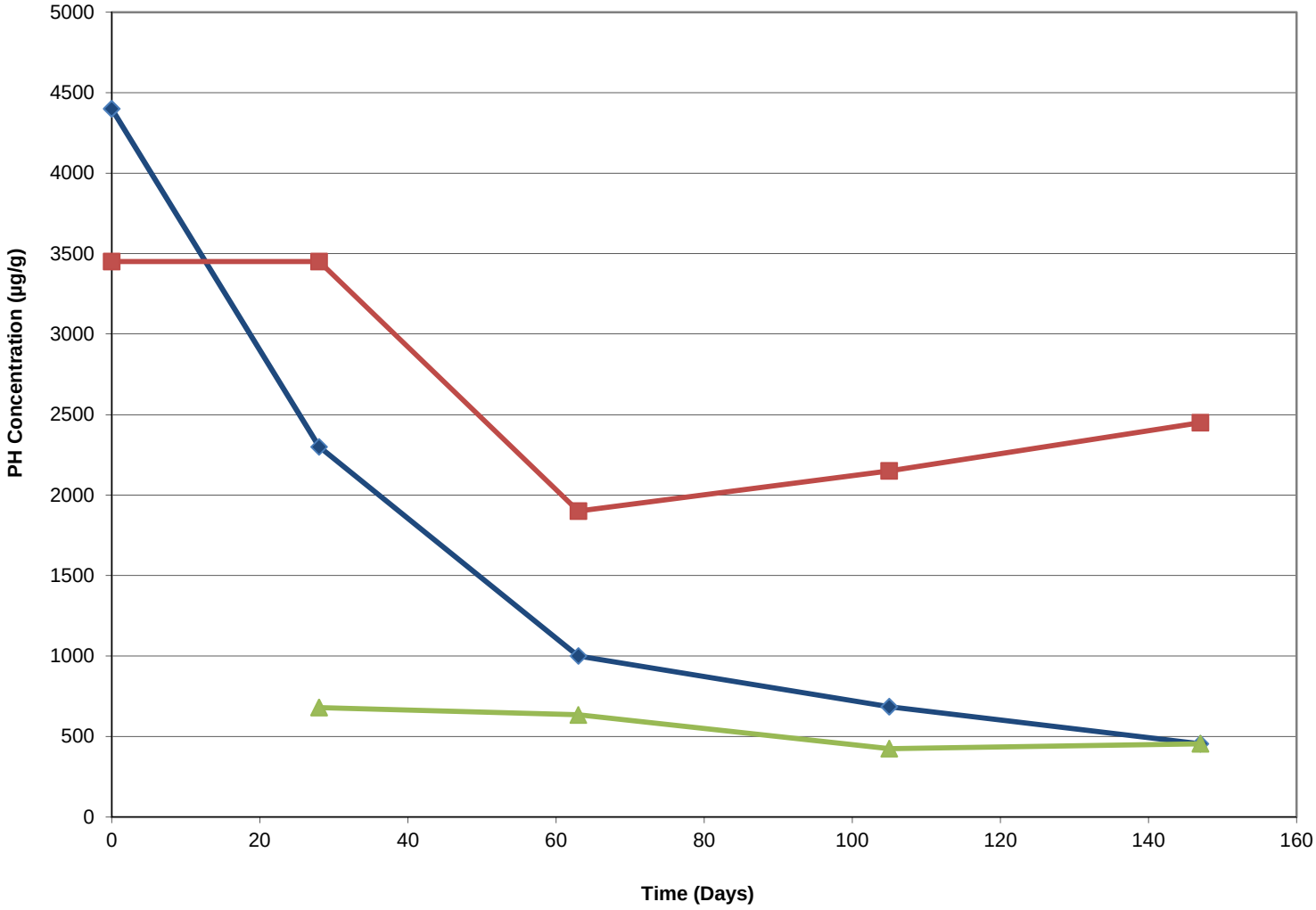


Petroleum Hydrocarbon Compounds Concentration Trends in Aerobic Treatment EHC-O Amended Microcosms (Patch Location)

Hope Bay, Northern Canada

4-Jun-12	Figure: **2**	SiREM

Graph 3

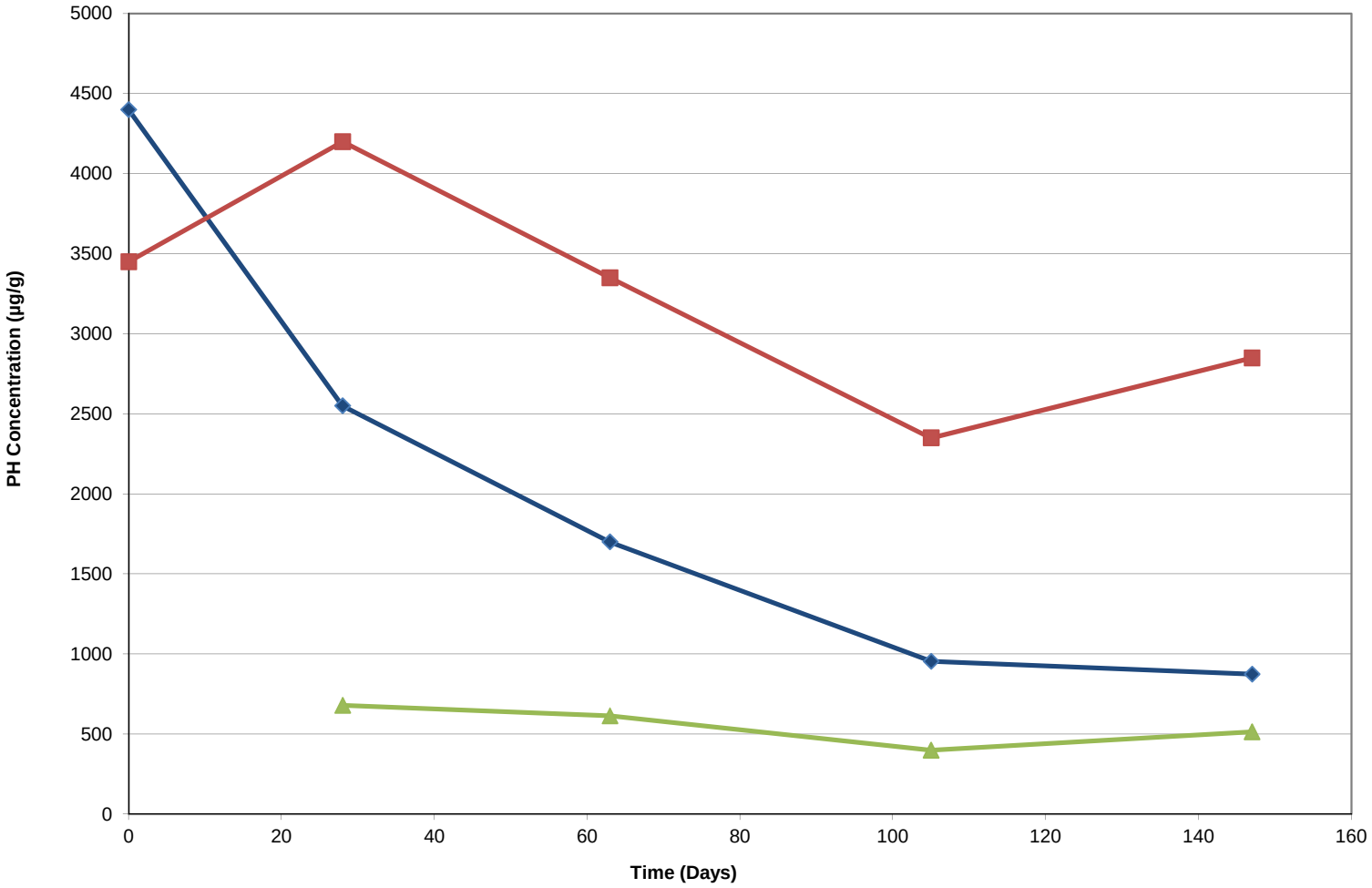


Petroleum Hydrocarbon Compounds Concentration Trends in Aerobic Nutrient Amended Microcosms (Patch Location)

Hope Bay, Northern Canada

4-Jun-12	Figure: **3**	SiREM

Graph 4



Petroleum Hydrocarbon Compounds Concentration Trends in Aerobic Nutrient and EHC-O Amended Microcosms (Patch Location)

Hope Bay, Northern Canada

4-Jun-12	Figure: **4**	SiREM

APPENDIX D

APPENDIX D SIREM BIOTREATABILITY STUDY RESULTS

Prepared for:

EBA Engineering
A Tetra Tech Company
Environment Practice
14940-123 Avenue
Edmonton, AB T5V 1B4

Final Report

LABORATORY BIOTREATABILITY STUDY TO ASSESS AEROBIC AND ANAEROBIC BIODEGRADATION OF PETROLEUM HYDROCARBONS AT TWO SITES IN NUNAVUT

Northern Canada Site

Prepared by:

130 Research Lane, Suite 2
Guelph, Ontario N1G 5G3

SiREM Ref: TL00307B
4 June 2012

TABLE OF CONTENTS

Page

1. INTRODUCTION 1

2. MATERIALS AND METHODS 2

2.1 Microcosm Construction and Incubation 2

2.2 Microcosm Sampling and Analysis 4

2.2.1 Petroleum Hydrocarbon analysis 4

2.2.2 Nitrogen, phosphate, sulfate and pH analysis 5

3. RESULTS 5

LIST OF TABLES

Table 1: Summary of Microcosm Control and Treatments
Table 2: Summary of Microcosm Control, Treatments and Amendments
Table 3: Summary of Microcosm PH, Nitrogen, Phosphorus, Sulfate, pH and Moisture Results
Table 4: Percent Removal of Petroleum Hydrocarbons in Microcosms

LIST OF FIGURES

Figure 1: Petroleum Hydrocarbon Compound Concentration Trends in Aerobic Active Control Microcosms (Patch Location)
Figure 2: Petroleum Hydrocarbon Compound Concentration Trends in Aerobic Treatment EHC-O Amended Microcosms (Patch Location)
Figure 3: Petroleum Hydrocarbon Compound Concentration Trends in Aerobic Nutrient Amended Microcosms (Patch Location)
Figure 4: Petroleum Hydrocarbon Compound Concentration Trends in Aerobic Nutrient and EHC-O Amended Microcosms (Patch Location)
Figure 5: Petroleum Hydrocarbon Compound Concentration Trends in Active Control Microcosms (Windy Location)
Figure 6: Petroleum Hydrocarbon Compound Concentration Trends in Aerobic Treatment EHC-O Amended Microcosms (Windy Location)
Figure 7: Petroleum Hydrocarbon Compound Concentration Trends in Anaerobic Nitrate Amended Microcosms (Windy Location)
Figure 8: Petroleum Hydrocarbon Compound Concentration Trends in Anaerobic Sulfate Amended Microcosms (Windy Location)

APPENDIX A: Chain of Custody Documentation

APPENDIX B: Summary of Percent Moisture and Water Holding Capacity Results

APPENDIX C: Summary of Nutrient and Moisture Amendment Calculations for Treatment Microcosms

APPENDIX D: Maxxam Analytical Reports

APPENDIX E: University of Guelph Analytical Reports

LIST OF ABBREVIATIONS

°C	degrees Celsius
DI	deionized
DAP	diammonium phosphate
EBA	EBA Engineering
g	grams
g/L	gram per liter
µL	microliters
mg/kg	milligram per kilogram
mg/L	milligram per liter
mL	milliliter
mL/g	milliliter per gram
mM	millimolar
$NaNO_3$	sodium nitrate
Na_2SO_4	sodium sulfate
NH_4Cl	ammonium chloride
NO_3	nitrate
%	percent
PHC	petroleum hydrocarbons
SiREM	SiREM Laboratory
SO_4	sulfate
WHC	water holding capacity

1. INTRODUCTION

EBA Engineering (EBA) retained SiREM Laboratories (SiREM) to perform a laboratory biotreatability study to assess the potential for *in situ* degradation of petroleum hydrocarbons (PHC) in soil from a site in northern Canada (the Site). As discussed in SiREM's proposal, Si-1274, the purpose of the study was to evaluate the natural and enhanced aerobic and anaerobic degradation processes for PHC using soils from two Site locations (Patch and Windy).

At each of the two locations, different treatments were applied in order to evaluate their effects on the degradation of PHC. The Patch location microcosms were maintained under aerobic conditions, and the treatments evaluated included amendment with oxygen releasing compound (EHC-O) (Adventus Americas, Illinois), nutrients, and nutrient/EHC-O. The Windy location treatments were maintained under both aerobic and anaerobic conditions. Treatments included amendment with nitrate (NO_3) and sulfate (SO_4) under anaerobic conditions, and amendment with EHC-O under aerobic conditions. The controls and treatments are summarized in Table 1 shown below, with further details on the amendments provided in Table 2.

Table 1: Summary of Microcosm Controls and Treatments

	Treatment/Control	Description	Patch location	Windy location
1	Intrinsic Control	Un-amended	2	2
2	Aerobic Treatment	Amended with oxygen releasing compound	2	2
3	Aerobic Nutrient Amended	Amended with oxygen releasing compound plus nitrogen and phosphorus	2	--
4	Nitrate Amended Treatment	Amended with nitrate as electron acceptor	--	2
5	Sulfate Amended Treatment	Amended with sulfate as electron acceptor	--	2
		Number of Microcosms	**6**	**8**

Soil was collected from the Site on August 22, 2011 by EBA and was received by SiREM on August 23, 2011 and stored at 4 degrees Celsius (^oC) until required for testing. The chain of custody documentation related to these samples is provided in Appendix A.

The remainder of this report is divided into two sections. Section 2 presents the experimental materials and methods and Section 3 presents the results of the biotreatability study.

2. MATERIALS AND METHODS

The following sections summarize the methods for microcosm construction and incubation (Section 2.1); and microcosm sampling and analysis (Section 2.2).

2.1 Microcosm Construction and Incubation

Two Site locations were evaluated (Patch and Windy) in this study; each with three treatments (Table 1). Thirty-four microcosms were constructed for each location to allow for sacrificial sampling of duplicate microcosms for each sampling event. Table 2 summarizes the details of microcosm construction and amendments for the treatment and control microcosms. Microcosms were incubated for 147 days in an incubator at 10°C. On August 30, 2011 sub-samples of the material for each location were collected for PHC analysis to verify the material as received was representative of Site PHC concentrations (Table 2). The remainder of the material was stored in a cold room at 4 ^{O}C until microcosm construction. EBA confirmed that the concentrations were appropriate and to proceed with the study.

On October 5, 2011 (Day 0), the material was removed from the cold room and the material for the aerobic microcosms was transferred to a laboratory fume hood and the material for the anaerobic microcosms was transferred to a temporary anaerobic glove bag filled with nitrogen gas. In both cases the soil was combined and mixed by hand to improve reproducibility between microcosm replicates. The homogenized soil was sub-divided into clean plastic bags for preparation of the treatment and control microcosms. For the treatments 1,800 grams (g) of soil was required and for the controls 2,200 g of soil was required to have sufficient material for the required replicates. The material for the Patch and Windy locations was handled separately to avoid cross contamination.

In order to provide sufficient moisture for biodegradation deionized (DI) water was added to the bulk soil so that it approximated one half of the water holding capacity (WHC) of the soil (this typically avoids free standing water in the microcosms). This dosing rate is based on past experience with similar treatability studies conducted by SiREM. The WHC for the Patch and Windy material was determined to be 0.39 mL/g and 0.47 mL/g respectively and are provided in Appendix B. For the Patch location Aerobic Active control 69 milliliters (mL) of DI water was added to 2,200 g of soil to reach one half of the water holding capacity. The soil for the Patch location Nutrient and Nutrient/EHC-O amended treatments was combined prior to the addition of EHC-O

and 112.5 mL of DI water was added to reach one half of the WHC. For the Windy location active control 121 mL of DI water was added to 2,200 g of soil and to the NO_3 and SO_4 anaerobic treatment soil, 99 mL of DI water was added to 1,800 g of soil to reach one half of the WHC. Calculations for the amount of water added are provided in Appendix C. It is important to note that the Windy location controls were stored under aerobic conditions to 27 November 2011 (Day 53), after which the microcosms were sealed and stored in an anaerobic chamber for the duration of the study.

For the Patch location, nitrogen and phosphorus were evaluated as the nutrient source. Typical nutrient loading rates are based on a carbon:nitrogen:phosphorous ratio of 100:10:1. Based on the PHC concentrations representing the carbon, this would be equivalent to a nitrogen concentration of 294 milligram per kilogram (mg/kg). However, nitrogen levels higher than 200 mg/kg may be toxic to microorganisms (Elizabeth Edwards, Personal Communication, 2010). Therefore, nitrogen was added to achieve a target concentration of 200 mg/kg. Diammonium phosphate (DAP) was used to provide both nitrogen (200 mg/kg) and phosphorus (222 mg/kg). A weight of 3.4 g of DAP was dissolved into the 112.5 mL of DI water and the solution was added to the appropriate homogenized soil to reach the target nutrient concentration. The soil was mixed well and 200 g of this material was added to eighteen sterile 250 mL glass wide-mouth bottles. The nutrient/EHC-O amended individual microcosms and the EHC-O amended individual microcosms were amended with 0.5 g of EHC-O (2.5 g EHC-O/kg of soil) as recommended by Adventus. All microcosms were stirred and capped with foam plugs in order to allow oxygen transfer into the bottles and stored in an incubator at 10^{O}C.

In the Windy location, NO_3 and SO_4 were evaluated as the electron acceptors. The homogenized soil (1,800 g of soil) used for the NO_3-amended microcosms was amended with 270 microliters (µL) of a 200 gram per liter (g/L) sodium nitrate ($NaNO_3$) stock solution to a target concentration of 124 milligram per liter (mg/L) or 2 millimolar (mM) in the pore volume. This concentration of NO_3 was selected to provide sufficient nitrate without exceeding the toxicity limit of 2 mM (Elizabeth Edwards, Personal Communication, 2010). The homogenized soil (1,800 g of soil) used for the SO_4 amended microcosms was amended with 460 microliters (µL) of a 200 g/L sodium sulfate (Na_2SO_4) stock solution to a target of 192 mg/L or 2 mM in the pore volume. This amount was chosen to be equivalent to the nitrate concentration on a molar basis. Both treatments were constructed and sealed with screw caps and anaerobic tape under anaerobic conditions and stored in an incubator at 10^{O}C.

All treatment and control microcosms were weighed after the addition of soil and amendments. The bottles were stirred and weighed once a week for the duration of the study. When a decrease in weight of greater than 10 percent (%) was observed, DI water was added to the bottles to increase the weight back to the original weight in order to maintain the bottles at their original moisture content.

Nitrogen (in the form of Ammonium-N) was detected at lower than expected concentrations in the aerobic nutrient amended microcosms on November 2, 2011 (Day 28). Therefore, on November 24, 2011 (Day 50) the nutrient amended microcosms and the nutrient/EHC-O amended microcosms were re-amended with nitrogen to a target concentration of 200 mg/kg. A weight of 0.15 g of ammonium chloride (NH_4Cl) was dissolved into 10 mL of DI water and 1mL of this solution was added to each bottle to reach the target nitrogen concentration. Phosphorus was detected in the microcosms and therefore additional phosphorus was not added at this time.

In the anaerobic NO_3 microcosms the NO_3-N concentration was also lower than expected on November 2, 2011 (Day 63). Therefore, on December 22, 2011 (Day78) the NO_3 amended microcosms were re-amended with nitrate based on the soil mass in the microcosms instead of the pore volume as was done previously. A volume of 6.1 mL of a 200 g/L $NaNO_3$ stock solution was added to each bottle to reach the target NO_3 concentration of 200 mg/kg as nitrogen.

SO_4 was also detected at lower than expected concentration in the SO_4 amended microcosms on Day 63. Therefore, on December 22, 2011 (Day 78) the SO_4 amended microcosms were re-amended with SO_4 based on the soil mass in the microcosms instead of the pore volume as was done previously. A volume of 4.4 mL of a 200 g/L Na_2SO_4 stock solution was added to each bottle to reach the target SO_4 concentration of 200 mg/kg as sulphur. Also, after discussion with EBA, it was decided to add nutrients in the form of DAP to both the SO_4 and NO_3 amended treatments to achieve the same nitrogen and phosphorus concentration as in the nutrient amended microcosms. Therefore, on December 22, 2011 (Day 78) 189 mg of DAP was dissolved in 2 mL of DI water and was added to the NO_3 and SO_4 amended microcosms.

Data updates were provided to EBA after each sampling event. Due to the slower than expected activity it was decided, in consultation with EBA, to extend the study by one sampling event (42 days). At the start of the study SiREM constructed extra sets of duplicate microcosms for each control and treatment to allow for an additional sampling event if needed.

2.2 Microcosm Sampling and Analysis

2.2.1 Petroleum Hydrocarbon analysis

Analysis of the target PHC (F2-F4 Hydrocarbons) and moisture content analyses were conducted by an external laboratory, Maxxam Analytics Inc. (Maxxam Analytics, Mississauga, ON). On August 30, 2011, a sub-sample of the bulk homogenized soil

(from both locations) was collected in 250 mL (nominal volume) glass wide-mouth jars. The samples were placed on ice packs in a cooler and submitted to Maxxam for PHC (F2-F4 Hydrocarbons) analysis and moisture content analysis. On Day 0, 28, 50, 63, 105 and 147, sacrificial bottles from each control and treatment were placed in a cooler with ice packs and couriered overnight to Maxxam Analytics for PHC and moisture content analysis. It was noted that F4 (C34-C50) data was not provided for the baseline and time zero samples as this was not originally requested by EBA. However, Maxxam could include the F4 analysis for no extra charge upon request, so it was included in the data set for the duration of the study.

2.2.2 Nitrogen, phosphate, sulfate and pH analysis

Analysis of nitrogen and phosphorous was conducted by an external laboratory, University of Guelph Laboratory Services (Guelph, ON, Canada). At the beginning of the study a sub-sample of the bulk homogenized soil from each location was collected in sterile 50 mL centrifuge tubes, placed on ice packs in a cooler and hand delivered to the University of Guelph for nitrogen, phosphorous and soil pH baseline analysis.

On Days 0, 28, 50, 63, 105 and 147, 50 g sub-samples from each of the control and treatment microcosms were removed from the microcosms and placed in sterile 50 mL centrifuge tubes. The samples were placed on ice packs in a cooler and hand delivered to the University of Guelph for nitrogen, phosphorous and pH analysis. Throughout the duration of the study different nitrogen analyses were performed. At the baseline and time zero nitrogen data was reported in the form of NO_3-N. On November 2, 2011 (Day 28) nitrogen was reported in the form of Ammonium-N and NO_3-N. After discussion with EBA it was decided that the nitrogen analyses would be requested in the form of NO_3-N, Nitrite-N and Total Kjeldahl Nitrogen for the duration of the study. Also, on December 7, 2011(Day 63) and January 18, 2012 (Day 105) the sulfate amended treatments were analyzed for sulfate in order to monitor the amount of sulfate present in these treatment bottles.

3. RESULTS

Table 3 provides PHC (F2-F4), pH, moisture content and nutrients results from the control and treatment microcosms for both locations over the incubation period of the study. Table 4 provides a summary of the % PHC removal for each treatment. Figures 1 through 8 present trends in the concentrations of PHC concentrations in the control and treatment microcosms over the incubation period of the study.

Refer to Appendix B for the baseline WHC and moisture content results, Appendix C for amendment calculations, Appendix D for the Maxxam Analytics analytical reports and Appendix E for the University of Guelph analytical reports.

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TABLES

TABLE 2: SUMMARY OF MICROCOSM CONTROLS, TREATMENTS AND AMENDMENTS
Hope Bay, Northern Canada

Location	Microcosm Name	Number of Bottles*	Description
Patch	Aerobic Active Control	10	No amendments added. Amended with DI water throughout the duration of the study to maintain the % moisture (13%) present at the beginning of the study.
	Aerobic Treatment EHC-O Amended	8	Amended with 0.5 g of EHC-O on Day 0 and re-amended with 0.5 g of EHC-O on Day 50. Amended with DI water throughout the duration of the study to maintain the % moisture (13%) present at the beginning of the study.
	Aerobic Nutrient Amended Treatment	8	Amended with 189 mg DAP/200g soil to a target concentration of 200 mg/kg as Nitrogen on Day 0. Re-amended with 1 ml of 153 mg/mL stock solution of NH_4Cl to a target concentration of 200 mg/kg as Nitrogen on Day 50. Amended with DI water throughout the duration of the study to maintain the % moisture (13%) present at the beginning of the study.
	Aerobic Nutrient and EHC-O Amended Treatment	8	Amended with 189 mg DAP/200g soil to a target concentration of 200 mg/kg as Nitrogen and 0.5 g EHC-O on Day 0. Re-amended with 1 mL of 153 mg/mL stock solution of NH_4Cl to a target concentration of 200 mg/kg as Nitrogen and 0.5 g EHC-O on Day 50. Amended with DI water throughout the duration of the study to maintain the % moisture (13%) present at the beginning of the study.
Windy	Active Control	10	No amendments added. Amended with DI water throughout the duration of the study to maintain the % moisture (13%) present at the beginning of the study. On Day 58 bottles were sealed.
	Aerobic Treatment EHC-O Amended	8	Amended with 0.5 g of EHC-O on Day 0 and re-amended with 0.5 g of EHC-O on Day 50. Weighed throughout the duration of the study to verify %moisture remained at 13%.
	Anaerobic Nitrate Amended Treatment	8	Amended with 30 µL of 200 g/L $NaNO_3$ stock solution to a target concentration of 200 mg/kg as Nitrogen. Re-amended with 6.1 mL of 200g/ L $NaNO_3$ stock solution to a target concentration of 200 mg/kg as Nitrogen on Day 50. Weighed throughout the duration of the study to verify %moisture remained at 13%.
	Anaerobic Sulfate Amended Treatment	8	Amended with 51 µL of 200 g/L Na_2SO_4 stock solution to a target concentration of 200 mg/kg as Sulfur. Re-amended with 4.4 mL of 200g/L Na2SO4 stock solution to a target concentration of 200 mg/kg as Sulfur on Day 50. Weighed throughout the duration of the study to verify %moisture remained at 13%.

Notes:

*Number of bottles includes a duplicate used for repetitive sampling and screening by SiREM and sufficient replicates to submit duplicate samples for external lab analysis at the specified sampling points
DAP – diammonium phosphate
DI - deionized
g – gram
g/L – gram per liter
µL - microliter
mL – milliliter
mg - milligram
mg/kg – milligrams per kilogram
mg/L – milligrams per liter
mg/mL – milligrams per milliliter
NH_4Cl – ammonium chloride
Na NO_3 – sodium nitrate
Na_2SO_4 – sodium sulfate
% - percent

TABLE 3: SUMMARY OF MICROCOSM PH, NITROGEN, PHOSPHORUS, SULFATE, pH and % MOISTURE RESULTS
Hope Bay, Northern Canada

SiREM

Contol/Treatment	Date	Day	Treatment Replicate	F2 (C10-C16) µg/g	F3 (C16-C34) µg/g	F4 (C34-C50) µg/g	Ammonium-N mg/kg	Nitrate-N mg/kg	Nitrite-N mg/kg	Nitrogen (TKN) %dry	Phosphorus mg/kg	Sulpahte/Sulfur mg/kg/dry	pH	% Moisture	Comments
Aerobic Active Control Patch Location	30-Aug-11	-36	AAC Patch -1	3600	2100	--	--	<0.05	--	--	4.6	--	7.3	14.0	
			AAC Patch -2			--	--		--	--		--			
			Average Concentration	**3600**	**2100**			**ND**			**4.6**		**7.3**	**14**	
	5-Oct-11	0	AAC Patch -1	4200	3400	--	--	0.060	--	--	8.0	--	7.5	13	
			AAC Patch -2	4600	3500	--	--	0.070	--	--	7.2	--	7.5	15	
			Average Concentration	**4400**	**3450**			**0.065**			**7.6**		**7.5**	**14**	
	2-Nov-11	28	AAC Patch -1	4000	4800	630	1.2	0.31	--	--	7.1	--	--	15	
			AAC Patch -2	4400	4300	510	7.2	0.83	--	--	7.3	--	--	14	
			Average Concentration	**4200**	**4550**	**570**	**4.2**	**0.57**			**7.2**			**15**	
	7-Dec-11	63	AAC Patch -1	2400	3200	480	--	--	--	0.0060	6.1	--	7.5	12	
			AAC Patch -2	2800	4300	650	--	--	--	0.0070	6.4	--	7.6	8.0	
			Average Concentration	**2600**	**3750**	**565**				**0.0065**	**6.2**		**7.6**	**10**	
	18-Jan-12	105	AAC Patch -1	1900	3800	550	--	0.45	0.21	0.060	6.1	--	7.6	6.3	
			AAC Patch -2	1600	3700	520	--		0.15	0.070	9.3	--	7.7	5.3	
			Average Concentration	**1750**	**3750**	**535**		**0.45**	**0.18**	**0.065**	**7.7**		**7.7**	**5.8**	
	29-Feb-12	147	AAC Patch -1	1700	4600	600	--	1.69	0.21	0.070	10	--	7.5	13	
			AAC Patch -2	1400	4600	690	--	0.61	0.22	0.080	8.9	--	7.4	13	
			Average Concentration	**1550**	**4600**	**645**		**1.15**	**0.22**	**0.075**	**9.6**		**7.5**	**13**	
Aerobic Treatment EHC-O Amended Patch Location	5-Oct-11	0	EHC-O -Patch-1	4200	3400	--	--	0.060	--	--	15	--	8.7	13	Amended with 0.5g of EHC-O/200 g soil
			EHC-O Patch -2	4600	3500	--	--	0.060	--	--	12	--	8.6	15	
			Average Concentration	**4400**	**3450**			**0.060**			**13**		**8.7**	**14**	
	2-Nov-11	28	EHC-O -Patch-1	3600	4100	560	1.4	0.22	--	--	12	--	--	10	
			EHC-O Patch -2	5100	5700	750	<0.20	0.57	--	--	12	--	--	7.0	
			Average Concentration	**4350**	**4900**	**655**	**0.69**	**0.39**			**12**			**8.5**	
	24-Nov-11	50													Re-amended with 0.5 g of EHC-O/200 g soil
	7-Dec-11	63	EHC-O -Patch-1	2600	3800	590	--	--	--	0.0070	11	--	8.5	15	
			EHC-O Patch -2	2300	3100	470	--	--	--	0.0060	9.1	--	8.6	13	
			Average Concentration	**2450**	**3450**	**530**				**0.0065**	**10**		**8.6**	**14**	
	18-Jan-12	105	EHC-O -Patch-1	2000	3700	510	--	0.48	0.86	0.080	13	--	8.4	6.6	
			EHC-O Patch -2	1600	3500	490	--	0.38	0.50	0.070	13	--	8.4	13	
			Average Concentration	**1800**	**3600**	**500**		**0.43**	**0.68**	**0.075**	**13**		**8.4**	**9.8**	
	29-Feb-12	147	EHC-O -Patch-1	1400	3900	590	--	0.77	0.80	0.080	11	--	8.4	11	
			EHC-O Patch -2	2200	4600	620	--	0.51	0.44	0.060	7.7	--	8.3	12	
			Average Concentration	**1800**	**4250**	**605**		**0.64**	**0.62**	**0.070**	**9.3**		**8.4**	**12**	
Aerobic Nutrient Amended Patch Location	5-Oct-11	0	Aerobic Nutrient Patch-1	4200	3400	--	--	0.080	--	--	128	--	6.9	13	Amended with 189 mg of DAP/200 g soil
			Aerobic Nutrient Patch-2	4600	3500	--	--	0.080	--	--	140	--	6.9	15	
			Average Concentration	**4400**	**3450**			**0.080**			**134**		**6.9**	**14**	
	2-Nov-11	28	Aerobic Nutrient Patch-1	2200	3000	630	7.1	1.6	--	--	101	--	--	5.0	
			Aerobic Nutrient Patch-2	2400	3900	730	3.6	0.37	--	--	114	--	--	3.0	
			Average Concentration	**2300**	**3450**	**680**	**5.4**	**1.0**			**108**			**4.0**	
	24-Nov-11	50													Re-amended with1 mL of 153 mg/ml NH_4Cl
	7-Dec-11	63	Aerobic Nutrient Patch-1	1000	1900	680	--	--	--	0.11	100	--	6.5	11	
			Aerobic Nutrient Patch-2	1000	1900	590	--	--	--	0.12	103	--	6.6	15	
			Average Concentration	**1000**	**1900**	**635**				**0.12**	**101**		**6.6**	**13**	
	18-Jan-12	105	Aerobic Nutrient Patch-1	650	2300	440	--	0.44	0.088	0.13	110	--	6.5	6.6	
			Aerobic Nutrient Patch-2	720	2000	410	--	0.57	0.072	0.12	113	--	6.4	11	
			Average Concentration	**685**	**2150**	**425**		**0.51**	**0.080**	**0.13**	**112**		**6.5**	**8.8**	
	29-Feb-12	147	Aerobic Nutrient Patch-1	430	2300	470	--	0.56	<0.030	0.13	102	--	6.6	7.4	
			Aerobic Nutrient Patch-2	480	2600	440	--	0.58	<0.030	0.13	95	--	6.6	13	
			Average Concentration	**455**	**2450**	**455**		**0.57**	**ND**	**0.13**	**98**		**6.6**	**10**	
Aerobic Nutrient and EHC-O Amended Patch Location	5-Oct-11	0	Aerobic Nut/EHC-O Patch-1	4200	3400	--	--	0.080	--	--	288	--	8.5	13	
			Aerobic Nut/EHC-O Patch-2	4600	3500	--	--	0.080	--	--	274	--	8.4	15	
			Average Concentration	**4400**	**3450**			**0.080**			**281**		**8.5**	**14**	Amended with 189 mg of DAP/200 g soil, and 0.5 g EHC-O
	2-Nov-11	28	Aerobic Nut/EHC-O Patch-1	3000	4800	780	1.2	0.37	--	--	167	--	--	3.0	
			Aerobic Nut/EHC-O Patch-2	2100	3600	580	1.6	0.58	--	--	224	--	--	8.0	
			Average Concentration	**2550**	**4200**	**680**	**1.4**	**0.48**			**196**			**5.5**	
	24-Nov-11	50													Re-amended with 0.5 g of EHC-O, and 1 mL of 153 mg/ml NH_4Cl
	7-Dec-11	63	Aerobic Nut/EHC-O Patch-1	1800	3300	610	--	--	--	0.10	136	--	7.7	11	
			Aerobic Nut/EHC-O Patch-2	1600	3400	620	--	--	--	0.090	138	--	7.8	5.0	
			Average Concentration	**1700**	**3350**	**615**				**0.10**	**137**		**7.8**	**8.0**	
	18-Jan-12	105	Aerobic Nut/EHC-O Patch-1	920	2100	350	--	0.39	0.61	0.11	178	--	7.7	11	
			Aerobic Nut/EHC-O Patch-2	990	2600	450	--	0.46	0.50	0.10	197	--	7.8	5.4	
			Average Concentration	**955**	**2350**	**400**		**0.42**	**0.55**	**0.11**	**188**		**7.8**	**8.2**	
	29-Feb-12	147	Aerobic Nut/EHC-O Patch-1	780	2600	470	--	0.58	0.35	0.10	174	--	7.6	8.1	
			Aerobic Nut/EHC-O Patch-2	970	3100	560	--	0.64	0.31	0.10	157	--	7.0	5.8	
			Average Concentration	**875**	**2850**	**515**		**0.61**	**0.33**	**0.10**	**166**		**7.3**	**7.0**	
Active Control Windy Location	30-Aug-11	-36	AAC-1 -Windy	3000	460	--	--	0.10	--	--	1.7	--	6.5	15	
			AAC-2 -Windy			--	--	--	--	--		--			
			Average Concentration	**3000**	**460**			**0.10**			**1.7**		**6.5**	**15**	
	5-Oct-11	0	AAC-1 -Windy	3100	450	--	--	0.09	--	--	1.7	--	6.7	18	
			AAC-2 -Windy	2500	370	--	--	0.10	--	--	3.1	--	6.7	18	
			Average Concentration	**2800**	**410**			**0.10**			**2.4**		**6.7**	**18**	
	2-Nov-11	28	AAC-1 -Windy	2800	530	<2.0	<0.20	0.44	--	--	3.6	--	--	8.0	
			AAC-2 -Windy	3700	470	<2.0	3.1	1.9	--	--	4.7	--	--	18	
			Average Concentration	**3250**	**500**	**ND**	**1.5**	**1.2**			**4.2**			**13**	
	2-Dec-11	58													Bottles were sealed and transferred to the anaerobic chamber
	7-Dec-11	63	AAC-1 -Windy	1700	530	24	--	--	--	0.10	2.7	--	7.0	13	
			AAC-2 -Windy	1600	660	26	--	--	--	0.10	4.5	--	6.9	14	
			Average Concentration	**1650**	**595**	**25**				**0.10**	**3.6**		**7.0**	**14**	
	18-Jan-12	105	AAC-1 -Windy	1600	450	27	--	0.35	0.046	0.090	1.3	--	7.0	11	
			AAC-2 -Windy	1100	500	21	--	0.31	0.047	0.10	5.1	--	6.8	13	
			Average Concentration	**1350**	**475**	**24**		**0.33**	**0.046**	**0.10**	**3.2**		**6.9**	**12**	
	29-Feb-12	147	AAC-1 -Windy	1700	470	<2.0	--	0.58	<0.030	0.11	1.8	--	7.0	17	
			AAC-2 -Windy	2200	430	<2.0	--	0.46	<0.030	0.11	2.1	--	6.9	19	
			Average Concentration	**1950**	**450**	**ND**		**0.52**	**ND**	**0.11**	**1.9**		**7.0**	**18**	

TABLE 3: SUMMARY OF MICROCOSM PH, NITROGEN, PHOSPHORUS, SULFATE, pH and % MOISTURE RESULTS
Hope Bay, Northern Canada

Contol/Treatment	Date	Day	Treatment Replicate	F2 (C10-C16) µg/g	F3 (C16-C34) µg/g	F4 (C34-C50) µg/g	Ammonium-N mg/kg	Nitrate-N mg/kg	Nitrite-N mg/kg	Nitrogen (TKN) %dry	Phosphorus mg/kg	Sulpahte/Sulfur mg/kg/dry	pH	% Moisture	Comments
Aerobic Treatment EHC-O Amended Windy Location	5-Oct-11	0	EHC-O-1 -Windy	3100	450	--	--	0.11	--	--	8.8	--	8.4	18	Amended with 0.5 g EHC-O/200 g soil
			EHC-O-2 -Windy	2500	370	--	--	0.10	--	--	11.8	--	8.4	18	
			Average Concentration	**2800**	**410**			**0.11**			**10.3**		**8.4**	**18**	
	2-Nov-11	28	EHC-O-1 -Windy	2900	580	<2.0	<0.20	0.64	--	--	6.0	--	--	8	
			EHC-O-2 -Windy	3000	480	<2.0	<0.20	0.36	--	--	5.7	--	--	18	
			Average Concentration	**2950**	**530**	**ND**	**ND**	**0.50**			**5.8**			**13**	
	24-Nov-11	50													Re-amended with 0.5 g of EHC-O/200 g soil
	7-Dec-11	63	EHC-O-1 -Windy	2000	610	27	--	--	--	0.11	4.3	--	8.3	14	
			EHC-O-2 -Windy	1500	460	20	--	--	--	0.10	10.5	--	8.4	15	
			Average Concentration	**1750**	**535**	**24**				**0.11**	**7.4**		**8.4**	**15**	
	18-Jan-12	105	EHC-O-1 -Windy	760	380	23	--	0.54	0.57	0.09	3.5	--	8.2	11	
			EHC-O-2 -Windy	930	420	23	--	0.36	0.25	0.10	5.2	--	8.2	18	
			Average Concentration	**845**	**400**	**23**		**0.45**	**0.41**	**0.10**	**4.4**		**8.2**	**15**	
	29-Feb-12	147	EHC-O-1 -Windy	650	480	15	--	0.63	0.65	0.11	3.6	--	8.0	15	
			EHC-O-2 -Windy	750	510	26	--	1.09	0.47	0.10	4.1	--	8.1	21	
			Average Concentration	**700**	**495**	**21**		**0.86**	**0.56**	**0.11**	**3.8**		**8.1**	**18**	
Anaerobic Nitrate Amended Windy Location	5-Oct-11	0	NO_3-1 -Windy	3100	450	--	--	0.11	--	--	2.6	--	6.7	18	Amended with 30 µL of 200 g/L $NaNO_3$ stock solution
			NO_3-2-Windy	2500	370	--	--	0.12	--	--	5.4	--	6.7	18	
			Average Concentration	**2800**	**410**			**0.12**			**4.0**		**6.7**	**18**	
	2-Nov-11	28	NO_3-1 -Windy	3800	470	<2.0	<0.20	0.24	--	--	3.4	--	--	19	
			NO_3-2-Windy	4900	580	<2.0	<0.20	0.33	--	--	3.9	--	--	18	
			Average Concentration	**4350**	**525**	**ND**	**ND**	**0.28**			**3.6**			**19**	
	7-Dec-11	63	NO_3-1 -Windy	4100	730	24	--	--	--	0.11	2.4	--	7.1	19	
			NO_3-2-Windy	2600	510	22	--	--	--	0.10	4.3	--	7.1	19	
			Average Concentration	**3350**	**620**	**23**				**0.11**	**3.4**		**7.1**	**19**	
	22-Dec-11	78													Re-amended with 6.1 mL of 200g/L$NaNO_3$ stock solution
	18-Jan-12	105	NO_3-1 -Windy	2500	460	18	--	1740	0.061	0.32	90	--	6.7	20	
			NO_3-2-Windy	2100	380	18	--	1930	0.095	0.26	83	--	6.7	22	
			Average Concentration	**2300**	**420**	**18**		**1835**	**0.078**	**0.29**	**86**		**6.7**	**21**	
	29-Feb-12	147	NO_3-1 -Windy	3100	540	<2.0	--	2700	<0.030	0.26	93	--	6.6	19	
			NO_3-2-Windy	2800	480	14	--	2180	<0.030	0.23	73	--	6.7	21	
			Average Concentration	**2950**	**510**	**7.5**		**2440**	**ND**	**0.25**	**83**		**6.7**	**20**	
Anaerobic Sulfate Amended Windy Location	5-Oct-11	0	SO_4-1 -Windy	3100	450	--	--	0.10	--	--	2.3	--	6.6	18	Amended with 51 µL of 200 g/L Na_2SO_4 stock solution
			SO_4-2 -Windy	2500	370	--	--	0.10	--	--	1.8	--	6.6	18	
			Average Concentration	**2800**	**410**			**0.10**			**2.1**		**6.6**	**18**	
	2-Nov-11	28	SO_4-1 -Windy	3400	480	15	<0.20	0.16	--	--	4.7	--	--	16	
			SO_4-2 -Windy	4300	560	12	<0.20	0.11	--	--	3.3	--	--	18	
			Average Concentration	**3850**	**520**	**14**	**ND**	**0.14**			**4.0**			**17**	
	7-Dec-11	63	SO_4-1 -Windy	3500	640	18	--	--	--	0.10	2.3	120	6.9	17	
			SO_4-2 -Windy	3700	670	23	--	--	--	0.09	1.9	73	6.8	19	
			Average Concentration	**3600**	**655**	**21**				**0.10**	**2.1**	**96**	**6.9**	**18**	
	22-Dec-11	78													Re-amended with 4.4 mL of 200g/L Na_2SO_4 stock solution
	18-Jan-12	105	SO_4-1 -Windy	2700	450	21	--	2.7	0.074	0.12	102	1900	6.8	21	
			SO_4-2 -Windy	2500	450	21	--	0.33	0.065	0.11	106	2260	6.7	19	
			Average Concentration	**2600**	**450**	**21**		**1.5**	**0.069**	**0.12**	**104**	**2080**	**6.8**	**20**	
	29-Feb-12	147	SO_4-1 -Windy	3100	560	34	--	2.1	<0.030	0.11	73	777000	6.7	22	
			SO_4-2 -Windy	2500	460	12	--	1.6	<0.030	0.12	86	327000	6.8	21	
			Average Concentration	**2800**	**510**	**23**		**1.8**	**ND**	**0.12**	**79**	**552000**	**6.8**	**22**	

Notes:

AAC - aerobic active control
DAP - diammonium phosphate
µg/g - micrograms per gram
µL - microliter
mg - milligram
mg/kg - milligrams per kilogram
mg/L - milligram per liter
mL - milliliter
g- gram
g/L - grams per liter
ND - not detected
$NaNO_3$ - sodium nitrate
Na_2SO_4 - sodium sulfate
NH_4Cl - ammonium chloride
NO_3 - nitrate
SO_4 - sulfate
< - compound not detected, the associated value is the detected limit
% - percent
-- - not available/not applicable

TABLE 4: PERCENT REMOVAL OF PETROLEUM HYDROCARBONS IN MICROCOSMS

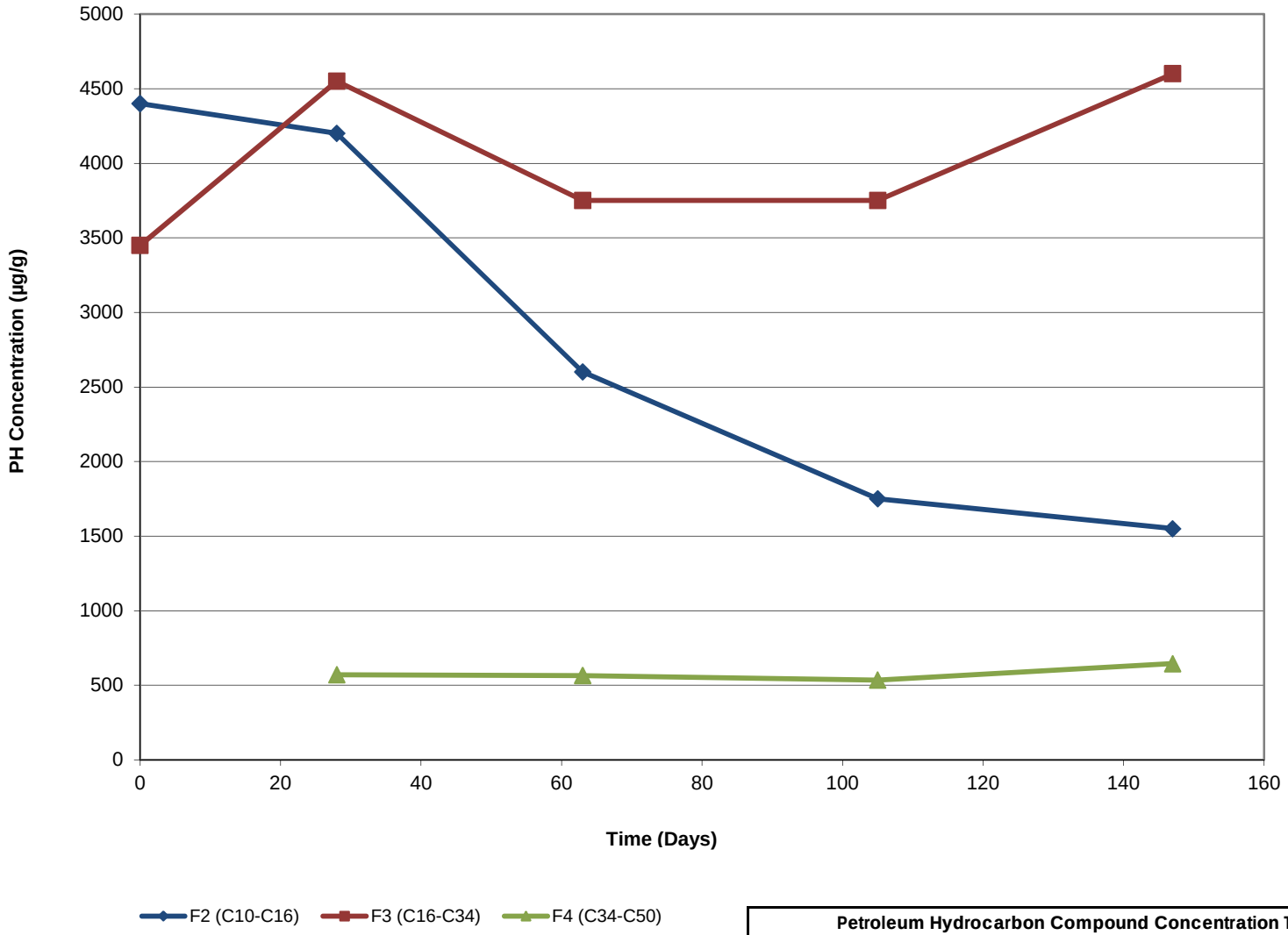
Hope Bay, Northern Canada

SiREM

Treatment	F2 (C10-C16)			F3 (C16-C34)			F4 (C34-C50)		
	% Removal	Initial [ ] (µg/g)	Final [ ] (µg/g)	**% Removal**	Initial [ ] (µg/g)	Final [ ] (µg/g)	**% Removal**	Initial [ ] (µg/g)	Final [ ] (µg/g)
Aerobic Active Control-Patch Location	65	4400	1550	~	3450	4600	~	570	645
Aerobic Treatment EHC-O Amended-Patch Location	59	4400	1800	~	3450	4250	8	655	605
Aerobic Nutrient Amended-Patch Location	90	4400	455	29	3450	2450	33	680	455
Aerobic Nutrient and EHC-O Amended-Patch Location	80	4400	875	17	3450	2850	24	680	515
Active Control-Windy Location	30	2800	1950	~	410	450	92	25	2
Aerobic Treatment EHC-O Amended-Windy Location	75	2800	700	~	410	495	13	24	21
Anaerobic Nitrate Amended-Windy Location	~	2800	2950	~	410	510	65	23	8
Anaerobc Sulfate Amended-Windy Location	~	2800	2800	~	410	510	~	14	23

Notes: % removal = {(initial concentration - final concentration)/initial concentration} * 100
% - percent
~ net degradation of compound was not detected over duration of study
[ ] - concentration
µg/g - microgram per gram

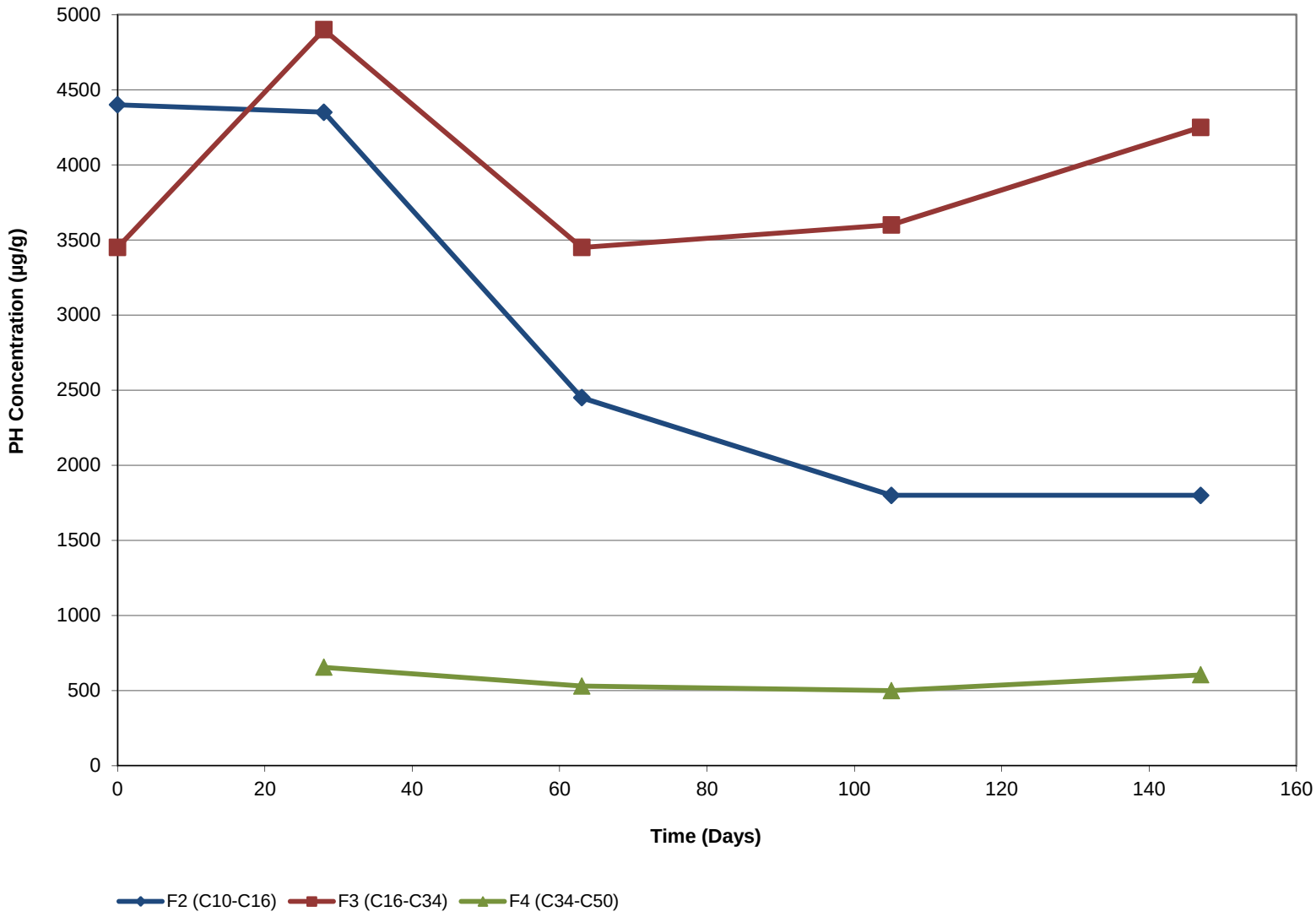
FIGURES



Petroleum Hydrocarbon Compound Concentration Trends in Aerobic Active Control Microcosms (Patch Location)

Hope Bay, Northern Canada

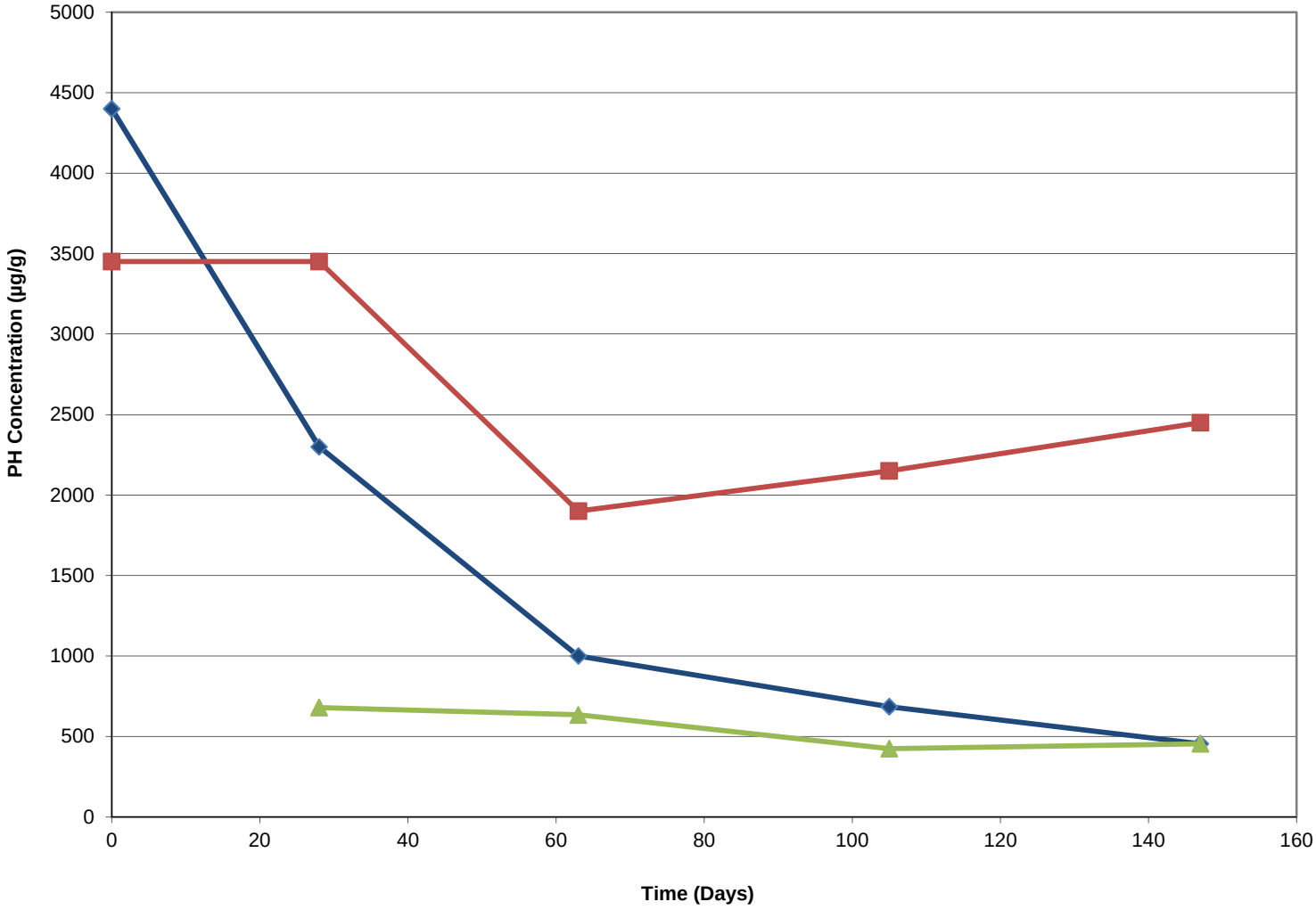
4-Jun-12	Figure: **1**	SiREM



Petroleum Hydrocarbon Compounds Concentration Trends in Aerobic Treatment EHC-O Amended Microcosms (Patch Location)

Hope Bay, Northern Canada

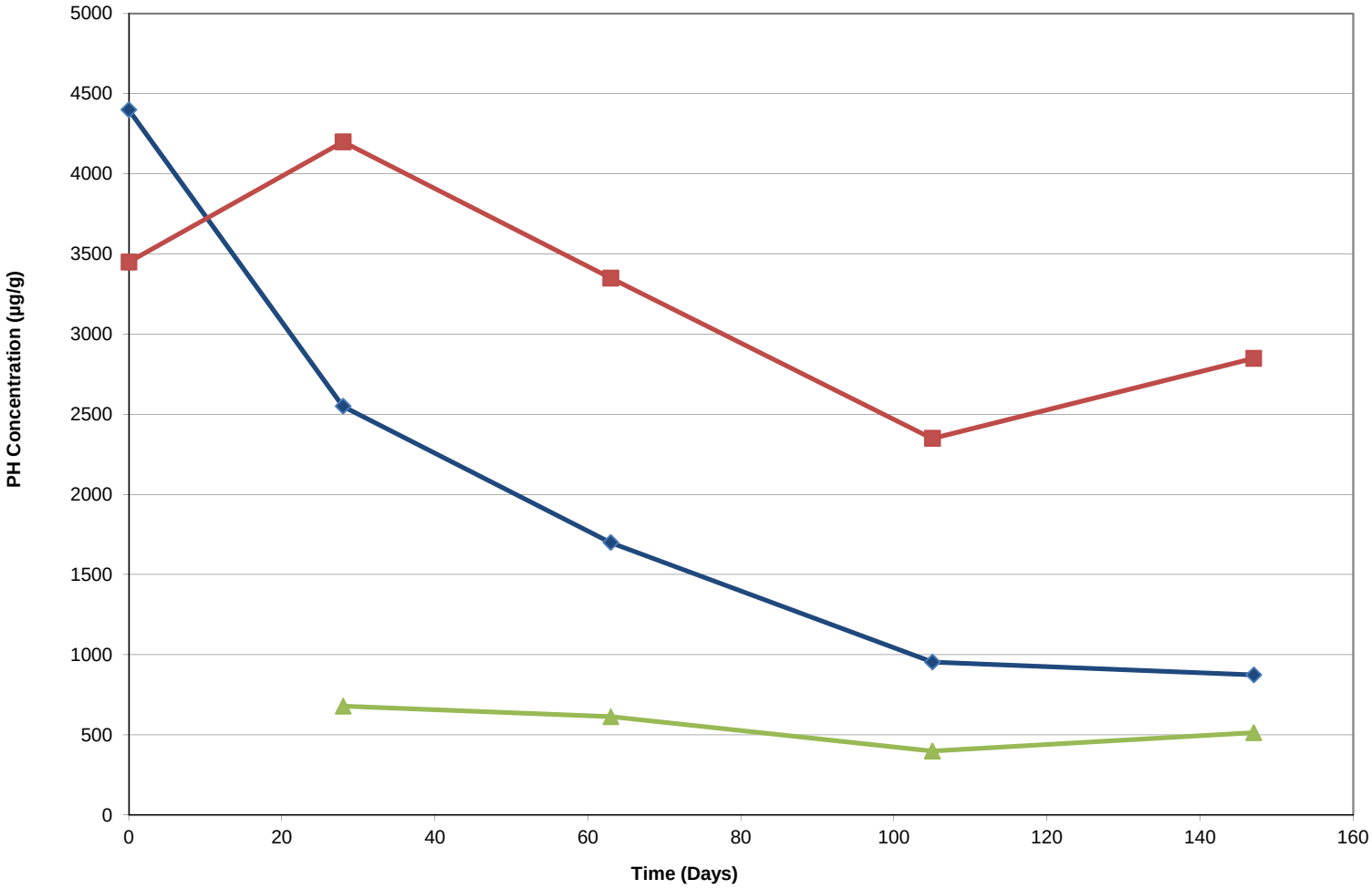
4-Jun-12	Figure: **2**	SiREM



Petroleum Hydrocarbon Compounds Concentration Trends in Aerobic Nutrient Amended Microcosms (Patch Location)

Hope Bay, Northern Canada

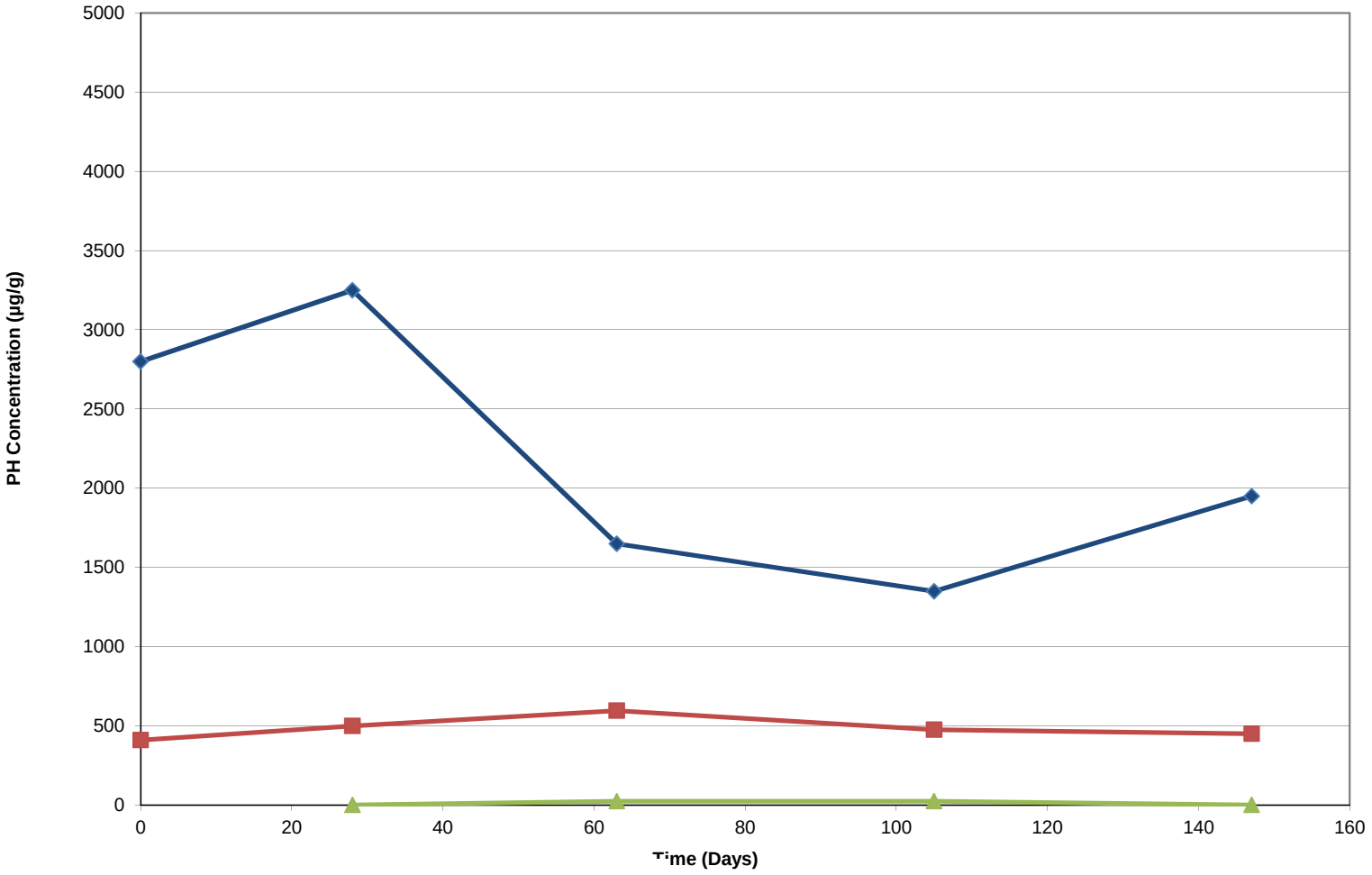
4-Jun-12	Figure: **3**	SiREM



Petroleum Hydrocarbon Compounds Concentration Trends in Aerobic Nutrient and EHC-O Amended Microcosms (Patch Location)

Hope Bay, Northern Canada

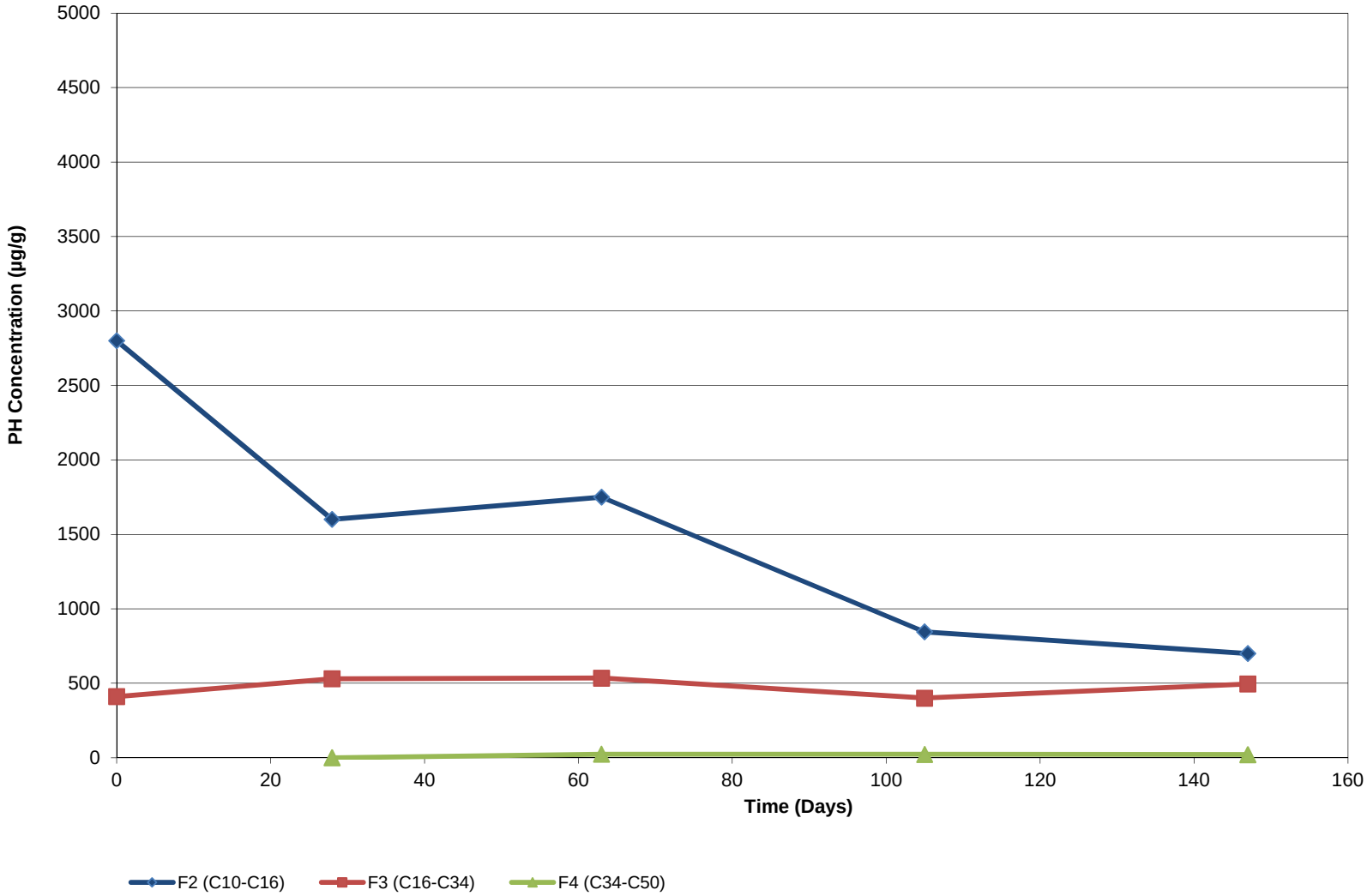
4-Jun-12	Figure: **4**	SiREM



Petroleum Hydrocarbon Compounds Concentration Trends in Active Control Microcosms (Windy Location)

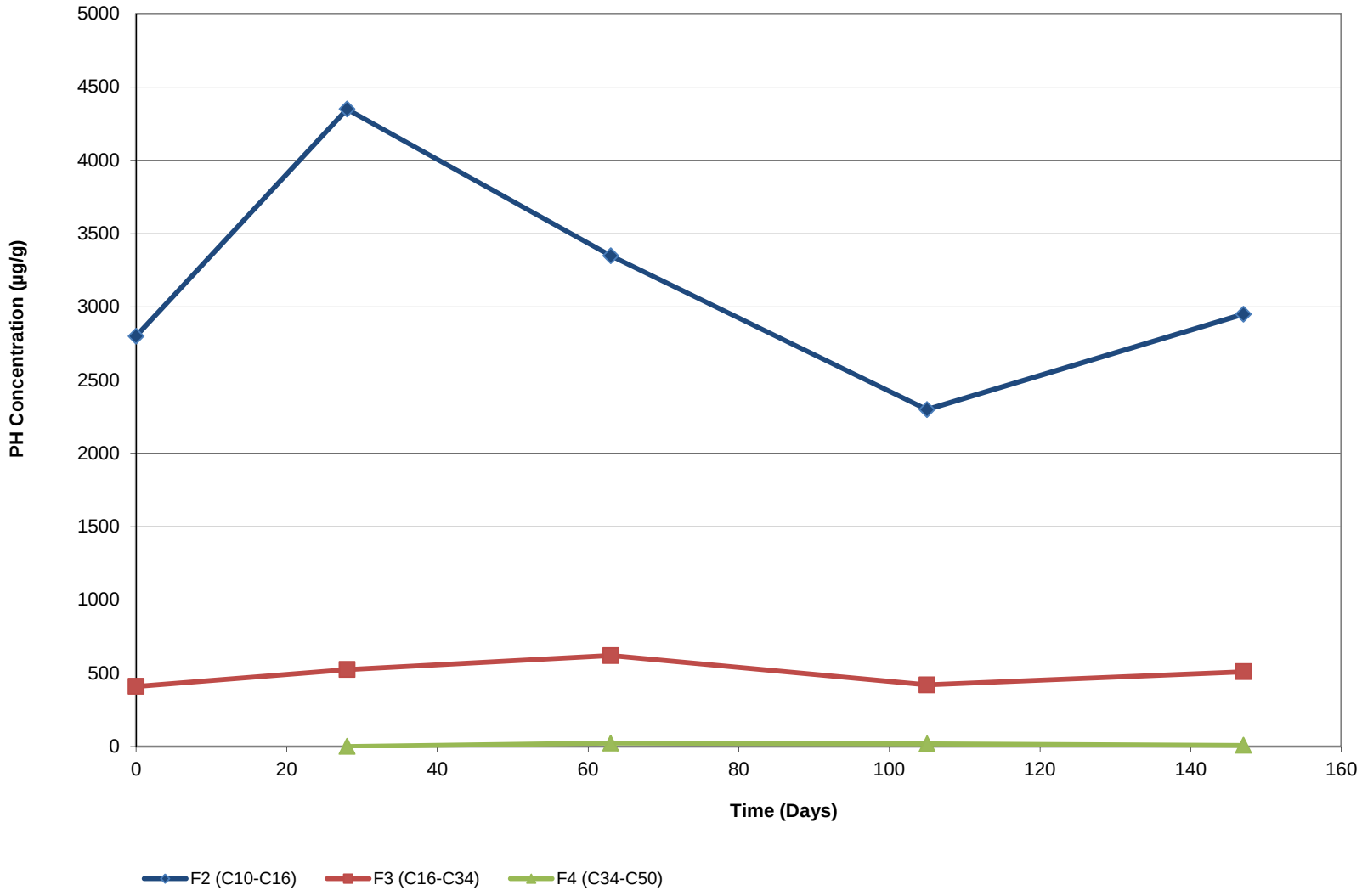
Hope Bay, Northern Canada

4-Jun-12	Figure: **5**	SiREM



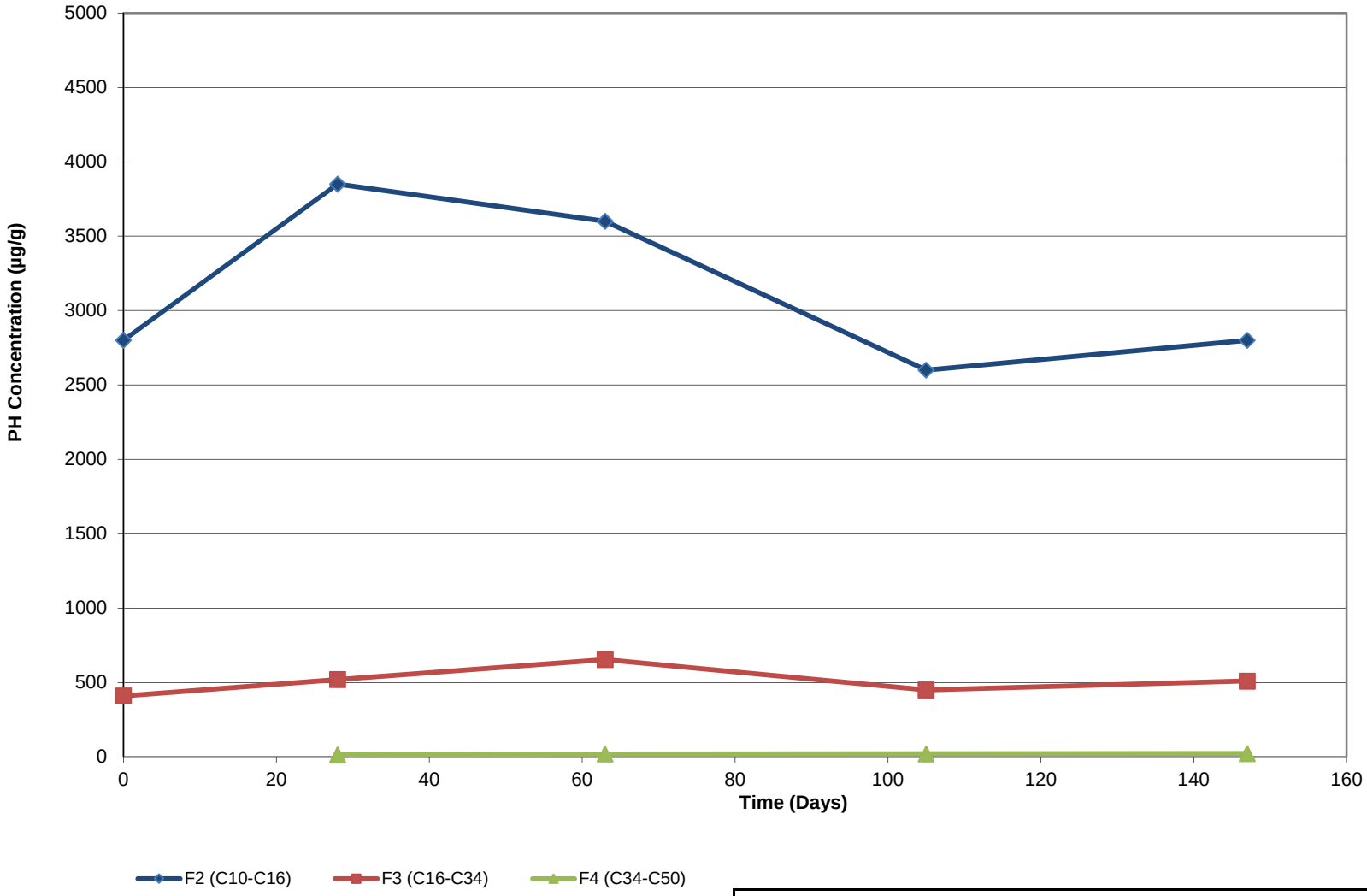
Petroleum Hydrocarbon Compounds Concentration Trends
in Aerobic Treatment EHC-O Amended Microcosms (Windy Location)
Hope Bay, Northern Canada

4-Jun-12	Figure: **6**	SiREM



Petroleum Hydrocarbon Compounds Concentration Trends
in Anaerobic Nitrate Amended Microcosms (Windy Location)
Hope Bay, Northern Canada

4-Jun-12	Figure: **7**	SiREM



Petroleum Hydrocarbon Compounds Concentration Trends
in Anaerobic Sulfate Amended Microcosms (Windy Location)
Hope Bay, Northern Canada

4-Jun-12	Figure: **8**	SiREM

APPENDIX A: Chain of Custody Documentation

Maxxam

Calgary: 4000 19st St. NE, T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-8889
www.maxxamanalytics.com

S-2306

Chain of Custody A050098

Page: 1 of 1

	Invoice To: C/O Report Address ☐	Report To: Same as Invoice ☒
Company:	EBA ENGINEERING	
Contact:	DANIELA FELSKE	
Address:	14940-123 AVE	
	Prov: EDMONTON PC: AB T5V 1B4	PC:
Contact #s:	Ph: 780-451-2121 Cell:	Ph: Cell:

Report Distribution (E-Mail):
dfelske@eba.ca
mhebert@eba.ca
bhorne@eba.ca

REGULATORY GUIDELINES:
☐ AT1
☐ CCME
☐ Regulated Drinking Water
☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #:	Y22101187.001
Project # / Name:	
Site Location:	ST-P274-01011
Quote #:	
Sampled By:	D. FELSKE

SERVICE REQUESTED: ☐ **RUSH** (Contact lab to reserve) **Date Required:** ☐ REGULAR (5 to 7 Days)

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00
#1	WINDY COMPOSITE			
2	W2-20			
3	W4-10			See Quote
4	W2-8			
#2	PATCH P5-3			BIOTREATABILITY
6	COMPOSITE P3-7			
7	P1-3			
8				
9				
10				
11				
12				

SOIL: BTEX F1-F4; Sieve (75 micron); Regulated Metals (CCME / AT1); Salinity 4; Assessment ICP Metals; Basic Class II Landfill

WATER: ☐BTEX F1; ☐BTEX F1-F2; ☐VOCs; ☐BTEX F1-F4; ☐ Routine Water ☐ Turb ☐ F; ☐ TOC ☐ DOC; Regulated Metals (CCME / AT1) Total / Dissolved; Mercury ☐ Total ☐ Dissolved

Other Analysis

HOLD - Do not Analyze

# of Containers Submitted

Please indicate Filtered, Preserved or Both (F, P, F/P) → F/P

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
DFELSKE	AUG 22, 2011	9:00
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions:

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #:		
N. Ward	23/Aug/11	10:45	Custody Seal	Temperature	Ice

Lab Comments:

Maxxam Analytics International Corporation o/a Maxxam Analytics

APPENDIX B: Summary of Percent Moisture and Water Holding Capacity Results

APPENDIX B: SUMMARY OF BASELINE MOISTURE CONTENT AND SOIL WATER HOLDING CAPACITY

Sample	Dish Weight (g)	Dish + Wet Sample (g)	Dish + Sample Dried @ 100C 16hr (g)	% Dry Matter	% Moisture	average
Windy-1	2.05	13.00	11.70	88.13%	11.87%	
Windy-2	2.05	13.35	11.80	86.28%	13.72%	12.79%
Windy-3	2.05	13.00	11.60	87.21%	12.79%	
Patch-1	2.10	16.40	14.55	87.06%	12.94%	
Patch-2	2.10	16.60	14.65	86.55%	13.45%	13.25%
Patch-3	2.10	18.95	16.70	86.65%	13.35%	

Sample	Sample Weight (g)	Buret Reading Start (ml)	Buret Reading Finish (ml)	Total Water Used (ml)	Total Water Holding Capacity (ml/g)	Percent Water Holding Capacity per gram (%)	Average Water Holding Capacity (ml/g)
Windy-1	10.00	3.50	7.30	3.80	0.38	38.00%	
Windy-2	10.00	7.30	12.50	5.20	0.52	52.00%	0.47
Windy-3	10.00	12.60	17.60	5.00	0.50	50.00%	
Patch-1	10.00	17.60	21.90	4.30	0.43	43.00%	
Patch-2	10.00	21.90	25.70	3.80	0.38	38.00%	0.39
Patch-3	10.00	25.70	29.30	3.60	0.36	36.00%	

APPENDIX C: Summary of Nutrient and Moisture Amendment Calculations for Treatment Microcosms

APPENDIX C: SUMMARY OF NUTRIENT AND MOISTURE AMENDMENT CALCULATIONS FOR TREATMENT MICROCOSMS

%Moisture = 13.25%
water holding capacity (WHC) = 0.39 ml/g

In 200g of soil (each treatment contains 200 g of soil)
(200 g) * (13.25%)
= 26.5 g of water in 200 g of soil

0.39 ml/g * 200 g soil
= 78 ml of water, but we want to use 50% WHC (as per proposal)
=78/2 = 39 mL
39 ml -26.5ml = 12.5 ml of water/treatment
Therefore we added 12.5mL of water per bottle to reach 50% of the WHC

N Calculation

N is the limiting factor as beyond 200 mg/kg it can be toxic
200mg/14mg/mmol (M.W of N)
=14.3 mmol of N

Used Diammonium Phosphate (NH4)2 HPO4
2 N in each mole of DAP
therefore 14.3/2= 7.15 mmol of DAP needed

7.15 mmol * 132 mg/mmol (MW of DAP)
= 943 mg/kg of DAP needed
943mg/kg / 5
= 189 mg of DAP/200 g soil

P Calculation

How much P was added in the 189 mg of DAP?
7.15 mmol of DAP * 31 mg/mmol (MW of P)
= 222 mg of P added.

Therefore, in 189 mg of DAP added to each bottle there was 200 mg/kg of N and 222 mg/kg of P added

APPENDIX C: SUMMARY OF NUTRIENT AND MOISTURE AMENDMENT CALCULATIONS FOR TREATMENT MICROCOSMS

Initial amendment was based on the estimated amount of water in each bottle.

NO3

Volume of water in each 200 g of soil= % Moisture

%Moisture of Windy Soil is 12.79% (measured. Re
WHC of Windy soil 0.47 ml/g (measured. Refer to 2nd sheet)

12.79% * 200g of soil = 25.6 ml of water in 200 g soil

WHC of 200 g of soil
0.47 ml/g * 200 g of soil = 94 ml of water
but we want to use 50% of WHC (as per proposal)
94/2= 47 ml

47 ml - 25.6 ml= 21.4 ml of water/treatment
We only added 10.7 ml because beyond this we found it would saturate the soil

Volume of water in 200 g of soil 25.6 ml + 10.7 ml = 36 ml

NO3 Target is 2mM (2mmol/L) as beyond this may be toxic

1mM NO3 = 62 mg/L
2mM NO3 = 124 mg/L

How many mmoles of NO3 in 2mM target
x mmol NO3 = 0.036 L water * 2mmol/L
x= 0.072 mmol NO3/200 g of soil

Calculation is based on the amount of water in the treatment bottles as the amount in the water is available to microorganisms.
Please see below for the calculation for how muchwas added per 200g of soil

We made a 200 g/L stock of NaNO3 which has a molecular weight of 84.99 g/mol

mmols in NaNO3 stock
= 1L* (200g/L)* (1mmol/84.99)*(1000mg/g)
= 2400 mmol/L

How much of this stock is needed to get 0.072 mmol of NO3 in 200 g of soil
=0.072mmol* (1L/2400mmol) * (1000 ml/1 L)
= 0.03 ml
= 30 uL
Therefore added 30 ul of a 200g/L NaNO3 stock to each NO3 bottle

How much N was added per 200g soil

We know that we need 0.072 mmol of NO3 per 200 g of soil to have 2mM (124 mg/L) NO3 target

MW of N = 14mg/mmol
0.072 mmol NO3 * 14 mg/mmol = 1.01 mg N added per 200g
or
1.01mg/200g * 1000g/1kg = 5.1 mg N/kg soil

How much NO3 was added per 200g soil
MW of NO3 = 62 mg/mol
therefore , 0.072 mmol NO3 * 62 mg/mmol
= 4.5 mg NO3 added per 200 g
4.5mg *5
= 22.5 mg NO3/kg

APPENDIX C: SUMMARY OF NUTRIENT AND MOISTURE AMENDMENT CALCULATIONS FOR TREATMENT MICROCOSMS

SO4
Know there's 36 ml of water/ 200g of soil

Calculation is based on the amount of water in the treatment bottles as the amount in the water is available to microorganisms.
Please see below for the calculation for how muchwas added per 200g of soil

Target 2mM of SO4
1mM= 96.1 mg/L
2mM= 192.2 mg/L

Howm many mmoles of SO4 in 2mM target?
xmmol SO4=0.036L water * 2mmol/L
=0.072 mmol SO4/200g of soil

Made 200g/L Na2 SO4 stock with MW of 142.1mg/mmol
How much SO4 is in this stock
=200g/L *(1mmol/142.1mg)(1000mg/1g)
= 1407 mmol SO4 in stock

How much of this stock is needed to get 0.072 mmol of SO4 in 200 g of soil
= 0.072 mmol * (1L/1407 mmol) *(1000 ml/1L)
= 0.051 ml
= 51 µL
Therefore added 51 ul of a 200g/L Na2SO4 stock to each SO4 bottle

How much SO4 was added per 200g soil
MW of SO = 96 mg/mmol
0.072 mmol SO4 * 96 mg/mmol = 6.91 mg of SO4/ 200 g of soil
6.91*5
= 34.6 mg SO4/kg soil

APPENDIX D: Maxxam Analytics Analytical Reports

Your Project #: S-2306
Your C.O.C. #: 3251

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2011/09/06

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B1D3370
Received: 2011/08/31, 10:10

Sample Matrix: SOLID
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Petroleum Hydrocarbons F2-F4 in Soil	2	2011/09/02	2011/09/03	CAM SOP-00316	CCME CWS
Moisture	2	N/A	2011/09/02	CAM SOP-00445	McKeague 2nd ed 1978

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act.

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 the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

../2

Your Project #: S-2306
Your C.O.C. #: 3251

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2011/09/06

CERTIFICATE OF ANALYSIS

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

JOLANTA GORALCZYK, Project Manager
Email: JGoralczyk@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.

Total cover pages: 2

Maxxam Job #: B1D3370
Report Date: 2011/09/06

SiREM - Site Recovery & Management
Client Project #: S-2306

RESULTS OF ANALYSES OF SOLID

Maxxam ID		KS7364	KS7365		
Sampling Date		2011/08/30	2011/08/30		
COC Number		3251	3251		
	Units	**WINDY-083011-A-BASELINE**	**PATCH-083011-A-BASELINE**	**RDL**	**QC Batch**
Inorganics					
Moisture	%	14	15	1	2602990

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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 #: B1D3370
Report Date: 2011/09/06

SiREM - Site Recovery & Management
Client Project #: S-2306

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		KS7364	KS7365		
Sampling Date		2011/08/30	2011/08/30		
COC Number		3251	3251		
	Units	**WINDY-083011-A-BASELINE**	**PATCH-083011-A-BASELINE**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons					
F2 (C10-C16 Hydrocarbons)	ug/g	3000	3600	10	2602748
F3 (C16-C34 Hydrocarbons)	ug/g	460	2100	10	2602748
Reached Baseline at C50	ug/g	Yes	Yes		2602748
Surrogate Recovery (%)					
o-Terphenyl	%	105	110		2602748

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B1D3370
Report Date: 2011/09/06

SiREM - Site Recovery & Management
Client Project #: S-2306

Test Summary

Maxxam ID	KS7364	**Collected**	2011/08/30
Sample ID	WINDY-083011-A-BASELINE	**Shipped**	
Matrix	SOLID	**Received**	2011/08/31

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2602748	2011/09/02	2011/09/03	JOLANTA KAWZOWICZ
Moisture	BAL	2602990	N/A	2011/09/02	LAKHVIR KALER

Maxxam ID	KS7365	**Collected**	2011/08/30
Sample ID	PATCH-083011-A-BASELINE	**Shipped**	
Matrix	SOLID	**Received**	2011/08/31

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2602748	2011/09/02	2011/09/03	JOLANTA KAWZOWICZ
Moisture	BAL	2602990	N/A	2011/09/02	LAKHVIR KALER

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Maxxam Job #: B1D3370
Report Date: 2011/09/06

SiREM - Site Recovery & Management
Client Project #: S-2306

GENERAL COMMENTS

Results relate only to the items tested.

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SiREM - Site Recovery & Management
Attention: Ximena Druar
Client Project #: S-2306
P.O. #:
Site Location:

Quality Assurance Report

Maxxam Job Number: MB1D3370

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
2602748	JKA	Matrix Spike	o-Terphenyl	2011/09/03		98	%	30 - 130
			F2 (C10-C16 Hydrocarbons)	2011/09/03		92	%	60 - 130
			F3 (C16-C34 Hydrocarbons)	2011/09/03		86	%	60 - 130
		Spiked Blank	o-Terphenyl	2011/09/03		99	%	30 - 130
			F2 (C10-C16 Hydrocarbons)	2011/09/03		87	%	60 - 130
			F3 (C16-C34 Hydrocarbons)	2011/09/03		86	%	60 - 130
		Method Blank	o-Terphenyl	2011/09/02		103	%	30 - 130
			F2 (C10-C16 Hydrocarbons)	2011/09/02	2 U, MDL=2		ug/g	
			F3 (C16-C34 Hydrocarbons)	2011/09/02	2 U, MDL=2		ug/g	
		RPD	F2 (C10-C16 Hydrocarbons)	2011/09/03	NC		%	50
			F3 (C16-C34 Hydrocarbons)	2011/09/03	NC		%	50
2602990	BOP	RPD	Moisture	2011/09/02	4.0		%	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 to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
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 (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

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Validation Signature Page

Maxxam Job #: B1D3370

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

CRISTINA CARRIERE, Scientific Services

MEDHAT RISKALLAH, Manager, Hydrocarbon Department

==========

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Your Project #: EBA STUDY
Your C.O.C. #: NA

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2011/10/13

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B1F6082
Received: 2011/10/06, 12:45

Sample Matrix: Soil
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Petroleum Hydrocarbons F2-F4 in Soil	4	2011/10/08	2011/10/12	CAM SOP-00316	CCME CWS
Moisture	4	N/A	2011/10/12	CAM SOP-00445	McKeague 2nd ed 1978

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act.

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 the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

../2

Your Project #: EBA STUDY
Your C.O.C. #: NA

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2011/10/13

CERTIFICATE OF ANALYSIS

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

JOLANTA GORALCZYK, Project Manager
Email: JGoralczyk@maxxam.ca
Phone# (905) 817-5700

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Total cover pages: 2

Maxxam Job #: B1F6082
Report Date: 2011/10/13

SiREM - Site Recovery & Management
Client Project #: EBA STUDY

RESULTS OF ANALYSES OF SOIL

Maxxam ID		LE3089	LE3090	LE3091	LE3092		
Sampling Date		2011/10/05	2011/10/05	2011/10/05	2011/10/05		
COC Number		NA	NA	NA	NA		
	Units	**EBA-PATCH-1 (T=O)**	**EBA-PATCH-2 (T=O)**	**EBA-WINDY-9 (T=O)**	**EBA-WINDY-10 (T=O)**	**RDL**	**QC Batch**
Inorganics							
Moisture	%	13	15	18	18	1	2645297

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B1F6082
Report Date: 2011/10/13

SiREM - Site Recovery & Management
Client Project #: EBA STUDY

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		LE3089	LE3090	LE3091	LE3092		
Sampling Date		2011/10/05	2011/10/05	2011/10/05	2011/10/05		
COC Number		NA	NA	NA	NA		
	Units	**EBA-PATCH-1 (T=O)**	**EBA-PATCH-2 (T=O)**	**EBA-WINDY-9 (T=O)**	**EBA-WINDY-10 (T=O)**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	4200	4600	3100	2500	10	2642136
F3 (C16-C34 Hydrocarbons)	ug/g	3400	3500	450	370	10	2642136
Surrogate Recovery (%)							
o-Terphenyl	%	113	112	108	106		2642136

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B1F6082
Report Date: 2011/10/13

SiREM - Site Recovery & Management
Client Project #: EBA STUDY

Test Summary

Maxxam ID LE3089 **Collected** 2011/10/05
Sample ID EBA-PATCH-1 (T=O) **Shipped**
Matrix Soil **Received** 2011/10/06

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2642136	2011/10/08	2011/10/12	DORINA POPA
Moisture	BAL	2645297	N/A	2011/10/12	LAKHVIR KALER

Maxxam ID LE3090 **Collected** 2011/10/05
Sample ID EBA-PATCH-2 (T=O) **Shipped**
Matrix Soil **Received** 2011/10/06

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2642136	2011/10/08	2011/10/12	DORINA POPA
Moisture	BAL	2645297	N/A	2011/10/12	LAKHVIR KALER

Maxxam ID LE3091 **Collected** 2011/10/05
Sample ID EBA-WINDY-9 (T=O) **Shipped**
Matrix Soil **Received** 2011/10/06

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2642136	2011/10/08	2011/10/12	DORINA POPA
Moisture	BAL	2645297	N/A	2011/10/12	LAKHVIR KALER

Maxxam ID LE3092 **Collected** 2011/10/05
Sample ID EBA-WINDY-10 (T=O) **Shipped**
Matrix Soil **Received** 2011/10/06

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2642136	2011/10/08	2011/10/12	DORINA POPA
Moisture	BAL	2645297	N/A	2011/10/12	LAKHVIR KALER

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Maxxam Job #: B1F6082
Report Date: 2011/10/13

SiREM - Site Recovery & Management
Client Project #: EBA STUDY

GENERAL COMMENTS

Results relate only to the items tested.

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SiREM - Site Recovery & Management
Attention: Ximena Druar
Client Project #: EBA STUDY
P.O. #:
Site Location:

Quality Assurance Report

Maxxam Job Number: MB1F6082

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
2642136	DPO	Matrix Spike	o-Terphenyl	2011/10/12		111	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/10/12		100	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2011/10/12		95	%	50 - 130
		Spiked Blank	o-Terphenyl	2011/10/12		101	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/10/12		86	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2011/10/12		81	%	70 - 130
		Method Blank	o-Terphenyl	2011/10/12		105	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/10/12	2 U, MDL=2		ug/g	
			F3 (C16-C34 Hydrocarbons)	2011/10/12	2 J, MDL=2		ug/g	
		RPD	F2 (C10-C16 Hydrocarbons)	2011/10/12	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2011/10/12	NC		%	30
2645297	PHM	RPD	Moisture	2011/10/12	0		%	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 to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
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 (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

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Validation Signature Page

Maxxam Job #: B1F6082

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

CRISTINA CARRIERE, Scientific Services

MEDHAT RISKALLAH, Manager, Hydrocarbon Department

==========

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Your Project #: EBA
Your C.O.C. #: NA

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2011/11/09

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B1H2500
Received: 2011/11/03, 10:01

Sample Matrix: Soil
Samples Received: 16

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Petroleum Hydrocarbons F2-F4 in Soil	16	2011/11/08	2011/11/09	CAM SOP-00316	CCME CWS
Moisture	16	N/A	2011/11/08	CAM SOP-00445	McKeague 2nd ed 1978

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act.

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Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

../2

Your Project #: EBA
Your C.O.C. #: NA

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2011/11/09

CERTIFICATE OF ANALYSIS

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

JOLANTA GORALCZYK, Project Manager
Email: JGoralczyk@maxxam.ca
Phone# (905) 817-5700

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Total cover pages: 2

Maxxam Job #: B1H2500
Report Date: 2011/11/09

SiREM - Site Recovery & Management
Client Project #: EBA

RESULTS OF ANALYSES OF SOIL

Maxxam ID		LM4253	LM4254	LM4255	LM4256	LM4257		
Sampling Date		2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25		
COC Number		NA	NA	NA	NA	NA		
	Units	**PATCH-021111-1**	**PATCH-021111-2**	**PATCH-021111-3**	**PATCH-021111-4**	**PATCH-021111-5**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	15	14	10	7	5	1	2675242

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		LM4258	LM4259	LM4260	LM4261	LM4262		
Sampling Date		2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25		
COC Number		NA	NA	NA	NA	NA		
	Units	**PATCH-021111-6**	**PATCH-021111-7**	**PATCH-021111-8**	**WINDY-021111-9**	**WINDY-021111-10**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	3	3	8	8	18	1	2675242

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		LM4263	LM4264	LM4265	LM4266	LM4267		
Sampling Date		2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25		
COC Number		NA	NA	NA	NA	NA		
	Units	**WINDY-021111-11**	**WINDY-021111-12**	**WINDY-021111-13**	**WINDY-021111-14**	**WINDY-021111-15**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	8	18	19	18	16	1	2675242

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B1H2500
Report Date: 2011/11/09

SiREM - Site Recovery & Management
Client Project #: EBA

RESULTS OF ANALYSES OF SOIL

Maxxam ID		LM4268		
Sampling Date		2011/11/02 15:25		
COC Number		NA		
	Units	**WINDY-021111-16**	**RDL**	**QC Batch**
Inorganics				
Moisture	%	18	1	2675242

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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 #: B1H2500
Report Date: 2011/11/09

SiREM - Site Recovery & Management
Client Project #: EBA

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		LM4253	LM4254	LM4255	LM4256		
Sampling Date		2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25		
COC Number		NA	NA	NA	NA		
	Units	**PATCH-021111-1**	**PATCH-021111-2**	**PATCH-021111-3**	**PATCH-021111-4**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	4000	4400	3600	5100	10	2674767
F3 (C16-C34 Hydrocarbons)	ug/g	4800	4300	4100	5700	10	2674767
F4 (C34-C50 Hydrocarbons)	ug/g	630	510	560	750	10	2674767
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2674767
Surrogate Recovery (%)							
o-Terphenyl	%	126	127	120	127		2674767

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		LM4257	LM4258	LM4259	LM4260		
Sampling Date		2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25		
COC Number		NA	NA	NA	NA		
	Units	**PATCH-021111-5**	**PATCH-021111-6**	**PATCH-021111-7**	**PATCH-021111-8**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	2200	2400	3000	2100	10	2674767
F3 (C16-C34 Hydrocarbons)	ug/g	3000	3900	4800	3600	10	2674767
F4 (C34-C50 Hydrocarbons)	ug/g	630	730	780	580	10	2674767
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2674767
Surrogate Recovery (%)							
o-Terphenyl	%	122	128	127	120		2674767

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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 #: B1H2500
Report Date: 2011/11/09

SiREM - Site Recovery & Management
Client Project #: EBA

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		LM4261	LM4262	LM4263	LM4264		
Sampling Date		2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25		
COC Number		NA	NA	NA	NA		
	Units	**WINDY-021111-9**	**WINDY-021111-10**	**WINDY-021111-11**	**WINDY-021111-12**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	2800	3700	2900	3000	10	2674767
F3 (C16-C34 Hydrocarbons)	ug/g	530	550	580	480	10	2674767
F4 (C34-C50 Hydrocarbons)	ug/g	2 U	2 U	2 U	11	10	2674767
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2674767
Surrogate Recovery (%)							
o-Terphenyl	%	126	120	127	126		2674767

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		LM4265	LM4266	LM4267	LM4268		
Sampling Date		2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25	2011/11/02 15:25		
COC Number		NA	NA	NA	NA		
	Units	**WINDY-021111-13**	**WINDY-021111-14**	**WINDY-021111-15**	**WINDY-021111-16**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	3800	4900	3400	4300	10	2674767
F3 (C16-C34 Hydrocarbons)	ug/g	470	580	480	560	10	2674767
F4 (C34-C50 Hydrocarbons)	ug/g	2 U	2 U	15	12	10	2674767
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2674767
Surrogate Recovery (%)							
o-Terphenyl	%	129	127	126	128		2674767

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B1H2500
Report Date: 2011/11/09

SiREM - Site Recovery & Management
Client Project #: EBA

Test Summary

Maxxam ID LM4253 **Collected** 2011/11/02
Sample ID PATCH-021111- 1 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4254 **Collected** 2011/11/02
Sample ID PATCH-021111- 2 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4255 **Collected** 2011/11/02
Sample ID PATCH-021111- 3 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4256 **Collected** 2011/11/02
Sample ID PATCH-021111- 4 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4257 **Collected** 2011/11/02
Sample ID PATCH-021111- 5 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4258 **Collected** 2011/11/02
Sample ID PATCH-021111- 6 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam Job #: B1H2500
Report Date: 2011/11/09

SiREM - Site Recovery & Management
Client Project #: EBA

Test Summary

Maxxam ID LM4259 **Collected** 2011/11/02
Sample ID PATCH-021111- 7 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4260 **Collected** 2011/11/02
Sample ID PATCH-021111- 8 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4261 **Collected** 2011/11/02
Sample ID WINDY-021111- 9 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4262 **Collected** 2011/11/02
Sample ID WINDY-021111- 10 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4263 **Collected** 2011/11/02
Sample ID WINDY-021111- 11 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4264 **Collected** 2011/11/02
Sample ID WINDY-021111- 12 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam Job #: B1H2500
Report Date: 2011/11/09

SiREM - Site Recovery & Management
Client Project #: EBA

Test Summary

Maxxam ID LM4265 **Collected** 2011/11/02
Sample ID WINDY-021111- 13 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4266 **Collected** 2011/11/02
Sample ID WINDY-021111- 14 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4267 **Collected** 2011/11/02
Sample ID WINDY-021111- 15 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

Maxxam ID LM4268 **Collected** 2011/11/02
Sample ID WINDY-021111- 16 **Shipped**
Matrix Soil **Received** 2011/11/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2674767	2011/11/08	2011/11/09	BARBARA WOWK
Moisture	BAL	2675242	N/A	2011/11/08	LAKHVIR KALER

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Maxxam Job #: B1H2500
Report Date: 2011/11/09

SiREM - Site Recovery & Management
Client Project #: EBA

GENERAL COMMENTS

Results relate only to the items tested.

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SiREM - Site Recovery & Management
Attention: Ximena Druar
Client Project #: EBA
P.O. #:
Site Location:

Quality Assurance Report

Maxxam Job Number: MB1H2500

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
2674767	BWW	Matrix Spike	o-Terphenyl	2011/11/09		125	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/11/09		118	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2011/11/09		123	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2011/11/09		125	%	50 - 130
		Spiked Blank	o-Terphenyl	2011/11/08		120	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/11/08		101	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2011/11/08		106	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2011/11/08		109	%	70 - 130
		Method Blank	o-Terphenyl	2011/11/08		109	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/11/08	2 U, MDL=2		ug/g	
			F3 (C16-C34 Hydrocarbons)	2011/11/08	6 J, MDL=2		ug/g	
			F4 (C34-C50 Hydrocarbons)	2011/11/08	2 U, MDL=2		ug/g	
		RPD	F2 (C10-C16 Hydrocarbons)	2011/11/09	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2011/11/09	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2011/11/09	NC		%	30
2675242	VK	RPD	Moisture	2011/11/08	4.1		%	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 to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
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 (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

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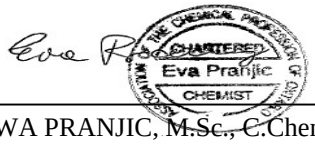
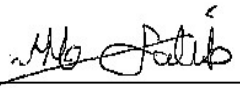
Validation Signature Page

Maxxam Job #: B1H2500

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



MAMDOUH SALIB, Analyst, Hydrocarbons

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Your Project #: EBA STUDY
Your C.O.C. #: 2102

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2011/12/14

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B1J3468
Received: 2011/12/08, 08:47

Sample Matrix: Soil
Samples Received: 16

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Petroleum Hydrocarbons F2-F4 in Soil	16	2011/12/12	2011/12/13	CAM SOP-00316	CCME CWS
Moisture	16	N/A	2011/12/13	CAM SOP-00445	McKeague 2nd ed 1978

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act.

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 the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

../2

Your Project #: EBA STUDY
Your C.O.C. #: 2102

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2011/12/14

CERTIFICATE OF ANALYSIS

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

JOLANTA GORALCZYK, Project Manager
Email: JGoralczyk@maxxam.ca
Phone# (905) 817-5700

==========

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Total cover pages: 2

Maxxam Job #: B1J3468
Report Date: 2011/12/14

SiREM - Site Recovery & Management
Client Project #: EBA STUDY

RESULTS OF ANALYSES OF SOIL

Maxxam ID		LX3359	LX3360	LX3361	LX3362	LX3363		
Sampling Date		2011/12/07	2011/12/07	2011/12/07	2011/12/07	2011/12/07		
COC Number		2102	2102	2102	2102	2102		
	Units	**PATCH-071211-1**	**PATCH-071211-2**	**PATCH-071211-3**	**PATCH-071211-4**	**PATCH-071211-5**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	12	8	15	13	11	1	2712156

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		LX3364	LX3365	LX3366	LX3367	LX3368		
Sampling Date		2011/12/07	2011/12/07	2011/12/07	2011/12/07	2011/12/07		
COC Number		2102	2102	2102	2102	2102		
	Units	**PATCH-071211-6**	**PATCH-071211-7**	**PATCH-071211-8**	**WINDY-071211-9**	**WINDY-071211-10**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	15	11	5	13	14	1	2712156

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		LX3369	LX3370	LX3371	LX3372	LX3373		
Sampling Date		2011/12/07	2011/12/07	2011/12/07	2011/12/07	2011/12/07		
COC Number		2102	2102	2102	2102	2102		
	Units	**WINDY-071211-11**	**WINDY-071211-12**	**WINDY-071211-13**	**WINDY-071211-14**	**WINDY-071211-15**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	14	15	19	19	17	1	2712156

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		LX3374		
Sampling Date		2011/12/07		
COC Number		2102		
	Units	**WINDY-071211-16**	**RDL**	**QC Batch**
Inorganics				
Moisture	%	19	1	2712156

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B1J3468
Report Date: 2011/12/14

SiREM - Site Recovery & Management
Client Project #: EBA STUDY

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		LX3359	LX3360	LX3361	LX3362		
Sampling Date		2011/12/07	2011/12/07	2011/12/07	2011/12/07		
COC Number		2102	2102	2102	2102		
	Units	**PATCH-071211-1**	**PATCH-071211-2**	**PATCH-071211-3**	**PATCH-071211-4**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	2400	2800	2600	2300	10	2710899
F3 (C16-C34 Hydrocarbons)	ug/g	3200	4300	3800	3100	10	2710899
F4 (C34-C50 Hydrocarbons)	ug/g	480	650	590	470	10	2710899
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2710899
Surrogate Recovery (%)							
o-Terphenyl	%	102	104	106	100		2710899

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		LX3363	LX3364	LX3365	LX3366		
Sampling Date		2011/12/07	2011/12/07	2011/12/07	2011/12/07		
COC Number		2102	2102	2102	2102		
	Units	**PATCH-071211-5**	**PATCH-071211-6**	**PATCH-071211-7**	**PATCH-071211-8**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	1000	1000	1800	1600	10	2710899
F3 (C16-C34 Hydrocarbons)	ug/g	1900	1900	3300	3400	10	2710899
F4 (C34-C50 Hydrocarbons)	ug/g	410	380	610	620	10	2710899
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2710899
Surrogate Recovery (%)							
o-Terphenyl	%	98	102	106	100		2710899

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B1J3468
Report Date: 2011/12/14

SiREM - Site Recovery & Management
Client Project #: EBA STUDY

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		LX3367	LX3368	LX3369	LX3370		
Sampling Date		2011/12/07	2011/12/07	2011/12/07	2011/12/07		
COC Number		2102	2102	2102	2102		
	Units	**WINDY-071211-9**	**WINDY-071211-10**	**WINDY-071211-11**	**WINDY-071211-12**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	1700	1600	2000	1500	10	2710899
F3 (C16-C34 Hydrocarbons)	ug/g	530	660	610	460	10	2710899
F4 (C34-C50 Hydrocarbons)	ug/g	24	26	27	20	10	2710899
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2710899
Surrogate Recovery (%)							
o-Terphenyl	%	94	96	95	93		2710899

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		LX3371	LX3372	LX3373	LX3374		
Sampling Date		2011/12/07	2011/12/07	2011/12/07	2011/12/07		
COC Number		2102	2102	2102	2102		
	Units	**WINDY-071211-13**	**WINDY-071211-14**	**WINDY-071211-15**	**WINDY-071211-16**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	4100	2600	3500	3700	10	2710899
F3 (C16-C34 Hydrocarbons)	ug/g	730	510	640	670	10	2710899
F4 (C34-C50 Hydrocarbons)	ug/g	24	22	18	23	10	2710899
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2710899
Surrogate Recovery (%)							
o-Terphenyl	%	96	95	95	93		2710899

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B1J3468
Report Date: 2011/12/14

SiREM - Site Recovery & Management
Client Project #: EBA STUDY

Test Summary

Maxxam ID LX3359 **Collected** 2011/12/07
Sample ID PATCH-071211-1 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3360 **Collected** 2011/12/07
Sample ID PATCH-071211-2 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3361 **Collected** 2011/12/07
Sample ID PATCH-071211-3 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3362 **Collected** 2011/12/07
Sample ID PATCH-071211-4 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3363 **Collected** 2011/12/07
Sample ID PATCH-071211-5 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3364 **Collected** 2011/12/07
Sample ID PATCH-071211-6 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

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Maxxam Job #: B1J3468
Report Date: 2011/12/14

SiREM - Site Recovery & Management
Client Project #: EBA STUDY

Test Summary

Maxxam ID LX3365 **Collected** 2011/12/07
Sample ID PATCH-071211-7 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3366 **Collected** 2011/12/07
Sample ID PATCH-071211-8 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3367 **Collected** 2011/12/07
Sample ID WINDY-071211-9 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3368 **Collected** 2011/12/07
Sample ID WINDY-071211-10 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3369 **Collected** 2011/12/07
Sample ID WINDY-071211-11 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3370 **Collected** 2011/12/07
Sample ID WINDY-071211-12 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

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Maxxam Job #: B1J3468
Report Date: 2011/12/14

SiREM - Site Recovery & Management
Client Project #: EBA STUDY

Test Summary

Maxxam ID LX3371 **Collected** 2011/12/07
Sample ID WINDY-071211-13 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3372 **Collected** 2011/12/07
Sample ID WINDY-071211-14 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3373 **Collected** 2011/12/07
Sample ID WINDY-071211-15 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

Maxxam ID LX3374 **Collected** 2011/12/07
Sample ID WINDY-071211-16 **Shipped**
Matrix Soil **Received** 2011/12/08

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2710899	2011/12/12	2011/12/13	ZHIYUE (FRANK) ZHU
Moisture	BAL	2712156	N/A	2011/12/13	LAKHVIR KALER

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Maxxam Job #: B1J3468
Report Date: 2011/12/14

SiREM - Site Recovery & Management
Client Project #: EBA STUDY

GENERAL COMMENTS

Results relate only to the items tested.

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SiREM - Site Recovery & Management
Attention: Ximena Druar
Client Project #: EBA STUDY
P.O. #:
Site Location:

Quality Assurance Report

Maxxam Job Number: MB1J3468

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
2710899	ZZ	Matrix Spike	o-Terphenyl	2011/12/13		100	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/12/13		113	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2011/12/13		105	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2011/12/13		116	%	50 - 130
		Spiked Blank	o-Terphenyl	2011/12/13		91	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/12/13		101	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2011/12/13		96	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2011/12/13		106	%	70 - 130
		Method Blank	o-Terphenyl	2011/12/13		92	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2011/12/13	2.0 U, MDL=2.0		ug/g	
			F3 (C16-C34 Hydrocarbons)	2011/12/13	3.8 J, MDL=2.0		ug/g	
			F4 (C34-C50 Hydrocarbons)	2011/12/13	2.0 U, MDL=2.0		ug/g	
		RPD	F2 (C10-C16 Hydrocarbons)	2011/12/13	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2011/12/13	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2011/12/13	NC		%	30
2712156	PHM	RPD	Moisture	2011/12/13	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 to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
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 (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

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Validation Signature Page

Maxxam Job #: B1J3468

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

CRISTINA CARRIERE, Scientific Services

MEDHAT RISKALLAH, Manager, Hydrocarbon Department

==========

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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Your Project #: EBA DTUDY
Your C.O.C. #: 2119

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2012/01/25

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B208557
Received: 2012/01/19, 09:15

Sample Matrix: Soil
Samples Received: 16

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Petroleum Hydrocarbons F2-F4 in Soil	16	2012/01/23	2012/01/24	CAM SOP-00316	CCME CWS
Moisture	16	N/A	2012/01/23	CAM SOP-00445	R.Carter,1993

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

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 the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

../2

Your Project #: EBA DTUDY
Your C.O.C. #: 2119

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2012/01/25

CERTIFICATE OF ANALYSIS

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

JOLANTA GORALCZYK, Project Manager
Email: JGoralczyk@maxxam.ca
Phone# (905) 817-5700

==========

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Total cover pages: 2

Maxxam Job #: B208557
Report Date: 2012/01/25

SiREM - Site Recovery & Management
Client Project #: EBA DTUDY

RESULTS OF ANALYSES OF SOIL

Maxxam ID		MH1219	MH1220	MH1221	MH1222	MH1223		
Sampling Date		2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40		
COC Number		2119	2119	2119	2119	2119		
	Units	**PATCH-18112-1**	**PATCH-18112-2**	**PATCH-18112-3**	**PATCH-18112-4**	**PATCH-18112-5**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	6.3	5.3	6.6	13	6.6	1.0	2743915

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MH1224	MH1225	MH1226	MH1227	MH1228		
Sampling Date		2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40		
COC Number		2119	2119	2119	2119	2119		
	Units	**PATCH-18112-6**	**PATCH-18112-7**	**PATCH-18112-8**	**WINDY-18112-9**	**WINDY-18112-10**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	11	11	5.4	11	13	1.0	2743915

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MH1229	MH1230	MH1231	MH1232	MH1233		
Sampling Date		2012/01/18	2012/01/18	2012/01/18	2012/01/18	2012/01/18		
COC Number		2119	2119	2119	2119	2119		
	Units	**WINDY-18112-11**	**WINDY-18112-12**	**WINDY-18112-13**	**WINDY-18112-14**	**WINDY-18112-15**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	11	18	20	22	21	1.0	2743915

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MH1234		
Sampling Date		2012/01/18		
COC Number		2119		
	Units	**WINDY-18112-16**	**RDL**	**QC Batch**
Inorganics				
Moisture	%	19	1.0	2743915

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B208557
Report Date: 2012/01/25

SiREM - Site Recovery & Management
Client Project #: EBA DTUDY

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		MH1219	MH1220	MH1221	MH1222		
Sampling Date		2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40		
COC Number		2119	2119	2119	2119		
	Units	**PATCH-18112-1**	**PATCH-18112-2**	**PATCH-18112-3**	**PATCH-18112-4**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	1900	1600	2000	1600	10	2743578
F3 (C16-C34 Hydrocarbons)	ug/g	3900	3800	3700	3500	10	2743578
F4 (C34-C50 Hydrocarbons)	ug/g	550	520	510	490	10	2743578
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2743578
Surrogate Recovery (%)							
o-Terphenyl	%	94	98	95	93		2743578

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MH1223	MH1224	MH1225	MH1226		
Sampling Date		2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40		
COC Number		2119	2119	2119	2119		
	Units	**PATCH-18112-5**	**PATCH-18112-6**	**PATCH-18112-7**	**PATCH-18112-8**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	650	720	920	990	10	2743578
F3 (C16-C34 Hydrocarbons)	ug/g	2300	2000	2100	2600	10	2743578
F4 (C34-C50 Hydrocarbons)	ug/g	440	410	350	450	10	2743578
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2743578
Surrogate Recovery (%)							
o-Terphenyl	%	87	87	89	90		2743578

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B208557
Report Date: 2012/01/25

SiREM - Site Recovery & Management
Client Project #: EBA DTUDY

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		MH1227	MH1228	MH1229	MH1230		
Sampling Date		2012/01/18 02:40	2012/01/18 02:40	2012/01/18	2012/01/18		
COC Number		2119	2119	2119	2119		
	Units	**WINDY-18112-9**	**WINDY-18112-10**	**WINDY-18112-11**	**WINDY-18112-12**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	1600	1100	760	930	10	2743578
F3 (C16-C34 Hydrocarbons)	ug/g	450	500	380	420	10	2743578
F4 (C34-C50 Hydrocarbons)	ug/g	27	21	23	23	10	2743578
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2743578
Surrogate Recovery (%)							
o-Terphenyl	%	87	89	97	90		2743578

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MH1231	MH1232	MH1233	MH1234		
Sampling Date		2012/01/18	2012/01/18	2012/01/18	2012/01/18		
COC Number		2119	2119	2119	2119		
	Units	**WINDY-18112-13**	**WINDY-18112-14**	**WINDY-18112-15**	**WINDY-18112-16**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	2500	2100	2700	2500	10	2743578
F3 (C16-C34 Hydrocarbons)	ug/g	460	380	450	450	10	2743578
F4 (C34-C50 Hydrocarbons)	ug/g	18	18	21	21	10	2743578
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2743578
Surrogate Recovery (%)							
o-Terphenyl	%	89	87	88	91		2743578

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B208557
Report Date: 2012/01/25

SiREM - Site Recovery & Management
Client Project #: EBA DTUDY

RESULTS OF ANALYSES OF SOIL

Maxxam ID		MH1219	MH1220	MH1221	MH1222	MH1223		
Sampling Date		2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40		
COC Number		2119	2119	2119	2119	2119		
	Units	**PATCH-18112-1**	**PATCH-18112-2**	**PATCH-18112-3**	**PATCH-18112-4**	**PATCH-18112-5**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	6.3	5.3	6.6	13	6.6	1.0	2743915

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MH1224	MH1225	MH1226	MH1227	MH1228		
Sampling Date		2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40		
COC Number		2119	2119	2119	2119	2119		
	Units	**PATCH-18112-6**	**PATCH-18112-7**	**PATCH-18112-8**	**WINDY-18112-9**	**WINDY-18112-10**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	11	11	5.4	11	13	1.0	2743915

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MH1229	MH1230	MH1231	MH1232	MH1233		
Sampling Date		2012/01/18	2012/01/18	2012/01/18	2012/01/18	2012/01/18		
COC Number		2119	2119	2119	2119	2119		
	Units	**WINDY-18112-11**	**WINDY-18112-12**	**WINDY-18112-13**	**WINDY-18112-14**	**WINDY-18112-15**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	11	18	20	22	21	1.0	2743915

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MH1234		
Sampling Date		2012/01/18		
COC Number		2119		
	Units	**WINDY-18112-16**	**RDL**	**QC Batch**
Inorganics				
Moisture	%	19	1.0	2743915

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B208557
Report Date: 2012/01/25

SiREM - Site Recovery & Management
Client Project #: EBA DTUDY

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		MH1219	MH1220	MH1221	MH1222		
Sampling Date		2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40		
COC Number		2119	2119	2119	2119		
	Units	**PATCH-18112-1**	**PATCH-18112-2**	**PATCH-18112-3**	**PATCH-18112-4**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	1900	1600	2000	1600	10	2743578
F3 (C16-C34 Hydrocarbons)	ug/g	3900	3800	3700	3500	10	2743578
F4 (C34-C50 Hydrocarbons)	ug/g	550	520	510	490	10	2743578
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2743578
Surrogate Recovery (%)							
o-Terphenyl	%	94	98	95	93		2743578

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MH1223	MH1224	MH1225	MH1226		
Sampling Date		2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40	2012/01/18 02:40		
COC Number		2119	2119	2119	2119		
	Units	**PATCH-18112-5**	**PATCH-18112-6**	**PATCH-18112-7**	**PATCH-18112-8**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	650	720	920	990	10	2743578
F3 (C16-C34 Hydrocarbons)	ug/g	2300	2000	2100	2600	10	2743578
F4 (C34-C50 Hydrocarbons)	ug/g	440	410	350	450	10	2743578
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2743578
Surrogate Recovery (%)							
o-Terphenyl	%	87	87	89	90		2743578

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B208557
Report Date: 2012/01/25

SiREM - Site Recovery & Management
Client Project #: EBA DTUDY

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		MH1227	MH1228	MH1229	MH1230		
Sampling Date		2012/01/18 02:40	2012/01/18 02:40	2012/01/18	2012/01/18		
COC Number		2119	2119	2119	2119		
	Units	**WINDY-18112-9**	**WINDY-18112-10**	**WINDY-18112-11**	**WINDY-18112-12**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	1600	1100	760	930	10	2743578
F3 (C16-C34 Hydrocarbons)	ug/g	450	500	380	420	10	2743578
F4 (C34-C50 Hydrocarbons)	ug/g	27	21	23	23	10	2743578
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2743578
Surrogate Recovery (%)							
o-Terphenyl	%	87	89	97	90		2743578

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MH1231	MH1232	MH1233	MH1234		
Sampling Date		2012/01/18	2012/01/18	2012/01/18	2012/01/18		
COC Number		2119	2119	2119	2119		
	Units	**WINDY-18112-13**	**WINDY-18112-14**	**WINDY-18112-15**	**WINDY-18112-16**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	2500	2100	2700	2500	10	2743578
F3 (C16-C34 Hydrocarbons)	ug/g	460	380	450	450	10	2743578
F4 (C34-C50 Hydrocarbons)	ug/g	18	18	21	21	10	2743578
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2743578
Surrogate Recovery (%)							
o-Terphenyl	%	89	87	88	91		2743578

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B208557
Report Date: 2012/01/25

SiREM - Site Recovery & Management
Client Project #: EBA DTUDY

Test Summary

Maxxam ID MH1219 **Collected** 2012/01/18
Sample ID PATCH-18112-1 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1220 **Collected** 2012/01/18
Sample ID PATCH-18112-2 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1221 **Collected** 2012/01/18
Sample ID PATCH-18112-3 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1222 **Collected** 2012/01/18
Sample ID PATCH-18112-4 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1223 **Collected** 2012/01/18
Sample ID PATCH-18112-5 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1224 **Collected** 2012/01/18
Sample ID PATCH-18112-6 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

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Maxxam Job #: B208557
Report Date: 2012/01/25

SiREM - Site Recovery & Management
Client Project #: EBA DTUDY

Test Summary

Maxxam ID MH1219 **Collected** 2012/01/18
Sample ID PATCH-18112-1 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1220 **Collected** 2012/01/18
Sample ID PATCH-18112-2 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1221 **Collected** 2012/01/18
Sample ID PATCH-18112-3 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1222 **Collected** 2012/01/18
Sample ID PATCH-18112-4 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1223 **Collected** 2012/01/18
Sample ID PATCH-18112-5 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1224 **Collected** 2012/01/18
Sample ID PATCH-18112-6 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

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Maxxam Job #: B208557
Report Date: 2012/01/25

SiREM - Site Recovery & Management
Client Project #: EBA DTUDY

Test Summary

Maxxam ID MH1225 **Collected** 2012/01/18
Sample ID PATCH-18112-7 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1226 **Collected** 2012/01/18
Sample ID PATCH-18112-8 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1227 **Collected** 2012/01/18
Sample ID WINDY-18112-9 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1228 **Collected** 2012/01/18
Sample ID WINDY-18112-10 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1229 **Collected** 2012/01/18
Sample ID WINDY-18112-11 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1230 **Collected** 2012/01/18
Sample ID WINDY-18112-12 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

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Maxxam Job #: B208557
Report Date: 2012/01/25

SiREM - Site Recovery & Management
Client Project #: EBA DTUDY

Test Summary

Maxxam ID MH1231 **Collected** 2012/01/18
Sample ID WINDY-18112-13 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1232 **Collected** 2012/01/18
Sample ID WINDY-18112-14 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1233 **Collected** 2012/01/18
Sample ID WINDY-18112-15 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

Maxxam ID MH1234 **Collected** 2012/01/18
Sample ID WINDY-18112-16 **Shipped**
Matrix Soil **Received** 2012/01/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2743578	2012/01/23	2012/01/24	RAVINDER GAIDHU
Moisture	BAL	2743915	N/A	2012/01/23	LAKHVIR KALER

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Maxxam Job #: B208557
Report Date: 2012/01/25

SiREM - Site Recovery & Management
Client Project #: EBA DTUDY

GENERAL COMMENTS

Results relate only to the items tested.

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SiREM - Site Recovery & Management
Attention: Ximena Druar
Client Project #: EBA DTUDY
P.O. #:
Site Location:

Quality Assurance Report

Maxxam Job Number: MB208557

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
2743578	RGA	Matrix Spike	o-Terphenyl	2012/01/24		81	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2012/01/24		83	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2012/01/24		85	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2012/01/24		82	%	50 - 130
		Spiked Blank	o-Terphenyl	2012/01/24		80	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2012/01/24		81	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2012/01/24		82	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2012/01/24		78 (1)	%	70 - 130
		Method Blank	o-Terphenyl	2012/01/24		79	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2012/01/24	2.0 U, MDL=2.0		ug/g	
			F3 (C16-C34 Hydrocarbons)	2012/01/24	3.0 J, MDL=2.0		ug/g	
			F4 (C34-C50 Hydrocarbons)	2012/01/24	2.0 U, MDL=2.0		ug/g	
		RPD	F2 (C10-C16 Hydrocarbons)	2012/01/24	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2012/01/24	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2012/01/24	NC		%	30
2743915	LKA	RPD	Moisture	2012/01/23	1.1		%	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 to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
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 (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.
(1) Recovery in Spiked Blank is below the recommended acceptable limits.

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Validation Signature Page

Maxxam Job #: B208557

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

CRISTINA CARRIERE, Scientific Services

MEDHAT RISKALLAH, Manager, Hydrocarbon Department

==========

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Your Project #: EBA#1
Your C.O.C. #: 2171

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2012/03/06

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B229452
Received: 2012/03/01, 10:35

Sample Matrix: Soil
Samples Received: 16

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Petroleum Hydrocarbons F2-F4 in Soil	10	2012/03/05	2012/03/05	CAM SOP-00316	CCME CWS
Petroleum Hydrocarbons F2-F4 in Soil	6	2012/03/05	2012/03/06	CAM SOP-00316	CCME CWS
Moisture	16	N/A	2012/03/05	CAM SOP-00445	R.Carter,1993

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

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 the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

../2

Your Project #: EBA#1
Your C.O.C. #: 2171

Attention: Ximena Druar
SiREM - Site Recovery & Management
130 Research Lane
Suite 2
Guelph, ON
CANADA N1G 5G3

Report Date: 2012/03/06

CERTIFICATE OF ANALYSIS

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

JOLANTA GORALCZYK, Project Manager
Email: JGoralczyk@maxxam.ca
Phone# (905) 817-5700

==========

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Total cover pages: 2

Maxxam Job #: B229452
Report Date: 2012/03/06

SiREM - Site Recovery & Management
Client Project #: EBA#1

Sampler Initials: XD

RESULTS OF ANALYSES OF SOIL

Maxxam ID		MR4236	MR4237	MR4238	MR4239	MR4240	MR4241		
Sampling Date		2012/02/29	2012/02/29	2012/02/29	2012/02/29	2012/02/29	2012/02/29		
COC Number		2171	2171	2171	2171	2171	2171		
	Units	**PATCH-22912-1**	**PATCH-22912-2**	**PATCH-22912-3**	**PATCH-22912-4**	**PATCH-22912-5**	**PATCH-22912-6**	**RDL**	**QC Batch**
Inorganics									
Moisture	%	13	13	11	12	7.4	13	1.0	2780806

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MR4242	MR4243	MR4244	MR4245	MR4246		
Sampling Date		2012/02/29	2012/02/29	2012/02/29	2012/02/29	2012/02/29		
COC Number		2171	2171	2171	2171	2171		
	Units	**PATCH-22912-7**	**PATCH-22912-8**	**WINDY-22912-9**	**WINDY-22912-10**	**PATCH-22912-11**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	8.1	5.8	17	19	15	1.0	2780806

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MR4247	MR4248	MR4249	MR4249	MR4250		
Sampling Date		2012/02/29	2012/02/29	2012/02/29	2012/02/29	2012/02/29		
COC Number		2171	2171	2171	2171	2171		
	Units	**PATCH-22912-12**	**PATCH-22912-13**	**PATCH-22912-14**	**PATCH-22912-14 Lab-Dup**	**PATCH-22912-15**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	21	19	21	21	22	1.0	2780806

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MR4251		
Sampling Date		2012/02/29		
COC Number		2171		
	Units	**PATCH-22912-16**	**RDL**	**QC Batch**
Inorganics				
Moisture	%	21	1.0	2780806

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B229452
Report Date: 2012/03/06

SiREM - Site Recovery & Management
Client Project #: EBA#1

Sampler Initials: XD

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		MR4236	MR4236	MR4237	MR4238	MR4239		
Sampling Date		2012/02/29	2012/02/29	2012/02/29	2012/02/29	2012/02/29		
COC Number		2171	2171	2171	2171	2171		
	Units	**PATCH-22912-1**	**PATCH-22912-1 Lab-Dup**	**PATCH-22912-2**	**PATCH-22912-3**	**PATCH-22912-4**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/g	1700	1400	1400	1400	2200	10	2780391
F3 (C16-C34 Hydrocarbons)	ug/g	4600	3900	4600	3900	4600	10	2780391
F4 (C34-C50 Hydrocarbons)	ug/g	600	580	690	590	620	10	2780391
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes	Yes		2780391
Surrogate Recovery (%)								
o-Terphenyl	%	95	86	101	91	90		2780391

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MR4240	MR4241	MR4242	MR4243	MR4244		
Sampling Date		2012/02/29	2012/02/29	2012/02/29	2012/02/29	2012/02/29		
COC Number		2171	2171	2171	2171	2171		
	Units	**PATCH-22912-5**	**PATCH-22912-6**	**PATCH-22912-7**	**PATCH-22912-8**	**WINDY-22912-9**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/g	430	480	780	970	1700	10	2780391
F3 (C16-C34 Hydrocarbons)	ug/g	2300	2600	2600	3100	470	10	2780391
F4 (C34-C50 Hydrocarbons)	ug/g	470	440	470	560	2.0 U	10	2780391
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes	Yes		2780391
Surrogate Recovery (%)								
o-Terphenyl	%	89	106	92	92	82		2780391

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Report Date: 2012/03/06

SiREM - Site Recovery & Management
Client Project #: EBA#1

Sampler Initials: XD

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		MR4245	MR4246	MR4247	MR4248		
Sampling Date		2012/02/29	2012/02/29	2012/02/29	2012/02/29		
COC Number		2171	2171	2171	2171		
	Units	**WINDY-22912-10**	**PATCH-22912-11**	**PATCH-22912-12**	**PATCH-22912-13**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	2200	650	750	3100	10	2780391
F3 (C16-C34 Hydrocarbons)	ug/g	430	480	510	540	10	2780391
F4 (C34-C50 Hydrocarbons)	ug/g	2.0 U	15	26	2.0 U	10	2780391
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		2780391
Surrogate Recovery (%)							
o-Terphenyl	%	97	97	94	91		2780391

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		MR4249	MR4250	MR4251		
Sampling Date		2012/02/29	2012/02/29	2012/02/29		
COC Number		2171	2171	2171		
	Units	**PATCH-22912-14**	**PATCH-22912-15**	**PATCH-22912-16**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons						
F2 (C10-C16 Hydrocarbons)	ug/g	2800	3100	2500	10	2780391
F3 (C16-C34 Hydrocarbons)	ug/g	480	560	460	10	2780391
F4 (C34-C50 Hydrocarbons)	ug/g	14	34	12	10	2780391
Reached Baseline at C50	ug/g	Yes	Yes	Yes		2780391
Surrogate Recovery (%)						
o-Terphenyl	%	85	87	85		2780391

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B229452
Report Date: 2012/03/06

SiREM - Site Recovery & Management
Client Project #: EBA#1

Sampler Initials: XD

Test Summary

Maxxam ID MR4236 **Collected** 2012/02/29
Sample ID PATCH-22912-1 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/05	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4236 Dup **Collected** 2012/02/29
Sample ID PATCH-22912-1 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/05	BARBARA WOWK

Maxxam ID MR4237 **Collected** 2012/02/29
Sample ID PATCH-22912-2 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/05	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4238 **Collected** 2012/02/29
Sample ID PATCH-22912-3 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/05	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4239 **Collected** 2012/02/29
Sample ID PATCH-22912-4 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/05	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4240 **Collected** 2012/02/29
Sample ID PATCH-22912-5 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/05	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

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Maxxam Job #: B229452
Report Date: 2012/03/06

SiREM - Site Recovery & Management
Client Project #: EBA#1

Sampler Initials: XD

Test Summary

Maxxam ID MR4241 **Collected** 2012/02/29
Sample ID PATCH-22912-6 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/05	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4242 **Collected** 2012/02/29
Sample ID PATCH-22912-7 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/05	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4243 **Collected** 2012/02/29
Sample ID PATCH-22912-8 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/05	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4244 **Collected** 2012/02/29
Sample ID WINDY-22912-9 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/05	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4245 **Collected** 2012/02/29
Sample ID WINDY-22912-10 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/05	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4246 **Collected** 2012/02/29
Sample ID PATCH-22912-11 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/06	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

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Maxxam Job #: B229452
Report Date: 2012/03/06

SiREM - Site Recovery & Management
Client Project #: EBA#1

Sampler Initials: XD

Test Summary

Maxxam ID MR4247 **Collected** 2012/02/29
Sample ID PATCH-22912-12 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/06	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4248 **Collected** 2012/02/29
Sample ID PATCH-22912-13 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/06	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4249 **Collected** 2012/02/29
Sample ID PATCH-22912-14 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/06	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4249 Dup **Collected** 2012/02/29
Sample ID PATCH-22912-14 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4250 **Collected** 2012/02/29
Sample ID PATCH-22912-15 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/06	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

Maxxam ID MR4251 **Collected** 2012/02/29
Sample ID PATCH-22912-16 **Shipped**
Matrix Soil **Received** 2012/03/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2780391	2012/03/05	2012/03/06	BARBARA WOWK
Moisture	BAL	2780806	N/A	2012/03/05	VALENTINA KAFTANI

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 #: B229452
Report Date: 2012/03/06

SiREM - Site Recovery & Management
Client Project #: EBA#1

Sampler Initials: XD

GENERAL COMMENTS

Results relate only to the items tested.

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SiREM - Site Recovery & Management
Attention: Ximena Druar
Client Project #: EBA#1
P.O. #:
Site Location:

Quality Assurance Report

Maxxam Job Number: MB229452

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
2780391	BWW	Matrix Spike						
		[MR4236-01]	o-Terphenyl	2012/03/05		95	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2012/03/05		NC	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2012/03/05		NC	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2012/03/05		NC	%	50 - 130
		Spiked Blank	o-Terphenyl	2012/03/05		79	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2012/03/05		87	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2012/03/05		100	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2012/03/05		101	%	70 - 130
		Method Blank	o-Terphenyl	2012/03/05		79	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2012/03/05	2.0 U, MDL=2.0		ug/g	
			F3 (C16-C34 Hydrocarbons)	2012/03/05	2.0 U, MDL=2.0		ug/g	
			F4 (C34-C50 Hydrocarbons)	2012/03/05	2.0 U, MDL=2.0		ug/g	
		RPD [MR4236-01]	F2 (C10-C16 Hydrocarbons)	2012/03/05	19.4		%	30
			F3 (C16-C34 Hydrocarbons)	2012/03/05	18.3		%	30
			F4 (C34-C50 Hydrocarbons)	2012/03/05	2.4		%	30
2780806	LKA	RPD [MR4249-01]	Moisture	2012/03/05	1.4		%	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 to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
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 spiked amount was not sufficiently significant to permit a reliable recovery calculation.

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Validation Signature Page

Maxxam Job #: B229452

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

CRISTINA CARRIERE, Scientific Services

MAMDOUH SALIB, Analyst, Hydrocarbons

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APPENDIX D: University of Guelph Analytical Reports

UNIVERSITY of GUELPH
LABORATORY SERVICES
Agriculture and Food Laboratory

FINAL Report
Submission# **11-077733**
Reported: 2011-Sep-21

Submitted By:

SIREM LABORATORIES
XIMENA DRUAR
130 RESEARCH LANE
SUITE 2
GUELPH, ON N1G 5G3
Phone: 519 822-2230
Fax: 519 822-3151

Sampling Date: Not given
Received Date: 2011-Aug-30

Owner:
XIMENA DRUAR

pH (sat paste), Soil

Date Authorized: 2011-Sep-21 12:13

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	WINDY-083011-B-BASELINE	Soil		pH	6.5		
0002	PATCH-083011-B-BASELINE	Soil		pH	7.3		

Phosphorus, Soil (mass)

Date Authorized: 2011-Sep-21 12:13

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	WINDY-083011-B-BASELINE	Soil		Phosphorus, Extractable	1.70	mg/kg dry	
0002	PATCH-083011-B-BASELINE	Soil		Phosphorus, Extractable	4.63	mg/kg dry	

Total Nitrogen

Date Authorized: 2011-Sep-21 12:13

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	WINDY-083011-B-BASELINE	Soil		Nitrogen	0.10	% dry	
0002	PATCH-083011-B-BASELINE	Soil		Nitrogen	<0.05	% dry	

Test method(s): SNL-006 SNL-026 SNL-021

Supervisor: Nicolaas Schrier MSc 519 823 1268 ext. 57215 nschrier@uoguelph.ca

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UNIVERSITY of GUELPH
LABORATORY SERVICES
Agriculture and Food Laboratory

FINAL Report
Submission# **11-090565**
Reported: 2011-Oct-21

Submitted By:

SIREM LABORATORIES
XIMENA DRUAR
130 RESEARCH LANE
SUITE 2
GUELPH, ON N1G 5G3
Phone: 519 822-2230
Fax: 519 822-3151

Owner:
XIMENA DRUAR

Sampling Date: 2011-Oct-06

Received Date: 2011-Oct-07

pH (sat paste), Soil

Date Authorized: 2011-Oct-21 15:30

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result	Note
0001	1-PATCH-061011-1	Soil	11-Oct-06	pH	7.5	
0002	2-PATCH-061011-2	Soil	11-Oct-06	pH	7.5	
0003	3-PATCH-061011-3	Soil	11-Oct-06	pH	8.7	
0004	4-PATCH-061011-4	Soil	11-Oct-06	pH	8.6	
0005	5-PATCH-061011-5	Soil	11-Oct-06	pH	6.9	
0006	6-PATCH-061011-6	Soil	11-Oct-06	pH	6.9	
0007	7-PATCH-061011-7	Soil	11-Oct-06	pH	8.5	
0008	8-PATCH-061011-8	Soil	11-Oct-06	pH	8.4	
0009	9-WINDY-061011-9	Soil	11-Oct-06	pH	6.7	
0010	10-WINDY-061011-10	Soil	11-Oct-06	pH	6.7	
0011	11-WINDY-061011-11	Soil	11-Oct-06	pH	8.4	
0012	12-WINDY-061011-12	Soil	11-Oct-06	pH	8.4	
0013	13-WINDY-061011-13	Soil	11-Oct-06	pH	6.7	
0014	14-WINDY-061011-14	Soil	11-Oct-06	pH	6.7	
0015	15-WINDY-061011-15	Soil	11-Oct-06	pH	6.6	
0016	16-WINDY-061011-16	Soil	11-Oct-06	pH	6.6	

Phosphorus, Soil (mass)

Date Authorized: 2011-Oct-21 15:30

Phosphorus, Soil (mass) ....Continued

Date Authorized: 2011-Oct-21 15:30

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	1-PATCH-061011-1	Soil	11-Oct-06	Phosphorus, Extractable	7.97	mg/kg dry	
0002	2-PATCH-061011-2	Soil	11-Oct-06	Phosphorus, Extractable	7.23	mg/kg dry	
0003	3-PATCH-061011-3	Soil	11-Oct-06	Phosphorus, Extractable	14.5	mg/kg dry	
0004	4-PATCH-061011-4	Soil	11-Oct-06	Phosphorus, Extractable	12.0	mg/kg dry	
0005	5-PATCH-061011-5	Soil	11-Oct-06	Phosphorus, Extractable	128	mg/kg dry	
0006	6-PATCH-061011-6	Soil	11-Oct-06	Phosphorus, Extractable	140	mg/kg dry	
0007	7-PATCH-061011-7	Soil	11-Oct-06	Phosphorus, Extractable	288	mg/kg dry	
0008	8-PATCH-061011-8	Soil	11-Oct-06	Phosphorus, Extractable	274	mg/kg dry	
0009	9-WINDY-061011-9	Soil	11-Oct-06	Phosphorus, Extractable	1.71	mg/kg dry	
0010	10-WINDY-061011-10	Soil	11-Oct-06	Phosphorus, Extractable	3.13	mg/kg dry	
0011	11-WINDY-061011-11	Soil	11-Oct-06	Phosphorus, Extractable	8.79	mg/kg dry	
0012	12-WINDY-061011-12	Soil	11-Oct-06	Phosphorus, Extractable	11.8	mg/kg dry	
0013	13-WINDY-061011-13	Soil	11-Oct-06	Phosphorus, Extractable	2.64	mg/kg dry	
0014	14-WINDY-061011-14	Soil	11-Oct-06	Phosphorus, Extractable	5.38	mg/kg dry	
0015	15-WINDY-061011-15	Soil	11-Oct-06	Phosphorus, Extractable	2.32	mg/kg dry	
0016	16-WINDY-061011-16	Soil	11-Oct-06	Phosphorus, Extractable	1.78	mg/kg dry	

Total Nitrogen

Date Authorized: 2011-Oct-21 15:31

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	1-PATCH-061011-1	Soil	11-Oct-06	Nitrogen	0.06	% dry	
0002	2-PATCH-061011-2	Soil	11-Oct-06	Nitrogen	0.07	% dry	
0003	3-PATCH-061011-3	Soil	11-Oct-06	Nitrogen	0.06	% dry	
0004	4-PATCH-061011-4	Soil	11-Oct-06	Nitrogen	0.06	% dry	

Total Nitrogen ....Continued

Date Authorized: 2011-Oct-21 15:31

0005	5-PATCH-061011-5	Soil	11-Oct-06	Nitrogen	0.08	% dry
0006	6-PATCH-061011-6	Soil	11-Oct-06	Nitrogen	0.08	% dry
0007	7-PATCH-061011-7	Soil	11-Oct-06	Nitrogen	0.08	% dry
0008	8-PATCH-061011-8	Soil	11-Oct-06	Nitrogen	0.08	% dry
0009	9-WINDY-061011-9	Soil	11-Oct-06	Nitrogen	0.09	% dry
0010	10-WINDY-061011-10	Soil	11-Oct-06	Nitrogen	0.10	% dry
0011	11-WINDY-061011-11	Soil	11-Oct-06	Nitrogen	0.11	% dry
0012	12-WINDY-061011-12	Soil	11-Oct-06	Nitrogen	0.10	% dry
0013	13-WINDY-061011-13	Soil	11-Oct-06	Nitrogen	0.11	% dry
0014	14-WINDY-061011-14	Soil	11-Oct-06	Nitrogen	0.12	% dry
0015	15-WINDY-061011-15	Soil	11-Oct-06	Nitrogen	0.10	% dry
0016	16-WINDY-061011-16	Soil	11-Oct-06	Nitrogen	0.10	% dry

Test method(s): SNL-006 SNL-021 SNL-026

Supervisor: Nicolaas Schrier MSc 519 823 1268 ext. 57215 nschrier@uoguelph.ca

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UNIVERSITY of GUELPH
LABORATORY SERVICES
Agriculture and Food Laboratory

FINAL Report
Submission# **11-098901**
Reported: 2011-Nov-10

Submitted By:

SIREM LABORATORIES
XIMENA DRUAR
130 RESEARCH LANE
SUITE 2
GUELPH, ON N1G 5G3

Phone: 519 822-2230
Fax: 519 822-3151
Sampling Date: 2011-Nov-02

Received Date: 2011-Nov-03

Owner:
GEOSYNTEC CONSULTANTS
130 RESEARCH LANE
SUITE 2
GUELPH, ON N1G 5G3

519 822-2230

Ammonium Nitrate, Soil

Date Authorized: 2011-Nov-10 13:37

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	PATCH-021111-1	Soil	11-Nov-02	%Soil Moisture	15.83	% dry	
0001	PATCH-021111-1	Soil	11-Nov-02	Ammonium-N	1.21	mg/kg dry	
0001	PATCH-021111-1	Soil	11-Nov-02	Nitrate-N	0.305	mg/kg dry	
0002	PATCH-021111-2	Soil	11-Nov-02	%Soil Moisture	16.18	% dry	
0002	PATCH-021111-2	Soil	11-Nov-02	Ammonium-N	7.22	mg/kg dry	
0002	PATCH-021111-2	Soil	11-Nov-02	Nitrate-N	0.834	mg/kg dry	
0003	PATCH-021111-3	Soil	11-Nov-02	%Soil Moisture	11.46	% dry	
0003	PATCH-021111-3	Soil	11-Nov-02	Ammonium-N	1.37	mg/kg dry	
0003	PATCH-021111-3	Soil	11-Nov-02	Nitrate-N	0.221	mg/kg dry	
0004	PATCH-021111-4	Soil	11-Nov-02	%Soil Moisture	4.93	% dry	
0004	PATCH-021111-4	Soil	11-Nov-02	Ammonium-N	0.00	mg/kg dry	
0004	PATCH-021111-4	Soil	11-Nov-02	Nitrate-N	0.565	mg/kg dry	
0005	PATCH-021111-5	Soil	11-Nov-02	%Soil Moisture	3.62	% dry	
0005	PATCH-021111-5	Soil	11-Nov-02	Ammonium-N	7.11	mg/kg dry	
0005	PATCH-021111-5	Soil	11-Nov-02	Nitrate-N	1.55	mg/kg dry	
0006	PATCH-021111-6	Soil	11-Nov-02	%Soil Moisture	2.33	% dry	
0006	PATCH-021111-6	Soil	11-Nov-02	Ammonium-N	3.63	mg/kg dry	
0006	PATCH-021111-6	Soil	11-Nov-02	Nitrate-N	0.368	mg/kg dry	
0007	PATCH-021111-7	Soil	11-Nov-02	%Soil Moisture	2.12	% dry	
0007	PATCH-021111-7	Soil	11-Nov-02	Ammonium-N	1.23	mg/kg dry	
0007	PATCH-021111-7	Soil	11-Nov-02	Nitrate-N	0.372	mg/kg dry	
0008	PATCH-021111-8	Soil	11-Nov-02	%Soil Moisture	7.45	% dry	

Ammonium Nitrate, Soil ....Continued

Date Authorized: 2011-Nov-10 13:37

0008	PATCH-021111-8	Soil	11-Nov-02	Ammonium-N	1.58	mg/kg dry
0008	PATCH-021111-8	Soil	11-Nov-02	Nitrate-N	0.584	mg/kg dry
0009	WINDY-021111-9	Soil	11-Nov-02	%Soil Moisture	5.93	% dry
0009	WINDY-021111-9	Soil	11-Nov-02	Ammonium-N	0.00	mg/kg dry
0009	WINDY-021111-9	Soil	11-Nov-02	Nitrate-N	0.435	mg/kg dry
0010	WINDY-021111-10	Soil	11-Nov-02	%Soil Moisture	17.16	% dry
0010	WINDY-021111-10	Soil	11-Nov-02	Ammonium-N	3.08	mg/kg dry
0010	WINDY-021111-10	Soil	11-Nov-02	Nitrate-N	1.88	mg/kg dry
0011	WINDY-021111-11	Soil	11-Nov-02	%Soil Moisture	8.20	% dry
0011	WINDY-021111-11	Soil	11-Nov-02	Ammonium-N	0.00	mg/kg dry
0011	WINDY-021111-11	Soil	11-Nov-02	Nitrate-N	0.636	mg/kg dry
0012	WINDY-021111-12	Soil	11-Nov-02	%Soil Moisture	19.86	% dry
0012	WINDY-021111-12	Soil	11-Nov-02	Ammonium-N	0.00	mg/kg dry
0012	WINDY-021111-12	Soil	11-Nov-02	Nitrate-N	0.361	mg/kg dry
0013	WINDY-021111-13	Soil	11-Nov-02	%Soil Moisture	20.92	% dry
0013	WINDY-021111-13	Soil	11-Nov-02	Ammonium-N	0.00	mg/kg dry
0013	WINDY-021111-13	Soil	11-Nov-02	Nitrate-N	0.236	mg/kg dry
0014	WINDY-021111-14	Soil	11-Nov-02	%Soil Moisture	21.93	% dry
0014	WINDY-021111-14	Soil	11-Nov-02	Ammonium-N	0.00	mg/kg dry
0014	WINDY-021111-14	Soil	11-Nov-02	Nitrate-N	0.329	mg/kg dry
0015	WINDY-021111-15	Soil	11-Nov-02	%Soil Moisture	21.30	% dry
0015	WINDY-021111-15	Soil	11-Nov-02	Ammonium-N	0.00	mg/kg dry
0015	WINDY-021111-15	Soil	11-Nov-02	Nitrate-N	0.158	mg/kg dry
0016	WINDY-021111-16	Soil	11-Nov-02	%Soil Moisture	19.35	% dry
0016	WINDY-021111-16	Soil	11-Nov-02	Ammonium-N	0.00	mg/kg dry
0016	WINDY-021111-16	Soil	11-Nov-02	Nitrate-N	0.113	mg/kg dry

Comments:

Ammonium-N in Soil: Samples reported as zero are < 0.20 mg/kg dry.

Phosphorus, Soil (mass)

Date Authorized: 2011-Nov-10 13:37

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result	Note

Phosphorus, Soil (mass) ....Continued

Date Authorized: 2011-Nov-10 13:37

0001	PATCH-021111-1	Soil	11-Nov-02	Phosphorus, Extractable	7.12	mg/kg dry
0002	PATCH-021111-2	Soil	11-Nov-02	Phosphorus, Extractable	7.32	mg/kg dry
0003	PATCH-021111-3	Soil	11-Nov-02	Phosphorus, Extractable	12.3	mg/kg dry
0004	PATCH-021111-4	Soil	11-Nov-02	Phosphorus, Extractable	12.1	mg/kg dry
0005	PATCH-021111-5	Soil	11-Nov-02	Phosphorus, Extractable	101	mg/kg dry
0006	PATCH-021111-6	Soil	11-Nov-02	Phosphorus, Extractable	114	mg/kg dry
0007	PATCH-021111-7	Soil	11-Nov-02	Phosphorus, Extractable	167	mg/kg dry
0008	PATCH-021111-8	Soil	11-Nov-02	Phosphorus, Extractable	224	mg/kg dry
0009	WINDY-021111-9	Soil	11-Nov-02	Phosphorus, Extractable	3.61	mg/kg dry
0010	WINDY-021111-10	Soil	11-Nov-02	Phosphorus, Extractable	4.71	mg/kg dry
0011	WINDY-021111-11	Soil	11-Nov-02	Phosphorus, Extractable	5.98	mg/kg dry
0012	WINDY-021111-12	Soil	11-Nov-02	Phosphorus, Extractable	5.71	mg/kg dry
0013	WINDY-021111-13	Soil	11-Nov-02	Phosphorus, Extractable	3.36	mg/kg dry
0014	WINDY-021111-14	Soil	11-Nov-02	Phosphorus, Extractable	3.90	mg/kg dry
0015	WINDY-021111-15	Soil	11-Nov-02	Phosphorus, Extractable	4.70	mg/kg dry
0016	WINDY-021111-16	Soil	11-Nov-02	Phosphorus, Extractable	3.32	mg/kg dry

Test method(s): CHEM-185 SNL-026

Supervisor: Nicolaas Schrier MSc 519 823 1268 ext. 57215 nschrier@uoguelph.ca

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UNIVERSITY of GUELPH
LABORATORY SERVICES
Agriculture and Food Laboratory

FINAL Report
Submission# **11-109729**
Reported: 2011-Dec-21

Submitted By:

SIREM LABORATORIES
XIMENA DRUAR
130 RESEARCH LANE
SUITE 2
GUELPH, ON N1G 5G3
Phone: 519 822-2230
Fax: 519 822-3151

Sampling Date: 2011-Dec-07

Received Date: 2011-Dec-07

Owner:
XIMENA DRUAR

Other

Date Authorized: 2011-Dec-21 16:37

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result	Note
0015	WINDY-071211-15	Soil	11-Dec-07	Other	120	
0016	WINDY-071211-16	Soil	11-Dec-07	Other	72.9	

Comments:

SN-Other is Extractable Soil Sulphate-Sulphur (mg/kg dry).

pH (sat paste), Soil

Date Authorized: 2011-Dec-21 16:14

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result	Note
0001	PATCH-071211-1	Soil	11-Dec-07	pH	7.5	
0002	PATCH-071211-2	Soil	11-Dec-07	pH	7.6	
0003	PATCH-071211-3	Soil	11-Dec-07	pH	8.5	
0004	PATCH-071211-4	Soil	11-Dec-07	pH	8.6	
0005	PATCH-071211-5	Soil	11-Dec-07	pH	6.5	
0006	PATCH-071211-6	Soil	11-Dec-07	pH	6.6	
0007	PATCH-071211-7	Soil	11-Dec-07	pH	7.7	
0008	PATCH-071211-8	Soil	11-Dec-07	pH	7.8	
0009	WINDY-071211-9	Soil	11-Dec-07	pH	7.0	
0010	WINDY-071211-10	Soil	11-Dec-07	pH	6.9	
0011	WINDY-071211-11	Soil	11-Dec-07	pH	8.3	
0012	WINDY-071211-12	Soil	11-Dec-07	pH	8.4	
0013	WINDY-071211-13	Soil	11-Dec-07	pH	7.1	
0014	WINDY-071211-14	Soil	11-Dec-07	pH	7.1	

pH (sat paste), Soil ....Continued

Date Authorized: 2011-Dec-21 16:14

0015	WINDY-071211-15	Soil	11-Dec-07	pH	6.9
0016	WINDY-071211-16	Soil	11-Dec-07	pH	6.8

Phosphorus, Soil (mass)

Date Authorized: 2011-Dec-21 16:14

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	PATCH-071211-1	Soil	11-Dec-07	Phosphorus, Extractable	6.05	mg/kg dry	
0002	PATCH-071211-2	Soil	11-Dec-07	Phosphorus, Extractable	6.35	mg/kg dry	
0003	PATCH-071211-3	Soil	11-Dec-07	Phosphorus, Extractable	11.1	mg/kg dry	
0004	PATCH-071211-4	Soil	11-Dec-07	Phosphorus, Extractable	9.07	mg/kg dry	
0005	PATCH-071211-5	Soil	11-Dec-07	Phosphorus, Extractable	99.7	mg/kg dry	
0006	PATCH-071211-6	Soil	11-Dec-07	Phosphorus, Extractable	103	mg/kg dry	
0007	PATCH-071211-7	Soil	11-Dec-07	Phosphorus, Extractable	136	mg/kg dry	
0008	PATCH-071211-8	Soil	11-Dec-07	Phosphorus, Extractable	138	mg/kg dry	
0009	WINDY-071211-9	Soil	11-Dec-07	Phosphorus, Extractable	2.70	mg/kg dry	
0010	WINDY-071211-10	Soil	11-Dec-07	Phosphorus, Extractable	4.45	mg/kg dry	
0011	WINDY-071211-11	Soil	11-Dec-07	Phosphorus, Extractable	4.30	mg/kg dry	
0012	WINDY-071211-12	Soil	11-Dec-07	Phosphorus, Extractable	10.5	mg/kg dry	
0013	WINDY-071211-13	Soil	11-Dec-07	Phosphorus, Extractable	2.37	mg/kg dry	
0014	WINDY-071211-14	Soil	11-Dec-07	Phosphorus, Extractable	4.33	mg/kg dry	
0015	WINDY-071211-15	Soil	11-Dec-07	Phosphorus, Extractable	2.25	mg/kg dry	
0016	WINDY-071211-16	Soil	11-Dec-07	Phosphorus, Extractable	1.85	mg/kg dry	

Total Nitrogen

Date Authorized: 2011-Dec-21 16:14

Total Nitrogen ....Continued

Date Authorized: 2011-Dec-21 16:14

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	PATCH-071211-1	Soil	11-Dec-07	Nitrogen	0.06	% dry	
0002	PATCH-071211-2	Soil	11-Dec-07	Nitrogen	0.07	% dry	
0003	PATCH-071211-3	Soil	11-Dec-07	Nitrogen	0.07	% dry	
0004	PATCH-071211-4	Soil	11-Dec-07	Nitrogen	0.06	% dry	
0005	PATCH-071211-5	Soil	11-Dec-07	Nitrogen	0.11	% dry	
0006	PATCH-071211-6	Soil	11-Dec-07	Nitrogen	0.12	% dry	
0007	PATCH-071211-7	Soil	11-Dec-07	Nitrogen	0.10	% dry	
0008	PATCH-071211-8	Soil	11-Dec-07	Nitrogen	0.09	% dry	
0009	WINDY-071211-9	Soil	11-Dec-07	Nitrogen	0.10	% dry	
0010	WINDY-071211-10	Soil	11-Dec-07	Nitrogen	0.10	% dry	
0011	WINDY-071211-11	Soil	11-Dec-07	Nitrogen	0.11	% dry	
0012	WINDY-071211-12	Soil	11-Dec-07	Nitrogen	0.10	% dry	
0013	WINDY-071211-13	Soil	11-Dec-07	Nitrogen	0.11	% dry	
0014	WINDY-071211-14	Soil	11-Dec-07	Nitrogen	0.10	% dry	
0015	WINDY-071211-15	Soil	11-Dec-07	Nitrogen	0.10	% dry	
0016	WINDY-071211-16	Soil	11-Dec-07	Nitrogen	0.09	% dry	

Test method(s): SNL-021 SNL-006 Non-routine SNL-026

Supervisor: Nicolaas Schrier MSc 519 823 1268 ext. 57215 nschrier@uoguelph.ca

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LABORATORY SERVICES
Agriculture and Food Laboratory

FINAL Report
Submission# **12-006102**
Reported: 2012-Jan-27

Submitted By:

SIREM LABORATORIES
XIMENA DRUAR
130 RESEARCH LANE
SUITE 2
GUELPH, ON N1G 5G3

Phone: 519 822-2230
Fax: 519 822-3151
Sampling Date: 2012-Jan-18
Received Date: 2012-Jan-19

Owner:
XIMENA DRUAR

Nitrate, Soil

Date Authorized: 2012-Jan-27 15:07

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	1-PATCH-18112	Soil	12-Jan-18	Nitrate-N	0.445	mg/kg	
0002	2-PATCH-18112	Soil	12-Jan-18	Nitrate-N	0.405	mg/kg	
0003	3-PATCH-18112	Soil	12-Jan-18	Nitrate-N	0.479	mg/kg	
0004	4-PATCH-18112	Soil	12-Jan-18	Nitrate-N	0.377	mg/kg	
0005	5-PATCH-18112	Soil	12-Jan-18	Nitrate-N	0.443	mg/kg	
0006	6-PATCH-18112	Soil	12-Jan-18	Nitrate-N	0.572	mg/kg	
0007	7-PATCH-18112	Soil	12-Jan-18	Nitrate-N	0.393	mg/kg	
0008	8-PATCH-18112	Soil	12-Jan-18	Nitrate-N	0.456	mg/kg	
0009	9-WINDY-18112	Soil	12-Jan-18	Nitrate-N	0.346	mg/kg	
0010	10-WINDY-18112	Soil	12-Jan-18	Nitrate-N	0.306	mg/kg	
0011	11-WINDY-18112	Soil	12-Jan-18	Nitrate-N	0.542	mg/kg	
0012	12-WINDY-18112	Soil	12-Jan-18	Nitrate-N	0.360	mg/kg	
0013	13-WINDY-18112	Soil	12-Jan-18	Nitrate-N	1740	mg/kg	
0014	14-WINDY-18112	Soil	12-Jan-18	Nitrate-N	1930	mg/kg	
0015	15-WINDY-18112	Soil	12-Jan-18	Nitrate-N	2.66	mg/kg	
0016	16-WINDY-18112	Soil	12-Jan-18	Nitrate-N	0.633	mg/kg	

Nitrite, Soil

Date Authorized: 2012-Jan-27 15:07

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	1-PATCH-18112	Soil	12-Jan-18	Nitrite-N	0.206	mg/kg dry	
0002	2-PATCH-18112	Soil	12-Jan-18	Nitrite-N	0.153	mg/kg dry	
0003	3-PATCH-18112	Soil	12-Jan-18	Nitrite-N	0.855	mg/kg dry	

Nitrite, Soil ....Continued

Date Authorized: 2012-Jan-27 15:07

0004	4-PATCH-18112	Soil	12-Jan-18	Nitrite-N	0.496	mg/kg dry
0005	5-PATCH-18112	Soil	12-Jan-18	Nitrite-N	0.0875	mg/kg dry
0006	6-PATCH-18112	Soil	12-Jan-18	Nitrite-N	0.0720	mg/kg dry
0007	7-PATCH-18112	Soil	12-Jan-18	Nitrite-N	0.606	mg/kg dry
0008	8-PATCH-18112	Soil	12-Jan-18	Nitrite-N	0.502	mg/kg dry
0009	9-WINDY-18112	Soil	12-Jan-18	Nitrite-N	0.0455	mg/kg dry
0010	10-WINDY-18112	Soil	12-Jan-18	Nitrite-N	0.0470	mg/kg dry
0011	11-WINDY-18112	Soil	12-Jan-18	Nitrite-N	0.567	mg/kg dry
0012	12-WINDY-18112	Soil	12-Jan-18	Nitrite-N	0.250	mg/kg dry
0013	13-WINDY-18112	Soil	12-Jan-18	Nitrite-N	0.0610	mg/kg dry
0014	14-WINDY-18112	Soil	12-Jan-18	Nitrite-N	0.0945	mg/kg dry
0015	15-WINDY-18112	Soil	12-Jan-18	Nitrite-N	0.0740	mg/kg dry
0016	16-WINDY-18112	Soil	12-Jan-18	Nitrite-N	0.0645	mg/kg dry

Other

Date Authorized: 2012-Jan-27 15:09

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result	Note
0015	15-WINDY-18112	Soil	12-Jan-18	Other	1900	
0016	16-WINDY-18112	Soil	12-Jan-18	Other	2260	

Comments:

SN-Other is Extractable Soil Sulphate-Sulphur (mg/kg dry).

pH (sat paste), Soil

Date Authorized: 2012-Jan-27 15:08

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result	Note
0001	1-PATCH-18112	Soil	12-Jan-18	pH	7.6	
0002	2-PATCH-18112	Soil	12-Jan-18	pH	7.7	
0003	3-PATCH-18112	Soil	12-Jan-18	pH	8.4	
0004	4-PATCH-18112	Soil	12-Jan-18	pH	8.4	
0005	5-PATCH-18112	Soil	12-Jan-18	pH	6.5	
0006	6-PATCH-18112	Soil	12-Jan-18	pH	6.4	
0007	7-PATCH-18112	Soil	12-Jan-18	pH	7.7	
0008	8-PATCH-18112	Soil	12-Jan-18	pH	7.8	

pH (sat paste), Soil ....Continued

Date Authorized: 2012-Jan-27 15:08

0009	9-WINDY-18112	Soil	12-Jan-18	pH	7.0
0010	10-WINDY-18112	Soil	12-Jan-18	pH	6.8
0011	11-WINDY-18112	Soil	12-Jan-18	pH	8.2
0012	12-WINDY-18112	Soil	12-Jan-18	pH	8.2
0013	13-WINDY-18112	Soil	12-Jan-18	pH	6.7
0014	14-WINDY-18112	Soil	12-Jan-18	pH	6.7
0015	15-WINDY-18112	Soil	12-Jan-18	pH	6.8
0016	16-WINDY-18112	Soil	12-Jan-18	pH	6.7

Phosphorus, Soil (mass)

Date Authorized: 2012-Jan-27 15:08

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	1-PATCH-18112	Soil	12-Jan-18	Phosphorus, Extractable	6.11	mg/kg dry	
0002	2-PATCH-18112	Soil	12-Jan-18	Phosphorus, Extractable	9.30	mg/kg dry	
0003	3-PATCH-18112	Soil	12-Jan-18	Phosphorus, Extractable	13.3	mg/kg dry	
0004	4-PATCH-18112	Soil	12-Jan-18	Phosphorus, Extractable	13.3	mg/kg dry	
0005	5-PATCH-18112	Soil	12-Jan-18	Phosphorus, Extractable	110	mg/kg dry	
0006	6-PATCH-18112	Soil	12-Jan-18	Phosphorus, Extractable	113	mg/kg dry	
0007	7-PATCH-18112	Soil	12-Jan-18	Phosphorus, Extractable	178	mg/kg dry	
0008	8-PATCH-18112	Soil	12-Jan-18	Phosphorus, Extractable	197	mg/kg dry	
0009	9-WINDY-18112	Soil	12-Jan-18	Phosphorus, Extractable	1.32	mg/kg dry	
0010	10-WINDY-18112	Soil	12-Jan-18	Phosphorus, Extractable	5.12	mg/kg dry	
0011	11-WINDY-18112	Soil	12-Jan-18	Phosphorus, Extractable	3.52	mg/kg dry	
0012	12-WINDY-18112	Soil	12-Jan-18	Phosphorus, Extractable	5.18	mg/kg dry	
0013	13-WINDY-18112	Soil	12-Jan-18	Phosphorus, Extractable	89.6	mg/kg dry	
0014	14-WINDY-18112	Soil	12-Jan-18	Phosphorus, Extractable	83.2	mg/kg dry	

Phosphorus, Soil (mass) ....Continued

Date Authorized: 2012-Jan-27 15:08

0015	15-WINDY-18112	Soil	12-Jan-18	Phosphorus, Extractable	102	mg/kg dry
0016	16-WINDY-18112	Soil	12-Jan-18	Phosphorus, Extractable	106	mg/kg dry

Total Nitrogen

Date Authorized: 2012-Jan-27 15:08

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	1-PATCH-18112	Soil	12-Jan-18	Nitrogen	0.06	% dry	
0002	2-PATCH-18112	Soil	12-Jan-18	Nitrogen	0.07	% dry	
0003	3-PATCH-18112	Soil	12-Jan-18	Nitrogen	0.08	% dry	
0004	4-PATCH-18112	Soil	12-Jan-18	Nitrogen	0.07	% dry	
0005	5-PATCH-18112	Soil	12-Jan-18	Nitrogen	0.13	% dry	
0006	6-PATCH-18112	Soil	12-Jan-18	Nitrogen	0.12	% dry	
0007	7-PATCH-18112	Soil	12-Jan-18	Nitrogen	0.11	% dry	
0008	8-PATCH-18112	Soil	12-Jan-18	Nitrogen	0.10	% dry	
0009	9-WINDY-18112	Soil	12-Jan-18	Nitrogen	0.09	% dry	
0010	10-WINDY-18112	Soil	12-Jan-18	Nitrogen	0.10	% dry	
0011	11-WINDY-18112	Soil	12-Jan-18	Nitrogen	0.09	% dry	
0012	12-WINDY-18112	Soil	12-Jan-18	Nitrogen	0.10	% dry	
0013	13-WINDY-18112	Soil	12-Jan-18	Nitrogen	0.32	% dry	
0014	14-WINDY-18112	Soil	12-Jan-18	Nitrogen	0.26	% dry	
0015	15-WINDY-18112	Soil	12-Jan-18	Nitrogen	0.12	% dry	
0016	16-WINDY-18112	Soil	12-Jan-18	Nitrogen	0.11	% dry	

Test method(s): SNL-036 SNL-026 SNL-006 Non-routine SNL-021

Supervisor: Nicolaas Schrier MSc 519 823 1268 ext. 57215 nschrier@uoguelph.ca

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UNIVERSITY of GUELPH
LABORATORY SERVICES
Agriculture and Food Laboratory

FINAL Report
Submission# **12-019294**
Reported: 2012-Mar-16

Submitted By:

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130 RESEARCH LANE
SUITE 2
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Phone: 519 822-2230
Fax: 519 822-3151

Owner:
XIMENA DRUAR

Sampling Date: Not given Received Date: 2012-Feb-29

Nitrate, Soil

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	PATCH-22912-1	Soil		Nitrate-N	1.69	mg/kg	
0002	PATCH-22912-2	Soil		Nitrate-N	0.614	mg/kg	
0003	PATCH-22912-3	Soil		Nitrate-N	0.773	mg/kg	
0004	PATCH-22912-4	Soil		Nitrate-N	0.509	mg/kg	
0005	PATCH-22912-5	Soil		Nitrate-N	0.558	mg/kg	
0006	PATCH-22912-6	Soil		Nitrate-N	0.574	mg/kg	
0007	PATCH-22912-7	Soil		Nitrate-N	0.580	mg/kg	
0008	PATCH-22912-8	Soil		Nitrate-N	0.642	mg/kg	
0009	WINDY-22912-9	Soil		Nitrate-N	0.577	mg/kg	
0010	WINDY-22912-10	Soil		Nitrate-N	0.458	mg/kg	
0011	WINDY-22912-11	Soil		Nitrate-N	0.631	mg/kg	
0012	WINDY-22912-12	Soil		Nitrate-N	1.09	mg/kg	
0013	WINDY-22912-13	Soil		Nitrate-N	2700	mg/kg	
0014	WINDY-22912-14	Soil		Nitrate-N	2180	mg/kg	
0015	WINDY-22912-15	Soil		Nitrate-N	2.05	mg/kg	
0016	WINDY-22912-16	Soil		Nitrate-N	1.57	mg/kg	

Nitrite, Soil

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	PATCH-22912-1	Soil		Nitrite-N	0.208	mg/kg dry	
0002	PATCH-22912-2	Soil		Nitrite-N	0.223	mg/kg dry	
0003	PATCH-22912-3	Soil		Nitrite-N	0.802	mg/kg dry	
0004	PATCH-22912-4	Soil		Nitrite-N	0.439	mg/kg dry	

Nitrite, Soil ....Continued

Date Authorized: 2012-Mar-16 18:15

0005	PATCH-22912-5	Soil	Nitrite-N	<0.0300	mg/kg dry
0006	PATCH-22912-6	Soil	Nitrite-N	<0.0300	mg/kg dry
0007	PATCH-22912-7	Soil	Nitrite-N	0.353	mg/kg dry
0008	PATCH-22912-8	Soil	Nitrite-N	0.313	mg/kg dry
0009	WINDY-22912-9	Soil	Nitrite-N	<0.0300	mg/kg dry
0010	WINDY-22912-10	Soil	Nitrite-N	<0.0300	mg/kg dry
0011	WINDY-22912-11	Soil	Nitrite-N	0.651	mg/kg dry
0012	WINDY-22912-12	Soil	Nitrite-N	0.468	mg/kg dry
0013	WINDY-22912-13	Soil	Nitrite-N	<0.0300	mg/kg dry
0014	WINDY-22912-14	Soil	Nitrite-N	<0.0300	mg/kg dry
0015	WINDY-22912-15	Soil	Nitrite-N	<0.0300	mg/kg dry
0016	WINDY-22912-16	Soil	Nitrite-N	<0.0300	mg/kg dry

Other

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result	Note
0015	WINDY-22912-15	Soil		Other	777000	
0016	WINDY-22912-16	Soil		Other	327000	

Comments:

SN-Other is Extractable Soil Sulphate-Sulphur (mg/kg dry).

pH (sat paste), Soil

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result	Note
0001	PATCH-22912-1	Soil		pH	7.5	
0002	PATCH-22912-2	Soil		pH	7.4	
0003	PATCH-22912-3	Soil		pH	8.4	
0004	PATCH-22912-4	Soil		pH	8.3	
0005	PATCH-22912-5	Soil		pH	6.6	
0006	PATCH-22912-6	Soil		pH	6.6	
0007	PATCH-22912-7	Soil		pH	7.6	
0008	PATCH-22912-8	Soil		pH	7.7	
0009	WINDY-22912-9	Soil		pH	7.0	

pH (sat paste), Soil ....Continued

Date Authorized: 2012-Mar-16 18:15

0010	WINDY-22912-10	Soil	pH	6.9
0011	WINDY-22912-11	Soil	pH	8.0
0012	WINDY-22912-12	Soil	pH	8.1
0013	WINDY-22912-13	Soil	pH	6.6
0014	WINDY-22912-14	Soil	pH	6.7
0015	WINDY-22912-15	Soil	pH	6.7
0016	WINDY-22912-16	Soil	pH	6.8

Phosphorus, Soil (mass)

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	PATCH-22912-1	Soil		Phosphorus, Extractable	10.2	mg/kg dry	
0002	PATCH-22912-2	Soil		Phosphorus, Extractable	8.91	mg/kg dry	
0003	PATCH-22912-3	Soil		Phosphorus, Extractable	10.9	mg/kg dry	
0004	PATCH-22912-4	Soil		Phosphorus, Extractable	7.67	mg/kg dry	
0005	PATCH-22912-5	Soil		Phosphorus, Extractable	102	mg/kg dry	
0006	PATCH-22912-6	Soil		Phosphorus, Extractable	94.9	mg/kg dry	
0007	PATCH-22912-7	Soil		Phosphorus, Extractable	174	mg/kg dry	
0008	PATCH-22912-8	Soil		Phosphorus, Extractable	157	mg/kg dry	
0009	WINDY-22912-9	Soil		Phosphorus, Extractable	1.76	mg/kg dry	
0010	WINDY-22912-10	Soil		Phosphorus, Extractable	2.07	mg/kg dry	
0011	WINDY-22912-11	Soil		Phosphorus, Extractable	3.62	mg/kg dry	
0012	WINDY-22912-12	Soil		Phosphorus, Extractable	4.06	mg/kg dry	
0013	WINDY-22912-13	Soil		Phosphorus, Extractable	92.6	mg/kg dry	
0014	WINDY-22912-14	Soil		Phosphorus, Extractable	72.8	mg/kg dry	
0015	WINDY-22912-15	Soil		Phosphorus, Extractable	72.5	mg/kg dry	

Phosphorus, Soil (mass) ....Continued

Date Authorized: 2012-Mar-16 18:15

0016	WINDY-22912-16	Soil		Phosphorus, Extractable	86.2	mg/kg dry

Total Nitrogen

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	PATCH-22912-1	Soil		Nitrogen	0.07	% dry	
0002	PATCH-22912-2	Soil		Nitrogen	0.08	% dry	
0003	PATCH-22912-3	Soil		Nitrogen	0.08	% dry	
0004	PATCH-22912-4	Soil		Nitrogen	0.06	% dry	
0005	PATCH-22912-5	Soil		Nitrogen	0.13	% dry	
0006	PATCH-22912-6	Soil		Nitrogen	0.13	% dry	
0007	PATCH-22912-7	Soil		Nitrogen	0.10	% dry	
0008	PATCH-22912-8	Soil		Nitrogen	0.10	% dry	
0009	WINDY-22912-9	Soil		Nitrogen	0.11	% dry	
0010	WINDY-22912-10	Soil		Nitrogen	0.11	% dry	
0011	WINDY-22912-11	Soil		Nitrogen	0.11	% dry	
0012	WINDY-22912-12	Soil		Nitrogen	0.10	% dry	
0013	WINDY-22912-13	Soil		Nitrogen	0.26	% dry	
0014	WINDY-22912-14	Soil		Nitrogen	0.23	% dry	
0015	WINDY-22912-15	Soil		Nitrogen	0.11	% dry	
0016	WINDY-22912-16	Soil		Nitrogen	0.12	% dry	

Test method(s): SNL-036 SNL-021 SNL-026 Non-routine SNL-006

Supervisor: Nicolaas Schrier MSc 519 823 1268 ext. 57215 nschrier@uoguelph.ca

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UNIVERSITY of GUELPH
LABORATORY SERVICES
Agriculture and Food Laboratory

FINAL Report
Submission# **12-019294**
Reported: 2012-Mar-16

Submitted By:

SIREM LABORATORIES
XIMENA DRUAR
130 RESEARCH LANE
SUITE 2
GUELPH, ON N1G 5G3

Phone: 519 822-2230
Fax: 519 822-3151

Owner:
XIMENA DRUAR

Sampling Date: Not given Received Date: 2012-Feb-29

Nitrate, Soil

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	PATCH-22912-1	Soil		Nitrate-N	1.69	mg/kg	
0002	PATCH-22912-2	Soil		Nitrate-N	0.614	mg/kg	
0003	PATCH-22912-3	Soil		Nitrate-N	0.773	mg/kg	
0004	PATCH-22912-4	Soil		Nitrate-N	0.509	mg/kg	
0005	PATCH-22912-5	Soil		Nitrate-N	0.558	mg/kg	
0006	PATCH-22912-6	Soil		Nitrate-N	0.574	mg/kg	
0007	PATCH-22912-7	Soil		Nitrate-N	0.580	mg/kg	
0008	PATCH-22912-8	Soil		Nitrate-N	0.642	mg/kg	
0009	WINDY-22912-9	Soil		Nitrate-N	0.577	mg/kg	
0010	WINDY-22912-10	Soil		Nitrate-N	0.458	mg/kg	
0011	WINDY-22912-11	Soil		Nitrate-N	0.631	mg/kg	
0012	WINDY-22912-12	Soil		Nitrate-N	1.09	mg/kg	
0013	WINDY-22912-13	Soil		Nitrate-N	2700	mg/kg	
0014	WINDY-22912-14	Soil		Nitrate-N	2180	mg/kg	
0015	WINDY-22912-15	Soil		Nitrate-N	2.05	mg/kg	
0016	WINDY-22912-16	Soil		Nitrate-N	1.57	mg/kg	

Nitrite, Soil

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	PATCH-22912-1	Soil		Nitrite-N	0.208	mg/kg dry	
0002	PATCH-22912-2	Soil		Nitrite-N	0.223	mg/kg dry	
0003	PATCH-22912-3	Soil		Nitrite-N	0.802	mg/kg dry	
0004	PATCH-22912-4	Soil		Nitrite-N	0.439	mg/kg dry	

Nitrite, Soil ....Continued

Date Authorized: 2012-Mar-16 18:15

0005	PATCH-22912-5	Soil	Nitrite-N	<0.0300	mg/kg dry
0006	PATCH-22912-6	Soil	Nitrite-N	<0.0300	mg/kg dry
0007	PATCH-22912-7	Soil	Nitrite-N	0.353	mg/kg dry
0008	PATCH-22912-8	Soil	Nitrite-N	0.313	mg/kg dry
0009	WINDY-22912-9	Soil	Nitrite-N	<0.0300	mg/kg dry
0010	WINDY-22912-10	Soil	Nitrite-N	<0.0300	mg/kg dry
0011	WINDY-22912-11	Soil	Nitrite-N	0.651	mg/kg dry
0012	WINDY-22912-12	Soil	Nitrite-N	0.468	mg/kg dry
0013	WINDY-22912-13	Soil	Nitrite-N	<0.0300	mg/kg dry
0014	WINDY-22912-14	Soil	Nitrite-N	<0.0300	mg/kg dry
0015	WINDY-22912-15	Soil	Nitrite-N	<0.0300	mg/kg dry
0016	WINDY-22912-16	Soil	Nitrite-N	<0.0300	mg/kg dry

Other

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result	Note
0015	WINDY-22912-15	Soil		Other	777000	
0016	WINDY-22912-16	Soil		Other	327000	

Comments:

SN-Other is Extractable Soil Sulphate-Sulphur (mg/kg dry).

pH (sat paste), Soil

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result	Note
0001	PATCH-22912-1	Soil		pH	7.5	
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0003	PATCH-22912-3	Soil		pH	8.4	
0004	PATCH-22912-4	Soil		pH	8.3	
0005	PATCH-22912-5	Soil		pH	6.6	
0006	PATCH-22912-6	Soil		pH	6.6	
0007	PATCH-22912-7	Soil		pH	7.6	
0008	PATCH-22912-8	Soil		pH	7.7	
0009	WINDY-22912-9	Soil		pH	7.0	

pH (sat paste), Soil ....Continued

Date Authorized: 2012-Mar-16 18:15

0010	WINDY-22912-10	Soil	pH	6.9
0011	WINDY-22912-11	Soil	pH	8.0
0012	WINDY-22912-12	Soil	pH	8.1
0013	WINDY-22912-13	Soil	pH	6.6
0014	WINDY-22912-14	Soil	pH	6.7
0015	WINDY-22912-15	Soil	pH	6.7
0016	WINDY-22912-16	Soil	pH	6.8

Phosphorus, Soil (mass)

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	PATCH-22912-1	Soil		Phosphorus, Extractable	10.2	mg/kg dry	
0002	PATCH-22912-2	Soil		Phosphorus, Extractable	8.91	mg/kg dry	
0003	PATCH-22912-3	Soil		Phosphorus, Extractable	10.9	mg/kg dry	
0004	PATCH-22912-4	Soil		Phosphorus, Extractable	7.67	mg/kg dry	
0005	PATCH-22912-5	Soil		Phosphorus, Extractable	102	mg/kg dry	
0006	PATCH-22912-6	Soil		Phosphorus, Extractable	94.9	mg/kg dry	
0007	PATCH-22912-7	Soil		Phosphorus, Extractable	174	mg/kg dry	
0008	PATCH-22912-8	Soil		Phosphorus, Extractable	157	mg/kg dry	
0009	WINDY-22912-9	Soil		Phosphorus, Extractable	1.76	mg/kg dry	
0010	WINDY-22912-10	Soil		Phosphorus, Extractable	2.07	mg/kg dry	
0011	WINDY-22912-11	Soil		Phosphorus, Extractable	3.62	mg/kg dry	
0012	WINDY-22912-12	Soil		Phosphorus, Extractable	4.06	mg/kg dry	
0013	WINDY-22912-13	Soil		Phosphorus, Extractable	92.6	mg/kg dry	
0014	WINDY-22912-14	Soil		Phosphorus, Extractable	72.8	mg/kg dry	
0015	WINDY-22912-15	Soil		Phosphorus, Extractable	72.5	mg/kg dry	

Phosphorus, Soil (mass) ....Continued

Date Authorized: 2012-Mar-16 18:15

0016	WINDY-22912-16	Soil		Phosphorus, Extractable	86.2	mg/kg dry

Total Nitrogen

Date Authorized: 2012-Mar-16 18:15

Sample ID	Client Sample ID	Specimen	Sampling date / time	Test	Result		Note
0001	PATCH-22912-1	Soil		Nitrogen	0.07	% dry	
0002	PATCH-22912-2	Soil		Nitrogen	0.08	% dry	
0003	PATCH-22912-3	Soil		Nitrogen	0.08	% dry	
0004	PATCH-22912-4	Soil		Nitrogen	0.06	% dry	
0005	PATCH-22912-5	Soil		Nitrogen	0.13	% dry	
0006	PATCH-22912-6	Soil		Nitrogen	0.13	% dry	
0007	PATCH-22912-7	Soil		Nitrogen	0.10	% dry	
0008	PATCH-22912-8	Soil		Nitrogen	0.10	% dry	
0009	WINDY-22912-9	Soil		Nitrogen	0.11	% dry	
0010	WINDY-22912-10	Soil		Nitrogen	0.11	% dry	
0011	WINDY-22912-11	Soil		Nitrogen	0.11	% dry	
0012	WINDY-22912-12	Soil		Nitrogen	0.10	% dry	
0013	WINDY-22912-13	Soil		Nitrogen	0.26	% dry	
0014	WINDY-22912-14	Soil		Nitrogen	0.23	% dry	
0015	WINDY-22912-15	Soil		Nitrogen	0.11	% dry	
0016	WINDY-22912-16	Soil		Nitrogen	0.12	% dry	

Test method(s): SNL-036 SNL-021 SNL-026 Non-routine SNL-006

Supervisor: Nicolaas Schrier MSc 519 823 1268 ext. 57215 nschrier@uoguelph.ca

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APPENDIX E

APPENDIX E GENERAL CONDITIONS

GENERAL CONDITIONS

GEOTECHNICAL REPORT

This report incorporates and is subject to these “General Conditions”.

1.0 USE OF REPORT AND OWNERSHIP

This geotechnical report pertains to a specific site, a specific development and a specific scope of work. It is not applicable to any other sites nor should it be relied upon for types of development other than that to which it refers. Any variation from the site or development would necessitate a supplementary geotechnical assessment.

This report and the recommendations contained in it are intended for the sole use of EBA’s Client. EBA does not accept any responsibility for the accuracy of any of the data, the analyses or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than EBA’s Client unless otherwise authorized in writing by EBA. Any unauthorized use of the report is at the sole risk of the user.

This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of EBA. Additional copies of the report, if required, may be obtained upon request.

2.0 ALTERNATE REPORT FORMAT

Where EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed EBA’s instruments of professional service), only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by EBA shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of EBA’s instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except EBA. EBA’s instruments of professional service will be used only and exactly as submitted by EBA.

Electronic files submitted by EBA have been prepared and submitted using specific software and hardware systems. EBA makes no representation about the compatibility of these files with the Client’s current or future software and hardware systems.

3.0 ENVIRONMENTAL AND REGULATORY ISSUES

Unless stipulated in the report, EBA has not been retained to investigate, address or consider and has not investigated, addressed or considered any environmental or regulatory issues associated with development on the subject site.

4.0 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems and methods employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. EBA does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

5.0 LOGS OF TESTHOLES

The testhole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance which requires precise definition of soil or rock zone transition elevations may require further investigation and review.

6.0 STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of test holes and/or soil/rock exposures. Stratigraphy is known only at the locations of the test hole or exposure. Actual geology and stratigraphy between test holes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historic environment. EBA does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional investigation and review may be necessary.

7.0 PROTECTION OF EXPOSED GROUND

Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance which can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

8.0 SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

9.0 INFLUENCE OF CONSTRUCTION ACTIVITY

There is a direct correlation between construction activity and structural performance of adjacent buildings and other installations. The influence of all anticipated construction activities should be considered by the contractor, owner, architect and prime engineer in consultation with a geotechnical engineer when the final design and construction techniques are known.

10.0 OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, as well as the potential of adverse circumstances arising from construction activity, observations during site preparation, excavation and construction should be carried out by a geotechnical engineer. These observations may then serve as the basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein.

11.0 DRAINAGE SYSTEMS

Where temporary or permanent drainage systems are installed within or around a structure, the systems which will be installed must protect the structure from loss of ground due to internal erosion and must be designed so as to assure continued performance of the drains. Specific design detail of such systems should be developed or reviewed by the geotechnical engineer. Unless otherwise specified, it is a condition of this report that effective temporary and permanent drainage systems are required and that they must be considered in relation to project purpose and function.

12.0 BEARING CAPACITY

Design bearing capacities, loads and allowable stresses quoted in this report relate to a specific soil or rock type and condition. Construction activity and environmental circumstances can materially change the condition of soil or rock. The elevation at which a soil or rock type occurs is variable. It is a requirement of this report that structural elements be founded in and/or upon geological materials of the type and in the condition assumed. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions assumed in this report in fact exist at the site.

13.0 SAMPLES

EBA will retain all soil and rock samples for 30 days after this report is issued. Further storage or transfer of samples can be made at the Client's expense upon written request, otherwise samples will be discarded.

14.0 INFORMATION PROVIDED TO EBA BY OTHERS

During the performance of the work and the preparation of the report, EBA may rely on information provided by persons other than the Client. While EBA endeavours to verify the accuracy of such information when instructed to do so by the Client, EBA accepts no responsibility for the accuracy or the reliability of such information which may affect the report.

Appendix B: Windy Camp and Patch Lake Facility Closure Cost Estimate

Table 1: Summary Table

	Patch Lake		Windy	
	By Task	By Facility	By Task	By Facility
Direct Cost Items	**Cost (rounded to nearest $ 1,000)**			
1. Transportation infrastructure (roads, airstrips, docks)		**$3,000.00**		**$3,000.00**
Remediation of Permafrost Degradation Areas	$3,000.00		$3,000.00	
2. Drill Sites/Drill Hole Abandonment		**$0.00**		**$22,000.00**
Drill sites restoration	$0.00		$3,000.00	
Drill sites abandonment	$0.00		$19,000.00	
3. Drainage / Diversion Channels		**$0.00**		**$5,000.00**
Breach of Diversion Berm	$0.00		$5,000.00	
4. Facilities Demolition		**$104,000.00**		**$301,000.00**
Collection and Disposal of Non-Hazardous Wastes	$0.00		$5,000.00	
Remediation of Permafrost Degradation Areas	$41,000.00		$6,000.00	
Stabilization of Tank Farm Spoil Piles	$19,000.00		$3,000.00	
Site Re-Vegetation and Drainage Control	$3,000.00		$10,000.00	
Remediation of Hydrocarbon Contaminated Soils	$41,000.00		$98,000.00	
Salvaging Usable Equipment and Supplies	$0.00		$23,000.00	
Demolition of Remaining Structures	$0.00		$151,000.00	
Collection and Disposal of Hazardous Waste	$0.00		$5,000.00	
5. Off-site Shipping for Disposal	$261,000.00	**$261,000.00**	$2,066,000.00	**$2,066,000.00**
6. Off-Site Disposal Fees	$26,000.00	**$26,000.00**	$297,000.00	**$297,000.00**
Total Direct Costs		**$394,000.00**		**$2,694,000.00**
7. Mobilization & Demobilization		$947,000.00		$855,000.00
8. Engineering and Consultants Services		$119,000.00		$96,000.00
9. General and Administration costs		$6,000.00		$16,000.00
10. Contingency		$39,000.00		$32,000.00
11. Post-closure Monitoring		$200,000.00		$200,000.00
Total Indirect Costs		**$1,311,000.00**		**$1,199,000.00**
Closure Cost - Subtotal		**$1,705,000.00**		**$3,893,000.00**
Closure Cost - Total		**$5,598,000.00**		

Table B2: Cost Itemised by Task- Patch Lake

Work Area Code	Item	Task	Sub-task	Activity	Task	Quantity	Unit	Cost Code	Unit Cost	Activity Total	Subtotals	Source / Comments
DIRECT CLOSURE COSTS												
Remediation of Permafrost Degradation Areas											$ 42,031	
PLF	2	1	1	Regrade Old Tank Farm	Stake-out low-lying areas in summer to place fill	1	day	C.5.09	$ 3,815.68	$ 3,816		For old tank farm and road restoration areas
PLF	2	1	2		Regrade spoil piles to ensure positive drainage	200	m^2	C.5.04	$ 2.38	$ 476		Assumed 10% of total area
PLF	2	1	3		Cover area with 1 m thermal cover of rock	3,000	m^3	C.4.08	$ 12.04	$ 36,126		Assumes 10% of area requires 0.3m of fill
PLF	2	2	1	Erosion Control	Install erosion control measures (coco matting)	200	m^2	C.5.07	$ 3.48	$ 696		Assumed 10% of total area
PLF	2	3	1	Reclaim winter road tracks	Fill in low lying areas (fill from spoil piles) - Road to Patch Lake	119	m^3	C.5.06	$ 7.68	$ 917		Assumes 25% of area requires 0.3m of fill
Stabilization of Tank Farm Spoil Piles											$ 19,241	
PLF	3	1	1	Regrade	Regrade spoil piles to ensure positive drainage (w/ Excavator)	3,630	m^2	C.5.05	$ 5.13	$ 18,609		
PLF	3	1	2	Erosion Control	Install erosion control measures (coco matting)	182	m^2	C.5.07	$ 3.48	$ 632		Assumed 5% of total area
Site Re-vegetation and Drainage Control											$ 1,500	
PLF	4	1	1	Revegetate regraded areas	Revegetate old tank farm and regraded road surfaces	-	m^2	C.3.02	$ 0.77	$ -		SRK estimate from previous closure cost estimates
PLF	4	2	1	Drianage control	Install silt fencing	1	LS		$ 1,500.00	$ 1,500		Assumes 3 thermal berms cosntructed and 100 m of silt fencing installed
Remediation of Hydrocarbon Contaminated Soils											$ 40,659	
PLF	5	1	1		Excavate impacted soil and place in megabags	264	m^3	C.3.03	$ 97.95	$ 25,850		
PLF	5	1	2		backfill with ROQ	264	m^3	C.4.08	$ 12.04	$ 3,178		
PLF	5	1	3		Regrade and reshape	291	m^2	C.5.05	$ 5.13	$ 1,492		
PLF	5	1	4		In-Situ bioremediation	39	m^3	H.07	$ 260.00	$ 10,140		
Off-site Shipping for Disposal											$ 260,997	
PLF	7	1	1		Non-hazardous waste	0	m^3	S.03	$ 200.00	$ -		
PLF	7	1	2		Hydrocarbon contaminated soil	264	m^3	S.01	$ 989.00	$ 260,997		
Off-Site Disposal Fees											$ 26,390	
PLF	8	1	1		Non-hazardous waste	0	m^3	M.10	$ 5.51	$ -		
PLF	8	1	2		Hydrocarbon contaminated soil	264	m^3	H.05	$ 100.00	$ 26,390		
					SUBTOTAL DIRECT COSTS						**$ 390,819**	
INDIRECT CLOSURE COSTS												
Contingency											$ 39,082	
-	1	1	-	Contingency	10 % of direct costs (less off-site shipping and disposal fees)	10%	%	x	$ 390,818.61	$ 39,082		
Patch Lake Mobilization & Demobilization											$ 688,607	
-	2	1	1	Winter Closure activities	Mobilization	1	ls	x	$ 335,905.91	$ 335,906		
-	2	1	2		Demobilization	1	ls	x	$ 352,701.20	$ 352,701		
Winter Road Construction/Maintenance											$ 25,680	
-	3	1	1	Construct and maintain Winter Road	Winter 2012	0.7	km	M.08	$ 18,342.50	$ 12,840		Mobilise equipment for Phase 1
-	3	1	2		Winter 2013	0.7	km	M.08	$ 18,342.50	$ 12,840		
Equipment stand-by											$ 233,168	
	4	1	1	Stand-by time	Spring 2012	92.0	days	x	$ 1,084.50	$ 99,774		May 1st to July 31
	4	1	2		Fall 2012	123.0	days	x	$ 1,084.50	$ 133,394		October 1st to January 31st
General and Administration costs											$ 5,651	
-	4	1	-	Travel allowance		3.00	person	OC.04	$ 750.00	$ 2,250		Travel allowance for hydrocarbon decontamination crew
-	4	2	-	Camp Management		-	day	OC.01	$ 677.00	$ -		
-	4	3	-	Camp Operations		22.7	per day per person	OC.02	$ 150.00	$ 3,401		
-	4	4	-	Camp Rental		-	year	OC.03	$ 400,000.00	$ -		Includes 12 man-months for hydrocarbons decontamination
Field support											$ 73,813	
-	5	1	-	Supervision		8	days	x	$ 789.72	$ 5,968		
-	5	2	-	Equipment maintenance support - Mechanic	10% of project duration	1	days	x	$ 852.60	$ 644		
-	5	3	-	Helicopter Support		8	days	x	$ 2,100.00	$ 67,200		4 hrs min. per day
Hydrocarbon decontamination											$ 45,000	
-	6	1	-	Engineering Design		1	LS	x	$ 15,000.00	$ 15,000		
-	6	2	-	Confirmatory Sampling and Analysis		1	LS	x	$ 30,000.00	$ 30,000		
Post-closure Monitoring											$ 200,000	
	8	1	1	Yearly Monitoring Cost	for 5 years	5.0	LS	x	$ 40,000.00	$ 200,000		Includes 1 week monitoring site work, sample testing, monitoring report, geotechnical inspection and report, vegetation specialist inspection and report
Other											$ -	
-	6	1	-	Contractor profit	% of direct and other indirect costs (excluding contingency)	0%	%	of	$ 1,462,736.33	$ -		
-	6	2	-	Bonding	% of direct cost	0%	%	of	$ 390,818.61	$ -		
-	6	4	-	Freight costs (included in material costs)		15%	%		-	$ -		
					SUBTOTAL INDIRECT COSTS						**$ 1,311,000**	
CLOSURE COSTS - TOTAL										**$**	**1,701,818**	

Table B3: Cost Itemised by Task- Windy Camp

Work Area Code	Item	Task	Sub-task	Activity	Task	Quantity	Unit	SRK Cost Code	Unit Cost	Activity Total	Subtotals (2012 rates)	Source / Comments
DIRECT COSTS												
Collection and Disposal of Hazardous Waste											$5,463	
WC	3	1	1	Consolidate and haul to jetty	Collect waste and place in suitable containers	2.8	m^3	C.1.01	$ 1,947.00	$5,452		Collect chemicals from all buildings and shops
WC	3	1	2		Haul containers to jetty for shipping off-site	2.8	m^3	C.5.09	$ 3.97	$11		
Salvaging Usable Equipment and Supplies											$22,722	
WC	5	2	1	Potable water supply system	Decommission	1.0	ls	C.2.02	$ 1,166.24	$1,166		Disconnect intake, plumbing, electrical, disconnect filtration unit
WC	5	2	2		Dismantle	1.0	ls	C.4.03	$ 3,995.40	$3,995		
WC	5	2	3		Load treatment units and tanks on skids for transport	4.0	m^3	C.5.14	$ 740.48	$2,962		Load treatment unit and holding tanks on skids and haul to Doris Camp
WC	5	3	1	Waste incinerator	Decommission (mechanical)	1.0	each	C.2.03	$ 1,083.75	$1,084		Disconnect fuel lines, etc.
WC	5	3	2		Collect ashes and place in containers	1.0	m^3	C.5.03	$ 341.76	$342		place residual waste in empty fuel drums
WC	5	3	3		Dismantle (welding crew)	1.0	each	C.4.04	$ 1,430.14	$1,430		
WC	5	3	4		Load onto skids for transport off site (other sites/third party)	6.8	m^3	C.5.14	$ 740.48	$4,998		
WC	5	4	1	Camp Heating Systems	Decommission electrical, mechanical	1.0	ls	C.2.04	$ 568.88	$569		
WC	5	4	2		Load reuseable components in containters for transport to Doris Cai	1.0	m^3	C.4.06	$ 113.92	$114		
WC	5	5	1	Shop/Office Furniture	Load reuseable components in containters for transport to Doris Cai	28.0	m^3	C.4.06	$ 113.92	$3,190		
WC	5	6	1	Communication equipment	Dismantled and packaged	1.0	ls	C.4.07	$ 313.10	$313		
WC	5	7	1	Transportation	Haul materials to Doris Camp	82.3	m^3	C.5.08	$ 2.62	$215		
WC	5	7	2		Unload container	82.3	m^3	C.5.07	$ 28.48	$2,343		
Demolition of Remaining Structures											$151,361	
WC	6	1	1	Building Demolition	Manual demolition beyond rock pads	886.2	m^2	C.4.09	$ 129.44	$114,706		
					Mechanical demolition on rock pads	3,479.1	m^3	C.4.10	$ 8.70	$30,277		
WC	6	1	2		Load debris into seacans for transport (to Roberts Bay)	1,605.4	m^3	C.5.02		$0		
WC	6	1	2		Haul to Roberts Bay for shipping off-site	1,605.4	m^3	C.5.09	$ 3.97	$6,377		
Remediation of Permafrost Degredation Areas											$8,078	
WC	7	1	1	Permafrost degradation	Place rockfill butress on slope near the tank farm	600.0	m^3	C.6.03	$ 7.68	$4,609		Rockfill sourced from water intake bldg. pad foundation
WC	7	2	1	Erosion Control	Install erosion control measures (coco matting)	500.0	m^2	C.6.04	$ 3.48	$1,741		
WC	7	3	1	Fill in low-lying areas of winter road	Fill in low-lying areas with rock fill to prevent ponding	225.0	m^3	C.6.03	$ 7.68	$1,728		
Collection and Disposal of Non-Hazardous Waste											$5,496	
WC	9	1	1	Summer Debris Collection	Collect misc debris scattered around site and stockpile	40,000.0	m^2	C.5.01	$ 0.13	$5,132		
WC	9	1	2		Load stockpiled debris into containter for transport (to landfill)	30.0	m^3	C.5.02	$ 8.16	$245		Assumed one Seacan of garbage
WC	9	2	1	Off-site disposal items	Haul materials to Roberts Bay Jetty	30.0	m^3	C.5.09	$ 3.97	$119		
Site Revegetation and Drainage Control											$9,972	
WC	10	1	1	Revegetate regraded areas	Revegetate	2,647.8	m^2	C.6.10	$ 0.77	$2,036		SRK estimate from previous closure cost estimates
WC	10	2	1	Regrade	Stake-out low-lying areas in summer to place fill	1.0	days	C.6.08	$ 3,815.68	$3,816		
WC	10	2	2		Regrade camp areas to ensure positive drainage	1,247.8	m^2	C.6.02	$ 2.38	$2,967		
WC	10	2	3		Fill in low-lying areas with soil to prevent ponding	150.0	m^3	C.6.03	$ 7.68	$1,152		
Remediation of Hydrocarbon Contaminated Soils											$97,609	
WC	11	1	1	Soil Bioremediation	Apply nutrients	113.5	m^3	H.07	$ 260.00	$29,510		assumed unit rate of nutrient application and factored up by 100
WC	11	2	1	Excavate and haul soil offsite for disposa	Excavate and place in sacks	639.0	m^3	C.5.18	$ 65.75	$42,008		see HC Contaminated Soil Quantities sheet
WC	11	2	2		Place megabags in containers	639.0	each	C.5.04	$ 14.04	$8,970		
WC	11	2	3		Haul containers to Roberts Bay for shipping	639.0	m^3	C.5.09	$ 3.97	$2,538		
WC	11	3	1	Excavate and haul soil to Doris OVB Dur	Excavate and place in sacks	65.0	m^3	C.5.18	$ 65.75	$4,273		
WC	11	3	2		Place megabags in containers	65.0	each	C.5.04	$ 14.04	$913		
WC	11	3	3		Haul containers to Doris OVB Dump	65.0	m^3	C.5.09	$ 3.97	$258		
WC	11	3	4		Empty megabags	65.0	m^3	C.5.19	$ 31.33	$2,036		
WC	11	4	1	Backfilling excavation with crushed rock	Load, Haul, Dump, Place from Quarry D (less than 1 km)	589.8	m^3	C.5.10	$ 12.04	$7,102		
Off-site Shipping for Disposal											$2,066,149	
WC	12	1	1	Ship off-site for disposal by barge	Hazardous waste	2.8	m^3	S.02	$ 200.00	$560		
WC	12	1	2		Non-Hazardous waste and demolition debris	2,347.0	m^3	S.03	$ 200.00	$469,393		
WC	12	1	3		Hydrocarbon contaminated soils	1,614.0	m^3	S.01	$ 989.00	$1,596,197		
Off-Site Disposal Fees											$297,299	
WC	13	1	1	Disposal fees in licensed facility	Hazardous waste	1.0	LS	M.09	$ 10,000.00	$10,000		
WC	13	1	2		Non-hazardous waste and demolition debris	2,347.0	m^3	M.10	$ 5.51	$12,928		
WC	13	1	3		Disposal fees at Hay River	2,743.7	t	H.05	$ 100.00	$274,372		
Final Reclamation of Drill Holes											$19,712	
WC	14	1	1	Drill Hole Decommisioning and Reclama	Cut off drill steel and cap; backfill depressions	1.0	LS		$ 19,711.72	$19,712		
					TOTAL DIRECT COSTS						**$2,683,860**	
INDIRECT CLOSURE COSTS												
Contingency											$32,041	
-	1	1	-	Contingency	10% of direct costs	10%	%	x	$320,411	$32,041.12		
Mobilization & Demobilization											$ 855,030	
-	2	1	1	Summer 2012 - Closure activities	Mobilization	1.0	ls	x	$ 417,087.64	$417,088		Equipment relocated from Patch Lake
-	2	1	2	Summer 2013 - Windy Camp to Hay Riv	Demobilization	1.0	ls	x	$ 437,942.03	$437,942		Equipment demobilised to Edmonton
General and Administration costs											$ 15,854	
-	5	1	-	Travel allowance		5	person	OC.04	$ 750.00	$3,750		
-	5	2	-	Camp Management		-	day	OC.01	$ 677.00	$0		
-	5	3	-	Camp Operations		80.7	day per per	OC.02	$ 150.00	$12,104		
-	5	4	-	Camp Rental		-	year	OC.03	$ 400,000.00	$0		
Field support											$ 20,573	
-	6	1	-	Supervision		16.1	days	x	$ 1,172	$18,921		
-	6	2	-	Equipment maintenance support - Mech	10% of project duration	2	days	x	$ 1,023	$1,651		
-	6	3		Helicopter Support		-	days	x	$ 2,100	$0		minimum of 4 hr per day
Hydrocarbon decontamination											$ 75,000	
-	7	1	-	Engineering Design		1.0	LS	x	$ 25,000	$25,000		
-	7	2	-	Confirmatory Sampling and Analysis		1.0	LS	x	$ 50,000	$50,000		
Post-closure Monitoring											$ 200,000	
	8	1	1	Yearly Monitoring Cost	for 5 years	5.0	LS	x	$ 40,000	$200,000		Includes 1 week monitoring site work, sample testing, monitoring report; geotechnical inspection and report; vegetation specialist inspection and report
Other											$ -	
-	9	1	-	Contractor profit	% of direct and other indirect costs (excluding contingency)	-	%	of	$ 3,650,316	$0.00		included in equipment unit rates and POH (i.e. Production Overhead) labor cost
-	9	2	-	Bonding	% of direct cost	-	%	of	$ 2,683,860	$0		
				Subtotal Indirect Costs	**SUBTOTAL INDIRECT COSTS**						**$ 1,198,498**	
CLOSURE COSTS - TOTAL											**$3,882,357**	

Table B4. Drill Hole Abandonments Notes:

Windy Camp

1 Assume 10 holes with a 2x5 m drill pad to be remediated.
2 No backfilling of holes is required
3 Unit rates for regrading drill pad surface and filling drill holes are found on the Windy Task Unit rate worksheet.

Activity	Task	Quantity	Unit	Cost Code	Unit Cost	Activity Total	Subtotals	Source / Comments
DIRECT COSTS								
Other Areas								
Drill Sites							$19,712	
Reclaim Drill holes	Cut of top of drill pipes and cap	889	ea	C.4.08	$ 20.74	$18,437		412 holes @Naartok + 19 @Wolverine + 385 @Doris
	Load debris into containers for disposal	10	m^3	C.5.02	$ 8.16	$81		
Regrade	Fill in low-lying areas (assumed sourced within 0.5km)	100	m^3	C.6.03	$ 7.68	$768		assume 10 holes to be remediated; 2x5 m area
Stabilize	Supply and place coconut matting	100	m^2	C.6.04	$ 3.48	$348		
Revegetate	Seed/Fertilize, by hand, high application rate	100	m^2	C.6.10	$ 0.77	$77		
Subtotal Direct Costs - Other Areas							**$19,712**	
TOTAL DIRECT COSTS							**$19,712**	

Table B5. Mob/Demob cost

Windy Mob/Demob Cost Notes

1 It is assumed that no equipment is available on site
2 All equipment is hauled from Edmonton to Hay River
3 All equipment is shipped by barge from Hay River to Hope Bay
4 The shipping cost is calculated on a revenue-tonne basis (Hay River to Cambridge Bay). 2011 rates (from NTCL) +5% fuel surcharge+5% rate increase to 2012
5 Demobilisation is assumed to have the same cost as mobilisation

No. of units	Description	Units	Quantity	Unit cost	2012 Task cost	Notes
	Crew					
	Note: Labour costs included in loaded Labour Unit Rates found on the Unit Rates and Task Unit Rates worksheets					
	Construction equipment	Footprint				
1	Bobcat	m^3	11.0	$ 332.96	$ 3,657.90	From Hay River to Roberts Bay
1	Loader	m^2	10.2	$ 332.96	$ 3,400.45	From Hay River to Roberts Bay
1	Dozer	m^2	20.3	$ 332.96	$ 6,750.26	From Hay River to Roberts Bay
1	Excavator	m^2	38.1	$ 332.96	$ 12,687.55	From Hay River to Roberts Bay
1	small equipment	m^3	24.1	$ 332.96	$ 8,025.01	From Hay River to Roberts Bay
1	Trucks (CAT 735)	m^2	41.6	$ 332.96	$ 13,860.35	From Hay River to Roberts Bay
1	Tractor trailer	m^3	86.8	$ 332.96	$ 28,907.95	From Hay River to Roberts Bay
1	Crewcab pickup (Ford F350)	m^3	33.8	$ 332.96	$ 11,254.35	From Hay River to Roberts Bay
	Truck equipment to Hay River (6 trucks)	each	8	$ 15,000.00	$ 120,000.00	= hauling 8 trailers from Edmonton / source: Doris cost estimate
SUBTOTAL MOBILISATION					**$ 417,087.64**	
SUBTOTAL DEMOBILISATION					**$ 437,942.03**	Assumes same cost as mobilisation, updated by 5%
CLOSURE COST TOTAL					***$ 855,029.67***	
% mobilisation assigned to Windy Closure		%	100%	$ 417,087.64	***$ 417,087.64***	
% demobilisation assigned to Windy Closure		%	100%	$ 437,942.03	***$ 437,942.03***	
Total assigned to Windy Closure					***$ 855,029.67***	

Camp costs

Description	Units	Cost Code	Quantity	Unit Cost	Task Cost	
Camp Management	day	OC.01	0	$677.00	$0	
Camp Operations	per day per person	OC.02	81	$150.00	$12,104	5 person crew for 21 days
Camp Rental	year	OC.03	0	$400,000.00	$0	assumed that people will stay at Doris Camp
Travel allowance	charter flights	OC.05	0	$10,000.00	$0	charter flights for 15 person crews
	commercial flights	OC.04	5	$750.00	$3,750	maximum of 2 weeks rotations
					$15,854	

Table B6. Indirect Unit Rates for Patch Lake

Mob/Demob Costs

Crew mobilization costs included in loaded labour rates

The barging fee for equipment is calculated on a square foot basis

No. of units	Description	Units	Quantity	Unit cost	2012 Task cost	Notes
	Crew					
	Note: Labour costs included in loaded Labour Unit Rates found on the Unit Rates and Task Unit Rates worksheets					
	Construction equipment	Footprint				The shipping fee for equipment is calculated on a revenue-tonne basis (Hay River to Cambridge Bay). 2011 rates from NTCL+5% fuel surcharge+5% rate increase to 2012
0	Bobcat	m^3	11.0	$ 332.96	$ -	From Hay River to Roberts Bay
1	Loader	m^2	10.2	$ 332.96	$ 3,400.45	From Hay River to Roberts Bay
1	Dozer	m^2	20.3	$ 332.96	$ 6,750.26	From Hay River to Roberts Bay
1	Excavator	m^2	38.1	$ 332.96	$ 12,687.55	From Hay River to Roberts Bay
0	small equipment	m^3	24.1	$ 332.96	$ -	From Hay River to Roberts Bay
1	Trucks (CAT 735)	m^2	41.6	$ 332.96	$ 13,860.35	From Hay River to Roberts Bay
0	Tractor trailer	m^3	86.8	$ 332.96	$ -	
1	Crewcab pickup (Ford F350)	m^3	33.8	$ 332.96	$ 11,254.35	
-	Truck equipment to Hay River (6 trucks)	each	8	$ 15,000.00	$ 120,000.00	= hauling 8 trailers from Edmonton / source: Doris cost estimate
	Subtotal Demobilisation				**$ 335,905.91**	
	Subtotal Demobilisation				**$ 352,701.20**	Assumes same cost as mobilisation, updated by 5%
	Total				**$ 688,607.11**	
	% mobilisation assigned to Windy Closure		100%	$ 335,905.91	$ 335,905.91	
	% assigned to Windy Closure		100%	$ 352,701.20	$ 352,701.20	
	Total assigned to Patch Lake Closure				***$ 688,607.11***	

Camp costs

Description	Units	Cost Code	Quantity	Unit Cost	Task Cost	
Camp Management	day	OC.01	0	$677.00	$0	it is assumed that people will be staying at Doris Camp
Camp Operations	per day per person	OC.02	23	$150.00	$3,401	3 person crew for 10 days
Camp Rental	year	OC.03	0	$400,000.00	$0	it is assumed that people will be staying at Doris Camp
Travel allowance	charter flights	OC.05	0	$10,000.00	$0	charter flights for 15 person crews
	commercial flights	OC.04	3.00	$750.00	$2,250	maximum of 2 weeks rotations
					$5,651	

Table B8. Unit Rates for Patch Lake

Cost Code	Item	Unit rate	Unit	Comment	Source
Equipment					
E.01	Dozer (CAT D7)	$ 166.50	hr	hourly equipment rate (less operator)	Nuna 2012 Equipment Rates
E.02	Dozer (CAT D4)	$ 86.80	hr	hourly equipment rate (less operator)	Nuna 2012 Equipment Rates
E.03	Truck (CAT 730)	$ 138.70	hr	hourly equipment rate (less operator)	Nuna 2012 Equipment Rates
E.04	Excavator (CAT 330 CL)	$ 185.00	hr	hourly equipment rate (less operator)	Nuna 2012 Equipment Rates
E.05	Loader (CAT IT28/930)	$ 82.30	hr	hourly equipment rate (less operator)	Nuna 2012 Equipment Rates
E.06	Skidsteer (Bobcat)	$ 80.10	hr	hourly equipment rate (less operator)	Nuna 2012 Equipment Rates
E.07	Welding Equipment	$ 52.58	day	300 Amps, gas/diesel driven	2009 BC Blue Book + 10% Northern Allowance+ 15% rate increase to 2012
E.08	Power washer	$ 110.00	day	Hot water pressure washer - 3000 PSI	www.abtoolrentals.com/Painting-Pressure-Washing.page + 10% rate increase to 2011
E.09	Drum crusher	$ 35.60	hr	30 tones, mobile	RSMeans, 2005; adjusted to 2009 dollars based on CPI +15% rate increase to 2012
E.10	Oil-water separator	$ 27.50	hr	10 GPM, underground	RSMeans, 2005; adjusted to 2009 dollars based on CPI +15% rate increase to 2012
E.11	Air Track Drill	$ 269.34	hr		2011 BC Blue Book + 10% Northern Allowance + 5% rate increase to 2012 +10% fuel facto
E.12	Helicopter	$ 2,100.00	hr	Fuel surcharge applies per operation hours	I Miskolczi (from Angela Holtzapfel@Newmont ESR)
E.13	Clemro Crusher	$ 787.40	hr	200 tons/hr (cost less operator)	Nuna 2012 Equipment Rates
E.14	Tractor Trailer (6 axle lowbed+booster)	$ 71.78	hr	hourly equipment rate (less operator)	2011 BC Blue Book + 10% Northern Allowance + 5% rate increase to 2012
E.15	Flatbed truck (6x4, 5 tonne)	$ 24.83	hr	hourly equipment rate (less operator)	2011 BC Blue Book + 10% Northern Allowance + 5% rate increase to 2012
Materials					
M.01	Explosives	$ 21.38	m^2	15% freight cost added	RSMeans, 2005; adjusted to 2009 dollars based on CPI+15% rate increase to 2012
M.02	Liner - HDPE	$ 28.93	m^2	supply and install	from JDS (Surface Water Management Options Analysis)
M.03	Liner - geotextile	$ 26.62	m^2	supply and install	from JDS (Surface Water Management Options Analysis)
M.04	Fuel (Diesel)	$ 1.17	L	2008 Landed fuel cost at Hope Bay	Maritz (from Jeff Reinson @ Newmont)
M.05	Silt Fencing	$ 1.32	m	15% freight cost added	Cost Mine 2011; original price quoted in linear ft
M.06	Coco-matting	$ 1.79	m^2	15% freight cost added	Cost Mine 2011; original price quoted in sq. yards
M.07	Seed/Fertilizer	$ 15.67	kg	15% freight cost added	Arctic Alpine seed mix (2009)
M.08	Winter road	$ 16,675.00	km	open and maintain for 2 months	NUNA Logistics 2009 (from Court Smith) + 15% cost increase to 2012
M.09	Hazardous Waste Disposal fee (@Hay River)	$ 10,000.00	20 ft seacan	Disposal + handling and cleaning fee	SRK estimate
M.10	Demolition Debris Disposal Fee (@Hay River)	$ 5.51	m^3	Disposal + handling fee	Personal communication with Rob Jamieson@Hay River Disposals Ltd.
M.11	Landfill Dump Fee (@Quarry#2 landfill)	$ 57.25	m^3	Dump fee = $71/t (0.733 t/$m^3$ bulk density)	Maritz (from Newmont)
M.12	Bentonite chips	$ 570.96	m^3	In 50 pound bags, 15% freight cost added	Holly North Production Supplies Limited
Labour					
L.01	Labour general	$ 56.96	hr		Yukon Gov. Fair Wage Sched. Apr. 2012 (82% Loading Rate Added)
L.02	Labour - Trades	$ 85.26	hr	Mechanic, Electrician, Welder, Plumber, Carpenter etc.	Yukon Gov. Fair Wage Sched. Apr. 2012 (82% Loading Rate Added)
L.03	Light Equipment Operator	$ 65.81	hr	Trucks	Yukon Gov. Fair Wage Sched. Apr. 2012 (82% Loading Rate Added)
L.04	Heavy Equipment Operator	$ 71.32	hr	Dozer, excavator	Yukon Gov. Fair Wage Sched. Apr. 2012 (82% Loading Rate Added)
L.05	Supervision	$ 97.70	hr		Yukon Gov. Fair Wage Sched. Apr. 2008 (82% Loading Rate Added)*+15% rate increase to 2012
L.06	Engineer (Consultant)	$ 145.00	hr	Int./Junior Eng.	SRK-Estimate (all inclusive)
Shipping					
S.01	Outbound Shipping - Soils	$ 989.00	m^3	1.7 t/m^3 bulk density	(7.75 m^2/seacan based on 29,000 lbs limit per seacan, seacan is 38.5 m^3) - from NTCL 17APR 12
S.02	Outbound Shipping - Haz Waste	$ 200.00	m^3	1.0 t/m^3 bulk density	(7.75 m^2/seacan based on 29,000 lbs limit per seacan, seacan is 38.5 m^3) - from NTCL 17APR 12
S.03	Outbound Shipping - Demolition	$ 200.00	m^3	0.733 t/m^3 bulk density	$7661/seacan (seacan is 38.5 m^3) - from NTCL 17APR 12
Hydrocarbon Soils and Hazardous Waste					
H.01	Excavate impacted soil	$ 19.18	m^3		WESA estimate
H.02	Low temperature thermal desorption	$ 100.00	m^3		WESA estimate
H.03	Rehydrate and backfill	$ 10.69	m^3		WESA estimate
H.04	Regrade and reshape	$ 2.38	m^2		WESA estimate
H.05	Tipping Fee for HC Soils at Hay River	$ 100.00	tonne		Communication with Hay River Landfill Tsharp 18APR12
H.06	Tipping Fee for Haz Waste at Disposal Site				
H.07	In-situ Bioremediation	$ 260.00	m^3		$260,000/1000$m^3$ EBA Report (Evaluation of Risk and Remedial Options, 2010)
Stand by equipment rates					
SB. 01	Dozer (CAT D7)	$ 83.25	hr	50 % hourly equipment rate (less operator)	Nuna 2012 Equipment Rates
SB. 02	Excavator (CAT 330 CL)	$ 92.50	hr	50 % hourly equipment rate (less operator)	Nuna 2012 Equipment Rates
SB. 03	Loader (CAT 966 F)	$ 41.15	hr	50 % hourly equipment rate (less operator)	Nuna 2012 Equipment Rates
SB. 04	Skidder (CAT 242B)	$ 40.05	hr	50 % hourly equipment rate (less operator)	Nuna 2012 Equipment Rates
Note: Loading Rate from Nuna					
Owner's cost					
OC.01	Camp management	$ 677.00	day		Newmont
OC.02	Camp operations	$ 150.00	day	includes food and camp maintenance	Newmont
OC.03	Camp rental	$ 400,000.00	year	25 man mobile camp	Newmont
OC.04	Commercial flight	$ 750.00	person	flight from Yellowknife to Cambridge Bay and return	
OC.05	Charter flight	$ 10,000.00	flight	Return from Yellowknife	

Fuel Rate Calculations

Equipment	HP	Fuel Consumption Factor (L/hr/HP)	Fuel Rate ($/hr)	Fuel Rate Source
Dozer	240	0.135	$37.91	CAT Handbook
Dozer	84	0.135	$13.27	CAT Handbook
Truck	435	0.065	$33.08	CAT Handbook
Excavator	268	0.130	$40.76	CAT Handbook
Loader	283	0.121	$40.06	CAT Handbook
Grader	62	0.14	$10.16	CAT Handbook
Welding Equipment	N/A	-	$3.23	Estimated
Power Washer	11	0.1	$1.29	ABToolRentals Catalogue
Drum Crusher	N/A	-	$3.23	Estimated
Air Track Drill	215	0.13	$32.70	CAT Handbook
Helicopter	-	-	$100.00	Estimated
Celmro Crusher	200	0.13	$30.42	Estimated (Chris Eliott)

Table B9. Unit Rates for Windy Camp

Cost Code	Item	Unit rate	Unit	Comment	Source
Equipment					
E.01	Dozer (CAT D7)	$ 166.50	hr	hourly equipment rate (less operator)	Nuna 2012 Equipment Rates
E.02	Dozer (CAT D4)	$ 86.80	hr	hourly equipment rate (less operator)	Nuna 2012 Equipment Rates
E.03	Truck (CAT 730)	$ 138.70	hr	hourly equipment rate (less operator)	Nuna 2012 Equipment Rates
E.04	Excavator (CAT 330 CL)	$ 185.00	hr	hourly equipment rate (less operator)	Nuna 2012 Equipment Rates
E.05	Loader (CAT IT28/930)	$ 82.30	hr	hourly equipment rate (less operator)	Nuna 2012 Equipment Rates
E.06	Skidsteer (Bobcat)	$ 80.10	hr	hourly equipment rate (less operator)	Nuna 2012 Equipment Rates
E.07	Welding Equipment	$ 52.58	day	300 Amps, gas/diesel driven	2009 BC Blue Book + 10% Northern Allowance+ 15% rate increase to 2012
E.08	Power washer	$ 110.00	day	Hot water pressure washer - 3000 PSI	www.abtoolrentals.com/Painting-Pressure-Washing.page + 10% rate increase to 2011
E.09	Drum crusher	$ 35.60	hr	30 tones, mobile	RSMeans, 2005; adjusted to 2009 dollars based on CPI +15% rate increase to 2012
E.10	Oil-water separator	$ 27.50	hr	10 GPM, underground	RSMeans, 2005; adjusted to 2009 dollars based on CPI +15% rate increase to 2012
E.11	Air Track Drill	$ 269.34	hr		2011 BC Blue Book + 10% Northern Allowance + 5% rate increase to 2012 +10% fuel facto
E.12	Helicopter	$ 2,100.00	hr	Fuel surcharge applies per operation hours	I Miskolczi (from Angela Holtzapfel@Newmont ESR)
E.13	Clemro Crusher	$ 787.40	hr	200 tons/hr (cost less operator)	Nuna 2012 Equipment Rates
E.14	Tractor Trailer (6 axle lowbed+booster)	$ 71.78	hr	hourly equipment rate (less operator)	2011 BC Blue Book + 10% Northern Allowance + 5% rate increase to 2012
E.15	Flatbed truck (6x4, 5 tonne)	$ 24.83	hr	hourly equipment rate (less operator)	2011 BC Blue Book + 10% Northern Allowance + 5% rate increase to 2012
Materials					
M.01	Explosives	$ 21.38	m^2	15% freight cost added	RSMeans, 2005; adjusted to 2009 dollars based on CPI+15% rate increase to 2012
M.02	Liner - HDPE	$ 28.93	m^2	supply and install	from JDS (Surface Water Management Options Analysis)
M.03	Liner - geotextile	$ 26.62	m^2	supply and install	from JDS (Surface Water Management Options Analysis)
M.04	Fuel (Diesel)	$ 1.17	L	2008 Landed fuel cost at Hope Bay	Maritz (from Jeff Reinson @ Newmont)
M.05	Silt Fencing	$ 1.32	m	15% freight cost added	Material Quote: Layfield, Jan. 2008
M.06	Coco-matting	$ 1.79	m^2	15% freight cost added	RSMeans, 2005; adjusted to 2009 dollars based on CPI
M.07	Seed/Fertilizer	$ 15.67	kg	15% freight cost added	Arctic Alpine Seed mix+ fertilizer (2009)
M.08	Winter road	$ 16,675.00	km	open and maintain for 2 months	NUNA Logistics 2009 (from Court Smith) + 15% cost increase to 2012
M.09	Hazardous Waste Disposal fee (@Hay River)	$ 10,000.00	20 ft container	Disposal + handling and cleaning fee	SRK estimate
M.10	Demolition Debris Disposal Fee (@Hay River)	$ 5.51	m^3	Disposal + handling fee	Personal communication with Rob Jamieson@Hay River Disposals Ltd.
M.11	Landfill Dump Fee (@Quarry#2 landfill)	$ 57.25	m^3	Dump fee = $71/t (0.733 t/$m^3$ bulk density)	Maritz (from Newmont)
M.12	Bentonite chips	$ 570.96	m^3	In 50 pound bags, 15% freight cost added	Holly North Production Supplies Limited
Labour					
L.01	Labour general	$ 56.96	hr		Yukon Gov. Fair Wage Sched. Apr. 2012 (82% Loading Rate Added)
L.02	Labour - Trades	$ 85.26	hr	Mechanic, Electrician, Welder, Plumber, Carpenter etc.	Yukon Gov. Fair Wage Sched. Apr. 2012 (82% Loading Rate Added)
L.03	Light Equipment Operator	$ 65.81	hr	Trucks	Yukon Gov. Fair Wage Sched. Apr. 2012 (82% Loading Rate Added)
L.04	Heavy Equipment Operator	$ 71.32	hr	Dozer, excavator	Yukon Gov. Fair Wage Sched. Apr. 2012 (82% Loading Rate Added)
L.05	Supervision	$ 97.70	hr		Yukon Gov. Fair Wage Sched. Apr. 2008 (82% Loading Rate Added)*+15% rate increase to 2012
L.06	Engineer (Consultant)	$ 145.00	hr	Int./Junior Eng.	SRK-Estimate (all inclusive)
Shipping					
S.01	Outbound Shipping - Soils	$ 989.00	m^3	1.7 t/m^3 bulk density	(7.75 m^3/seacan based on 29,000 lbs limit per seacan, seacan is 38.5 m^3) - from NTCL 17APR 12
S.02	Outbound Shipping - Haz Waste	$ 200.00	m^3	1.0 t/m^3 bulk density	(7.75 m^3/seacan based on 29,000 lbs limit per seacan, seacan is 38.5 m^3) - from NTCL 17APR 12
S.03	Outbound Shipping - Demolition	$ 200.00	m^3	0.733 t/m^3 bulk density	$7661/seacan (seacan is 38.5 m^3) - from NTCL 17APR 12
S.04	Outbound Shipping - Haz Waste (HR to disposal)				
Hydrocarbon Soils and Haz Waste					
H.01	Excavate impacted soil	$ 19.18	m^3		WESA estimate
H.02	Low temperature thermal desorption	$ 100.00	m^3		WESA estimate
H.03	Rehydrate and backfill	$ 10.69	m^3		WESA estimate
H.04	Regrade and reshape	$ 2.38	m^2		WESA estimate
H.05	Tipping Fee for HC Soils at Hay River	$ 100.00	tonne		Communication with Hay River Landfill Tsharp 18APR12
H.06	Tipping Fee for Haz Waste at Disposal Site				
H.07	In-situ Bioremediation	$ 260.00	m^3		$260,000/1000$m^3$ EBA Report (Evaluation of Risk and Remedial Options, 2010)
Stand-by equipment rates					
SB. 01	Dozer (CAT D7)	$ 83.25	hr	50% of hourly equipment rate (less operator)	Nuna 2012 Equipment Rates
SB. 02	Dozer (CAT D4)	$ 43.40	hr	50% of hourly equipment rate (less operator)	Nuna 2012 Equipment Rates
SB. 03	Truck (CAT 730)	$ 69.35	hr	50% of hourly equipment rate (less operator)	Nuna 2012 Equipment Rates
SB. 04	Excavator (CAT 330 CL)	$ 92.50	hr	50% of hourly equipment rate (less operator)	Nuna 2012 Equipment Rates
SB. 05	Loader (CAT IT28/930)	$ 41.15	hr	50% of hourly equipment rate (less operator)	Nuna 2012 Equipment Rates
SB. 06	Skidder (Bobcat)	$ 40.05	hr	50% of hourly equipment rate (less operator)	Nuna 2012 Equipment Rates
Note: Loading Rate includes allowances for (EI, CPP, MSP/Benefits/Travel/OT)					
Owner's cost					
OC.01	Camp management	$ 677.00	day		Newmont
OC.02	Camp operations	$ 150.00	day	includes food and camp maintenance	Newmont
OC.03	Camp rental	$ 400,000.00	year	25 man mobile camp	Newmont
OC.04	Commercial flight	$ 750.00	person	flight from Yellowknife to Cambridge Bay and return	
OC.05	Charter flight	$ 10,000.00	flight	Return from Yellowknife	

Fuel Rate Calculations

Equipment	HP	Fuel Consumption Factor (L/hr/HP)	Fuel Rate ($/hr)	Fuel Rate Source
Dozer	240	0.135	$37.91	CAT Handbook
Dozer	84	0.135	$13.27	CAT Handbook
Truck	435	0.065	$33.08	CAT Handbook
Excavator	268	0.130	$40.76	CAT Handbook
Loader	283	0.121	$40.06	CAT Handbook
Grader	62	0.14	$10.16	CAT Handbook
Welding Equipment	N/A		$3.23	Estimated
Power Washer	11	0.1	$1.29	ABToolRentals Catalogue
Drum Crusher	N/A		$3.23	Estimated
Air Track Drill	215	0.13	$32.70	CAT Handbook
Helicopter	-		$100.00	Estimated
Celmro Crusher	200	0.13	$30.42	Estimated (Chris Eliott)
Tractor Trailer (6 axle low bed + booster)	280	0.0315	$10.32	Estimated based on personal communication with Kenworth
Flatbed truck (6x4, 5 tonne)	600	0.0196	$13.76	Estimated based on personal communication with Kenworth

Fuel Consumption Factors (L per hour per HP)		
Backhoe	0.11	CAT Handbook
Excavator	0.130	CAT Handbook
Lifting	0.100	Estimated
Loader	0.121	CAT Handbook
Dozer	0.135	CAT Handbook
Grader	0.14	CAT Handbook
Truck	0.065	CAT Handbook
Compactor	0.13	CAT Handbook
Drill	0.13	Estimated
Tractor trailer	0.0196	5 MPG fuel mileage
Flatbed truck	0.0315	8 MPG fuel mileage

Table B10. Task Unit Rate Calculations for Windy Camp

				Unit Rates				Labour				
								$ 56.96	$ 85.26	$ 145.00	$ 65.81	$ 71.32
Cost Code	Item	Unit	Productivity (Unit/hr)	Total Unit Cost	Material Unit Rate	Labour Unit Rate	Equipment Unit Rate	General Labour	Tradesman - Electrical	Engineer/ Technician	Light Equipment Operator	Heavy Equipment Operator
Decontamination												
C.1.01	Collect hazardous chemical waste and place in suitable containers	m^3	0.17	$ 1,947.00	$ -	$ 1,453.20	$ 493.80	3				1
C.1.02	Drain above ground fuel storage tank	each	0.5	$ 227.84	$ -	$ 227.84	$ -	2				
C.1.03	Drain and power-wash empty fuel drums	each	12	$ 10.41	$ -	$ 9.49	$ 0.92	2				
C.1.04	Operate oil/water separator	each	4	$ 45.47	$ -	$ 42.72	$ 2.75	3				
Demolition												
C.2.01	Decomission above ground storage tanks	each	0.5	$ 398.36	$ -	$ 398.36	$ -	2	1			
C.2.02	Crush empty fuel drums	each	20	$ 15.16	$ -	$ 9.26	$ 5.90	2				1
C.2.03	Cut Tank Farm geomembrane to manageable size	sq. m	80	$ 2.14	$ -	$ 2.14	$ -	3				
C.2.04	Expose and remove tank farm liner	m^2	90.0	$ 3.48	$ -	$ 1.43	$ 2.06	1				1
C.2.05	Demolish wooden buildings/ shop structures/ living quarters	m^3	53	$ 10.61	$ -	$ 5.92	$ 4.69	3				2
C.2.06	Collect miscellaneous debris from around site	m^2	2529	$ 0.13	$ -	$ 0.10	$ 0.03	3				1
C.2.07	Demolish containment steel fence	Lm	25.00	$ 17.09	$ -	$ 9.69	$ 7.40	3				1
Soil Remediation												
C.3.01	Field Investigation	each	0.05	$ 5,678.40	$ 500.00	$ 5,178.40	$ -	2		1		
C.3.02	Revegetate (seeding&fertilising by hand; high application rate)	m^2	320.00	$ 0.77	$ 0.24	$ 0.53	$ -	3				
C.3.03	Load HC contaminated soils into megabags	m^3	3.50	$ 97.95	$ -	$ 32.55	$ 65.40	2				
C.3.04	Unload soils from megabags	m^3	10.00	$ 31.33	$ -	$ 12.83	$ 18.50	1				1
Material Relocations												
C.4.01	Load demolition debris/solid waste in containers	m^3	48.00	$ 8.16	$ -	$ 2.97	$ 5.18					2
C.4.02	Unload debris from containers	m^3	132.8	$ 3.72	$ -	$ 1.07	$ 2.65					2
C.4.03	Load large above ground storage tank on skid	each	0.5	$ 854.40	$ -	$ 484.40	$ 370.00	3				1
C.4.04	Load generator on skid	each	8	$ 46.28	$ -	$ 23.16	$ 23.13	2				1
C.4.05	Haul waste to Quarry #2 in 20 ft container (33.2 m^3/container), round trip	m^3		$ -	$ -	$ -						
C.4.06	Haul waste to Doris Camp (8.35 km), round trip	m^3	106	$ 2.95	$ -	$ -	$ -					
C.4.07	Haul waste to Roberts Bay Jetty (13.5 km), round trip	m^3	65	$ 1.82	$ -	$ -	$ -					
C.4.08	Load, haul, dump place: 2 trucks with <1.0km haul distance	m^3	75	$ 12.04	$ -	$ 3.66	$ 8.39				2	2
Earth works												
C.5.01	Drill and blast	m^3	100	$ 27.90	$ 21.38	$ 3.01	$ 3.52	1.5		0.5		2
C.5.02	Install HDPE Liner	m^2	175	$ 31.70	$ 28.93	$ 1.71	$ 1.06	4				1
C.5.03	Crusher: crush materials	m^3	125	$ 10.60	$ -	$ 2.17	$ 8.44	1				3
C.5.04	Regrade surface - rough grading, D7	m^2	100	$ 2.38	$ -	$ 0.71	$ 1.67					1
C.5.05	Regrade surface - with excavator	m^2	50	$ 5.13	$ -	$ 1.43	$ 3.70					1
C.5.06	Backfill depressions	m^3	20	$ 7.68	$ -	$ 3.57	$ 4.12					1
C.5.07	Install soil stabilization measures (straw/coconut matting)	m^2	269	$ 3.48	$ 1.79	$ 1.01	$ 0.69	3.5				1
C.5.08	Trackpack using loaded rock truck	m^2	100	$ 2.05	$ -	$ 0.66	$ 1.39				1	
C.5.09	Delineation of low-lying areas	day	0.125	$ 3,815.68	$ 100.00	$ 1,615.68	$ 2,100.00	1		1		
C.5.10	Install silt fencing	m	30	$ 5.12	$ 1.32	$ 3.80	$ -	2				
C.5.11	Backfill drill holes with bentonite chips	lm	100.00	$ 19.09	$ 17.95	$ 1.14	$ -	2				
Equipment relocation												
C.6.01	Dozer relocation	km	8	$ 29.73	$ -	$ 8.92	$ 20.81					1
C.6.02	Excavator relocation	km	8	$ 32.04	$ -	$ 8.92	$ 23.13					1
C.6.03	Loader relocation	km	15	$ 10.24	$ -	$ 4.75	$ 5.49					1

Table B10.

	Equipment										Hauling		= Fuel Rate [$/hr]
	$ 166.50	$ 86.80	$ 185.00	$ 82.30	$ 138.70	$ 2,100.00	$ 269.34	$ 35.60	$ 11.00	$ 787.40	$ 1.07	$ 24.83	= Equipment/Labor Hourly Rate [$/hr]
Cost Code	**Dozer - CAT D7**	**Dozer - CAT D4**	**Excavator - Cat 330**	**Loader - CAT 966**	**Truck - CAT 735**	**Helicopter**	**Drill**	**Drum crusher**	**Power washer**	**Crusher**	**Skid - per km/m3**	**Skid per km**	**Note / Source**
Decontam													
C.1.01				1									Includes all chemicals on site / jm_Estimate
C.1.02													Drain fuel /source - SRK estimate
C.1.03									1				Drain fuel and tripple-rinse drum (collect water for treatment)
C.1.04									1				
Demolitior													
C.2.01													Disconnect all fuel lines and electrical parts
C.2.02				1				1					Load/operate/unload drum crusher / source - SRK estimate
C.2.03													source - SRK estimate
C.2.04			1										source - SRK estimate
C.2.05	1			1									Demolish empty wood structures (offices, shacks, etc.)/ source - RSMeans
C.2.06				1									
C.2.07			1										
Soil Reme													
C.3.01													20 hr field investigation
C.3.02													
C.3.03	1				0.45								
C.3.04			1										
Material R													
C.4.01	1			1									
C.4.02	1		1										15 min to unload 1 seacan
C.4.03			1										
C.4.04			1										
C.4.05											18.0		Details - See Worksheet 5
C.4.06												18.0	Details - See Worksheet 5
C.4.07												25.8	Details - See Worksheet 5
C.4.08	1		1		2								
Earth wor													
C.5.01				1			1						source - RSMeans
C.5.02			1										
C.5.03			1	1						1			
C.5.04	1												source - RSMeans
C.5.05			1										
C.5.06				1									source - RSMeans
C.5.07			1										source - RSMeans
C.5.08					1								source - SRKjm estimate
C.5.09						0.125							1 day to stake low-lying areas in the field, material allowance included for stakes
C.5.10													
C.5.11													
Equipmen													
C.6.01	1												
C.6.02			1										
C.6.03				1									

Table B11. Task Unit Rate Calculations for Windy Camp

				Unit Rates				Labour							Equipment													
								$ 56.96	$ 85.26	$ 85.26	$ 85.26	$ 145.00	$ 65.81	$ 71.32	$ 166.50	$ 185.00	$ 82.30	$ 138.70	$ 71.78	$ 24.83	$ 2,100	$ 269.34	$ 35.60	$ 11.00	$ 5.26	$ 787.40		
Cost Code	Item	Unit	Productivity (Unit/hr)	Total Unit Cost	Material Unit Rate	Labour Unit Rate	Equipment Unit Rate	General Labour	Trades - Electrical	Trades - Mechanic	Trades - Plumbing	Engineer/ Technician	Light Equipment Operator	Heavy Equipment Operator	Dozer - CAT D7	Excavator - Cat 350	Loader - CAT IT28/930	Truck - CAT 730	Tractor Trailer	Flatbed truck (5 tonne)	Helicopter	Drill	Drum crusher	Power washer	Welding Equipment	Crusher	Note / Source
C. 1.00	Blank = No task to be performed		1	$ -	$ -	$ -	$ -																					
Hazardous waste																												
C.1.01	Collect hazardous chemical waste and place in suitable containers	m^3	0.17	$ 1,947.00	$ -	$ 1,453.20	$ 493.80	3						1			1										Includes all chemicals on site / jm_Estimate
Decomissioning																												
C.2.01	Decomission and remove all heating fuel tanks and place into lined facility	each	4.00	$ 66.89	$ -	$ 46.31	$ 20.58	2						1			1										Disconnect and remove all fuel drums and disconnect all Tidy Tanks from all structures
C.2.02	Decomission potable water supply	each	0.25	$ 1,166.24	$ -	$ 981.24	$ 185.00	1	1		1			0.25		0.25											Disconnect all electrical and plumbing (intake and distribution)
C.2.03	Decomission waste incinerator	each	0.17	$ 1,083.75	$ -	$ 960.30	$ 123.45	1		1				0.25			0.25										Disconnect and remove fuel storage
C.2.04	Decommission Main Camp Facility electricity	each	0.25	$ 568.88	$ -	$ 568.88	$ -	1	1																		De-energise main electrical board, disconnect auxiliary power (if exists)
C.2.05	Decommission Propane tanks (Kitchen)	each	1.00	$ 56.96	$ -	$ 56.96	$ -	1																			source - SRK estimate
Decontamination																												
C.3.01	Drain and wash heating fuel tanks (living quarters)	each	12.00	$ 10.41	$ -	$ 9.49	$ 0.92	2																1			Drain fuel and tripple-rinse drum (collect water for treatment)
C.3.02	Drain and power-wash heating fuel tanks (Tidy Tanks)	each	6.00	$ 20.82	$ -	$ 18.99	$ 1.83	2																1			Drain fuel from tanks and wash exterior with hot water (collect water for treatment)
C.3.03	Supply and install oil/water separator	each	0.50	$ 255.34	$ 27.50	$ 227.84	$ -	2																			Install valve on empty 55 Gal. drum
C.3.04	Operate oil/water separator	each	4.00	$ 45.47	$ -	$ 42.72	$ 2.75	3																1			Collect skimmed oil from seperator and place in suitable container - 15 minutes per 55 gal. drum
Demolition																												
C.4.01	Crush empty fuel drums	each	20.00	$ 15.16	$ -	$ 9.26	$ 5.90	2						1			1						1				
C.4.02	Cut Tank Farm geomembrane to manageable size	sq. m	80.00	$ 2.14	$ -	$ 2.14	$ -	3																			source - SRK estimate
C.4.03	Dismantle potable water supply	each	0.08	$ 3,995.40	$ -	$ 3,501.60	$ 493.80	3			1			0.5			0.5										source - SRK estimate
C.4.04	Dismantle incinerator	each	0.08	$ 1,430.14	$ -	$ 1,367.04	$ 63.10	2																	1		source - SRK estimate
C.4.05	Demolish office buildings/ shop structures/ living quarters (by mechanical equipment)	m^3	53.00	$ 10.61	$ -	$ 5.92	$ 4.69	3						2	1		1										Demolish empty wood structures (offices, shacks, etc.)/ source - ECHOS
C.4.06	Collect reusable items from offices/shops/main camp	m^3	2.00	$ 113.92	$ -	$ 113.92	$ -	4																			
C.4.07	Dismantle communication equipment	each	0.50	$ 313.10	$ -	$ 313.10	$ -	2	0.5																		
C.4.08	Cut off top of drill casings	each	3.00	$ 20.74	$ -	$ 18.99	$ 1.75	1																	1		
C.4.09	Demolish office buildings/ shop structures/ living quarters (by manual labor)	m^2	2.63	$ 129.44	$ -	$ 104.06	$ 25.38	3		1				0.25		0.25	0.25										
C.4.10	Demolish office buildings/ shop structures/ living quarters (mechanised)	m^3	52.00	$ 8.70	$ -	$ 3.56	$ 5.14	2						1		1	1										
Material Relocations																												
C.5.01	Clean up debris from site	m^2	2529.00	$ 0.13	$ -	$ 0.10	$ 0.03	3						1			1										source - SRK estimate
C.5.02	Load demolition debris/solid waste in containers	m^3	48.00	$ 8.16	$ -	$ 2.97	$ 5.18							2	1		1										source - SRK calculated from first principles
C.5.03	Load solid waste in 55 Gal drums	m^3	0.25	$ 341.76	$ -	$ 341.76	$ -	1.5																			source - RSMeans
C.5.04	Load drums/tanks in container	each	15.00	$ 14.04	$ -	$ 8.55	$ 5.49	1						1			1										
C.5.05	Load large above ground storage tank on skid	each	0.50	$ 854.40	$ -	$ 484.40	$ 370.00	3						1		1											
C.5.06	Unload debris from containers	m^3	132.80	$ 3.72	$ -	$ 1.07	$ 2.65							2	1	1											
C.5.07	Manually unload seacan container	m^3	4.00	$ 28.48	$ -	$ 28.48	$ -	2																			
C.5.08	Haul waste to Doris Camp in 20 ft container (33.2 m3/container)	m^3	88.76	$ 2.62	$ -	$ 0.74	$ 1.88						1		1												Productivity calculation shown on 'Relocation Unit Cost' Worksheet
C.5.09	Haul waste to Roberts Bay jetty in 20 ft container (33.2 m3/container)	m^3	58.48	$ 3.97	$ -	$ 1.13	$ 2.85						1		1												Productivity calculation shown on 'Relocation Unit Cost' Worksheet
C.5.10	Load, haul, dump, place: 2 trucks with <1.0km haul distance	m^3	75.00	$ 12.04	$ -	$ 3.66	$ 8.39						2	2	1	1		2									
C.5.11	Consolidate core boxes	hr	1.00	$ 210.58	$ -	$ 128.28	$ 82.30	1						1			1										Ship large propane tanks and envirotanks 1/skid / source - calculated from first principles
C.5.12	Load Seacan containers onto barges for off-site shipping	each																									
C.5.13	Decomission reusable structures	each	1.00	$ 99.59	$ -	$ 99.59	$ -	1	0.5																		
C.5.14	Load reusable structures on skids for hauling	each	0.50	$ 740.48	$ -	$ 370.48	$ 370.00	2						1		1											source - SRK estimate
C.5.15	Unload reusable structures from skids	each	0.50	$ 740.48	$ -	$ 370.48	$ 370.00	2						1		1											
C.5.16	Prepare structures for mobilization	m^2	6.75	$ 20.58	$ -	$ 20.58	$ -	2	0.1				0.25														source - SRK estimate
C.5.17	Load/unload containers onto lowbed																										
C.5.18	Load soils into megabags	m^3	4.00	$ 65.75	$ -	$ 44.93	$ 20.81	2					1			0.45											
C.5.19	Unload soils from megabags	m^3	10.00	$ 31.33	$ -	$ 12.83	$ 18.50	1						1		1											
Earth works																												
C.6.01	Drill and blast	m^3	100.00	$ 27.90	$ 21.38	$ 3.01	$ 3.52	1.5				0.5		2			1					1					source - ECHOS
C.6.02	Regrade surface - rough grading, D7	m^2	100.00	$ 2.38	$ -	$ 0.71	$ 1.67							1	1												source - ECHOS
C.6.03	Backfill depressions	m^3	20.00	$ 7.68	$ -	$ 3.57	$ 4.12							1			1										source - ECHOS
C.6.04	Install soil stabilization measures (straw/coconut matting)	m2	269.00	$ 3.48	$ 1.79	$ 1.01	$ 0.69	3.5						1		1											source - ECHOS
C.6.05	Crusher: crush quarry rock	m^3	125.00	$ 11.94	$ -	$ 2.17	$ 9.77	1						3	1	1	1									1	source - SRKjm estimate
C.6.06	Expose and remove tank farm liner	m^2	90.00	$ 3.48	$ -	$ 1.43	$ 2.06	1						1		1											source - SRK estimate
C.6.07	Trackpack using loaded rock truck	m^2	100.00	$ 2.05	$ -	$ 0.66	$ 1.39						1					1									
C.6.08	Delineation of low-lying areas	day	0.13	$ 3,815.68	$ 100.00	$ 1,615.68	$ 2,100.00	1				1									0.125						1 day to stake low-lying areas in the field, material allowance included for stakes
C.6.09	Install HDPE Liner	m^2	175.00	$ 31.70	$ 28.93	$ 1.71	$ 1.06	4						1		1											
C.6.10	Revegetate (seeding&fertilising by hand; high application rate)	m^2	320.00	$ 0.77	$ 0.24	$ 0.53	$ -	3																			
C.6.11	Backfill drill holes with bentonite chips	lm	100.00	$ 19.09	$ 17.95	$ 1.14	$ -	2																			
Equipment relocation																												
C.7.01	Dozer relocation	km	9.9	$ 24.02	$ -	$ 7.20	$ 16.82							1	1												
C.7.02	Excavator relocation	km	9.9	$ 25.89	$ -	$ 7.20	$ 18.69							1		1											
C.7.03	Loader relocation	km	15	$ 10.24	$ -	$ 4.75	$ 5.49							1			1										

Table B12. Relocation Unit Cost Calculations for Patch Lake

Unit rate of hauling bulk materials from Patch Lake on winter road			
By Skid - SnowCAT (equivalent to D7)			Note: Cost of winter road not included
Equipment Cost	$ 166.50	per hr	Includes fuel
Labour Cost	$ 56.96	per hr	
Average speed	$ 9.00	km/hr	Skids assumed as being available on site
Hauling capacity	$ 1.00	skids	One container per skid
Cargo capacity	$ 33.20	m^3	Standard 20 ft container
Space utilization ratio	$ 0.70		
Load	$ 23.24	m^3	CargoCapacity x # of Containers x Space Utilization Ratio
Cost	**$ 1.07**	**per km*m^3**	**Cost Per Hour ÷ Avg Speed ÷ Load**
Cost per skid	**$ 24.83**	**per km**	**Cos tPer Hour ÷ Avg Speed ÷ # of Skids**
Unit rate of hauling bulk materials from Patch Lake on All Weather Road			
By Truck - CAT 735			
Load	$ 15.00	m^3	
Cost	$ 138.70	per hr	
Average speed	$ 50.00	km/hr	
Cost	$ 0.18	per km*m^3	
Fleet productivity (100 %)	$ 134.73	m^3 per hr	
Hauling distance	$ 8.35	km	Patch Lake to Doris Quarry 2
# of trucks	$ 3.00		
Cycle time	$ 20.04	minutes	Patch to Doris and back
Real productivity	107.78	m^3 per hr	Demolition debris
Unit rate of hauling demolition waste in containers from Patch to Doris Camp on All Weather Road			
Tractor trailer with Lowboy, 2x20 ft seacans per trip			
Cost	$ 71.78	per hr	
Average speed	38	km/hr	
Hauling distance	8.35	km	
Hauling capacity	2	containers	
Cargo capacity	33.2	m^3	
Space utilization ratio	0.7		
Load	46.48	m^3	
Cost	$ 2.947	per m^3	
Productivity	105.76	m^3 per hr	
Return trip time	26.37	minutes	
Unit rate of hauling demolition waste in containers from Patch to Roberts Bay on All Weather Road			
Tractor trailer with Lowboy, 2x20 ft seacans per trip			
Cost	$ 71.78	per hr	
Average speed	38	km/hr	
Hauling distance	13.5	km	
Hauling capacity	2	containers	
Cargo capacity	33.2	m^3	
Space utilization ratio	0.7		
Load	46.48	m^3	
Cost	$ 1.823	per m^3	
Productivity	65.42	m^3 per hr	
Return trip time	42.63	minutes	

Table B13. Relocation Unit Cost Calculations for Windy Camp

Unit rate of hauling bulk materials from Windy on All Weather Road			
By Truck - CAT 735			
Load	15	m^3	
Cost	$ 167.60	per hr	
Average speed	50	km/hr	
Cost	$ 0.22	per km*m^3	
Fleet productivity (100 %)	125.00	m^3 per hr	
Hauling distance	9.00	km	Patch Lake to Doris Quarry 2
# of trucks	3.00		
Cycle time	21.60	minutes	Patch to Doris and back
Real productivity	100.00	m^3 per hr	Demolition debris
Unit rate of hauling demolition waste in containers from Windy to Doris Camp on All Weather Road			
Tractor trailer with Lowboy, 2x20 ft seacans per trip			
Cost	$ 71.78	per hr	
Average speed	38	km/hr	
Hauling distance	9.95	km	
Hauling capacity	2	containers	
Cargo capacity	33.2	m^3	
Space utilization ratio	0.7		
Load	46.48	m^3	
Cost	$ 2.473	per m^3	
Productivity	88.76	m^3 per hr	
Return trip time	31.42	minutes	
Unit rate of hauling demolition waste in containers from Windy to Roberts Bay on All Weather Road			
Tractor trailer with Lowboy, 2x20 ft seacans per trip			
Cost	$ 71.78	per hr	
Average speed	38	km/hr	
Hauling distance	15.1	km	
Hauling capacity	2	containers	
Cargo capacity	33.2	m^3	
Space utilization ratio	0.7		
Load	46.48	m^3	
Cost	$ 1.629	per m^3	
Productivity	58.48	m^3 per hr	
Return trip time	47.68	minutes	
By Skid - SnowCAT (equivalent to D7)			(Only if Winter Road option were still in play)
Cost	$ 159.90	per hr	
Average speed	9	km/hr	Sleds assumed as being available on site
Hauling capacity	2	skids	One container per skid
Cargo capacity	33.2	m^3	Standard 20 ft container
Space utilization ratio	0.7		
Load	46.48	m^3	CargoCapacity x #ofContainers x SpaceUtilizationRatio
Cost	$ 0.38	per km*m^3	CostPerHour÷AvgSpeed÷Load
Cost per skid	$ 8.88	per km	CostPerHour÷AvgSpeed÷#ofSkids
Unit rate for shipping from Roberts Bay to Hay River (in 20 ft containers)			
Demolition debris			
Volume of container	33.20	m^3	20 ft standard shipping containers
Volume of demolition waste	-	m^3	bulk volume of demolition debris
Container space utilization	0.75	%	SRKjm estimate
Cost of container per year	$ 1,300.00	each	personal communication with NTCL
cost of inbound shipping	$ 4,217.60	each	cost of inbound shipping from Tuktoyaktuk , per empty container / source - personal communication with NTCL
Cost of outbound shipping (demolition waste)	$ 551.61	m^3	$ 0.3791 per pound minus 10% / source - personal communication with NTCL
Bulk density of demolition debris	0.733333333	t/m^3	bulk density of demolition waste (SRKjm estimate)
Unit rate for demolition waste	$ 676.25	m^3	unit rate of shipping demolition waste from Roberts Bay to Hay River
Hydrocarbon contaminated soils			
Volume of soils	1,613.95		
Container space utilization	0.5	%	SRKjm estimate
Bulk density of soils	1.7	t/m^3	SRKjm estimate
Cost of outbound shipping (soils)	$ 1,278.73	m^3	$ 0.3791 per pound minus 10%
Unit rate for contaminated soils	$ 1,361.83	m^3	unit rate of shipping contaminated soils (sealed in 55 gallon drums) from Roberts Bay to Hay River

Table B15. Waste Volumes for Windy Camp

Volume Summary

Area	Item (description)	# of units	Unit Loose volume (m^3)	Total Loose volume (m^3)	Destination: All Off Site	Destination: Off Site + Reuse
Tanks	Tidy tank	8	1.35	10.78	Off Site	Doris
	Oil barrels for heating (Crushed)	6	0.04	0.25	Hay River	Hay River
	Aviation fuel barrels (205L) (Crushed)	5	0.04	0.21	Hay River	Hay River
Hazardous Waste	Misc. chemical bottles	1	2.80	2.80	Hay River	Hay River
Tank Farm	LLDPE Liner	1	12.00	12.00	Hay River	Hay River
Reuseable Eq./Supplies	Propane tank - large	6	4.32	25.92	Off Site	Off Site
	Propane tanks - small	3	1.55	4.64	Off Site	Off Site
	Water treatment unit and holding tanks	4	8.30	33.19	Off Site	Doris
	Waste Incinerator	1	6.75	6.75	Off Site	Off Site
	Heating System components	1	1.00	1.00	Hay River	Doris
	Communication Equipment	1	1.00	1.00	Off Site	Off Site
	Total vol. reuseable equipment sent to Doris/offsite				82.3	83.3
Camp Demolition	Tidy tank stands	8	1.50	12.00	Off Site	Doris
	Building - Fire suppression tank	1	23.99	23.99	Hay River	Hay River
	Tent (wood only)	32	9.4	299.52	Hay River	Hay River
	Tent (fabric)	32	2.70	86.40	Hay River	Hay River
	Cabin	4	26.15	104.60	Hay River	Doris
	Mess Hall1 (271 m2)	1	221.75	221.75	Hay River	Hay River
	Mess Hall2	1	255.87	255.87	Hay River	Hay River
	Driller's Dry (wood)	1	28.34	28.34	Hay River	Hay River
	Driller's Dry (fabric)	1	2.66	2.66	Hay River	Hay River
	Add-on to Driller's Dry	1	17.71	17.71	Hay River	Hay River
	Admin Building	1	108.02	108.02	Hay River	Doris
	Geology Office (not on dwg)	1	288.46	288.46	Hay River	Doris
	Core Logging Shack	1	135.34	135.34	Hay River	Doris
	Mechanical Shop	1	14.70	14.70	Hay River	Doris
	Helicopter shack-weatherhaven1	1	15.87	15.87	Hay River	Hay River
	Helicopter shack	1	140.34	140.34	Hay River	Hay River
	Helicopter shack-weatherhaven2	1	8.09	8.09	Hay River	Hay River
	Helicopter shack-weatherhaven3	1	12.69	12.69	Hay River	Hay River
	Helicopter pads (average dimension)	3	46.69	140.06	Hay River	Hay River
	Misc building near helipad2and3	1	51.54	51.54	Hay River	Hay River
	Trailers	3	26.54	79.62	Hay River	Doris
	Shipping containers	3	36.25	108.75	Hay River	Doris
	Misc small buildings near mech shop	1	33.52	33.52	Hay River	Hay River
	Water intake building	1	16.91	16.91	Hay River	Hay River
	Pallets	16	0.73	11.66	Hay River	Doris
	Other Misc. Debris allowance	1	30.00	30.00	Hay River	Hay River
	Total demolition volume			m^3	**2,236.4**	**1,385.3**
	Total volume to landfill:			m^3	**2,252.7**	**1,400.5**
	Total volume shipped off-site			m^3	**94.3**	**38.3**
	Total volume shipped to Hay River			m^3	**2,347.0**	**1,438.8**
	Total volume shipped to Doris Camp			m^3	-	**908.1**

Demolition Bulking Factors	
Tents - Empty	1.1
Wood Structures - Empty	1.3
Wood Structures - w/ Interior Wall Allowance	1.5
Steel Structures - Empty	1.3
Steel Structures - w/ Interior Wall Allowance	1.5
Mechanical Equipment	1.1
Liners	3
Pipelines	3

# of reusable structures:	26
Remobilized structures floor surface area:	891.558

Quantity Calculations

Area	Structure	Length (m)	Width/dia. (m)	Footprint Area (m2)	Avg. Height (m)	Wall thickness (m)	Floor thickness (m)	Roof Length (m)	Roof Thickness (m)	Wall Volume (m^3)	Floor Volume (m^3)	Roof Volume (m^3)	Total Volume (m^3)	Loose Volume (m^3)	Comments
Tanks	Crushed 45 gal drums		0.6		0.15								0.042		
Tank Farm	Liner			800	0.005								4.0	12.0	
Reuseable Equipment	Propane tank large	5.5	1		1								4.3		
	Propane tank small	3.5	0.8		0.75								1.5		
	Incinerator	1.5	1.5	2.25	3								6.8	6.8	
Camp Demolition	Tindy Tank Stands	1	1	1	1.5								1.5	1.5	No bulking factor applied.
	Fire suppression tank building	6	4	24	2.4	0.15	0.3	4.5	0.15	7.2	7.2	4.05	18.5	24.0	
	Tent (wood only)	6	4	24			0.3				7.2		7.2	9.36	
	Tent (fabric)	6	7.5	45		0.01				2.7			2.7	2.7	length of arch = 7.5 m; no bulking factor
	Cabin	6	4.5	27	2.4	0.15	0.3	5.0	0.15	7.6	8.1	4.5	20.1	26.1	roof angle = 15 deg.
	Mess Hall 1	23	11.5	264.5	2.4	0.15	0.3	12.7	0.15	24.8	79.35	43.6	147.8	221.7	Includes interior wall allowance
	Mess Hall 2	25	12	300	2.8	0.15	0.3	13.2	0.15	31.1	90	49.5	170.6	255.9	Includes interior wall allowance
	Driller's Dry (wood)	16.2	4.5	72.7			0.3				21.8		21.8	28.3	length = 14 ribs, 0.85m apart; width = 4m
	Driller's Dry (fabric)	16.2			15	0.01				2.4			2.4	2.7	height 4 m, arc length 15 m
	Add-on to Driller's Dry	5	4	20.0	2.4	0.1	0.3	4.4	0.15	4.3	6	3.3	13.6	17.7	5x4 m footprint, 2.4 m high
	Admin Building	18	7	126.0	4.9	0.1	0.3	7.7	0.15	24.5	37.8	20.8	83.1	108.0	18x7 m footprint, avg height = 2.4m
	Geology office	27.7	6.7	185.6	4.9	0.15	0.3	7.4	0.15	50.3	111.4	30.6	192.3	288.5	2 story bldg.
	Core Logging Shack	27.7	5.1	142.4	2.4	0.15	0.3	5.7	0.15	24.0	42.7	23.5	90.2	135.3	
	Mechanical shop	20	7.2	144.0	5.5		0	11.3	0.05			11.3	11.3	14.7	
	Helicopter shack														
	Weatherhaven 1	7.3	5.3	38.7	2.5	0.01	0.3			2.8	11.6		14.4	15.9	
	Shack	8.2	8.9	72.5	5.5	0.15	0.3			28.0	43.5	22.0	93.6	140.3	
	Weatherhaven 2	5.9	3.5	20.5	2.5	0.01	0.3			1.2	6.2		7.4	8.1	
	Weatherhaven 3	6.9	4.5	31.3	2.5	0.01	0.3			2.2	9.4		11.5	12.7	
	Helipads														
	Helipad1	6.1	4.8	29.5	0.5								14.8	22.1	
	Helipad2	11	7.4	80.9	0.5								40.4	60.6	
	Helipad3	11.8	6.5	76.4	0.5								38.2	57.3	
	Water Treatment Unit and holding tanks	6.3	3.7	23.0	2.4	0.15	0.3	4.0	0.15	7.3	13.8	3.8	24.9	37.3	
	Misc building 1	6.9	4.5	31.3	3.0	0.15	0.3	5.0	0.15	10.5	18.8	5.2	34.4	51.5	
	Trailers	6	2.5	15.0	2.4	0.15	0.3	2.8	0.15	6.2	9.0	2.5	17.7	26.5	
	Water intake building	3	3	9.0	2.4	0.15	0.3	3.3	0.15	4.4	5.4	1.5	11.3	16.9	
	Pallets	1.8	1.8		0.15								0.5	0.7	
	Total demolition volume			1605.4	m^3							Total Volume (m^3)		1605.4	
	Total volume shipped off-site			1605.4	m^3										
	Total volume shipped to Hay River			1605.4	m^3										
	Total volume shipped to Doris Camp			0.0	m^3										

Table B15. Waste Volumes for Windy Camp
Manual Demolition Calculations

Area	Structure	Length (m)	Width/dia. (m)	Avg. Height (m)	Roof Length (m)	Wall Area (m^2)	Floor Area (m^2)	Roof Area (m^2)	Wall Demolition (Hrs)	Floor Demolition (Hrs)	Roof Demolition (Hrs)	Total Demolition time (Hrs)
Work Productivity Factors for manual Demolition (m2/hr)	**Studs**					**12.1**	**23.2**	**23.2**				
	Plywood					**13.9**	**12.4**	**17.4**				
	Insulation					**30.2**		**30.2**				
	Tent Structure						92					
	Fire suppression tank building	6	4	2.4	4.5	48	24	27	9.0	3.0	3.609556976	15.6
	Tent (wood only)	6	4			0	24	0	0.0	3.0	0	3.0
Camp Demolition	Cabin	6	4.5	2.4	5.0	50.4	27	29.7	9.5	3.3	3.970512674	16.8
	Mess Hall 1	23	11.5	2.4	12.7	165.6	264.5	290.95	31.1	32.7	38.8963186	102.7
	Mess Hall 2	25	12	2.8	13.2	207.2	300	330	38.9	37.1	44.11680749	120.1
	Driller's Dry (wood)	16.2	4.5			0	72.675	0	0.0	9.0	0	9.0
	Add-on to Driller's Dry	5	4	2.4	4.4	43.2	20	22	8.1	2.5	2.941120499	13.5
	Admin Building	18	7	4.9	7.7	245	126	138.6	46.0	15.6	18.52905915	80.1
	Geology office	27.7	6.7	4.9	7.4	335.52384	185.59	204.149	63.0	23.0	27.29212767	113.2
	Core Logging Shack	27.7	5.1	2.4	5.7	160.154112	142.378	156.6158	30.1	17.6	20.93754272	68.6
	Helicopter shack	8.2	8.9	5.5		186.976512	72.4535	0	35.1	9.0	0	44.1
	Helipad1	6.1	4.8	0.5		10.94	29.524	0	2.1	3.7	0	5.7
	Helipad2	11	7.4	0.5		18.35	80.85	0	3.4	10.0	0	13.4
	Helipad3	11.8	6.5	0.5		18.25	76.375	0	3.4	9.5	0	12.9
	Water Treatment Unit and holding tanks	6.3	3.7	2.4	4.0	48.475392	23.0368	25.34048	9.1	2.9	3.387700236	15.3
	Misc building 1	6.9	4.5	3.0	5.0	69.67728	31.257	34.3827	13.1	3.9	4.596530172	21.5
	Trailers	6	2.5	2.4	2.8	41.4528	15	16.5	7.8	1.9	2.205840375	11.8
	Water intake building	3	3	2.4	3.3	29.2608	9	9.9	5.5	1.1	1.323504225	7.9
	Tent (fabric)	6	7.5			0	45	0	0.0	5.6	0	5.6
	Driller's Dry (fabric)	16.2	15			0	242.25	0	0.0	30.0	0	30.0
	Weatherhaven 1	7.3	5.3			0	38.69	0	0.0	4.8	0	4.8
	Weatherhaven 2	5.9	3.5			0	20.51	0	0.0	2.5	0	2.5
	Weatherhaven 3	6.9	4.5			0	31.257	0	0.0	3.9	0	3.9
	Mechanical shop	20	7.2	5.5	11.3	0	144	0	0.0	17.8	0	17.8
	Total Footprint	1901.35	m^2									**722.1**
	Time to demolish	722.1	Hrs									**man-hrs**
	Overall productivity	2.6	m^2/hr									

72.2142086	**10.3163155**
man-days	**weeks**

Manual and Mechanical Demolition Calculations

Area	Structure	Length (m)	Width/dia. (m)	Avg. Height (m)	Roof Length (m)	Wall Area (m^2)	Floor Area (m^2)	Roof Area (m^2)	Building Volume	Wall Demolition (Hrs)	Floor Demolition (Hrs)	Roof Demolition (Hrs)	Total Demolition time (Hrs)
Work Productivity Factors for Manual Demolition (m^2/hr)	**Studs**					**12.1**	**23.2**	**23.2**					
	Plywood					**13.9**	**12.4**	**17.4**					
	Insulation					**30.2**		**30.2**					
	Tent Structure						**92**						
Mechanical Demolition (m^2/hr)							**52**						
	Fire suppression tank building	6	4	2.4	4.5				57.6	0.0	0.0	0	1.1
	Tent (wood only)	6	4	0.3					7.2	0.0	0.0	0	0.1
Camp Demolition	Cabin	6	4.5	2.4	5.0	50.4	27	29.7		9.5	3.3	3.970512674	16.8
	Mess Hall 1	23	11.5	2.4	12.7				634.8	0.0	0.0	0	12.2
	Mess Hall 2	25	12	2.8	13.2				840	0.0	0.0	0	16.2
	Driller's Dry (wood)	16.2	4.5	0.3					21.8025	0.0	0.0	0	0.4
	Add-on to Driller's Dry	5	4	2.4	4.4				48	0.0	0.0	0	0.9
	Admin Building	18	7	4.9	7.7				617.4	0.0	0.0	0	11.9
	Geology office	27.7	6.7	4.9	7.4				905.085312	0.0	0.0	0	17.4
	Core Logging Shack	27.7	5.1	2.4	5.7				347.174515	0.0	0.0	0	6.7
	Helicopter shack	8.2	8.9	5.5		186.976512	72.4535	0		35.1	9.0	0	44.1
	Helipad1	6.1	4.8	0.5		10.94	29.524	0		2.1	3.7	0	5.7
	Helipad2	11	7.4	0.5		18.35	80.85	0		3.4	10.0	0	13.4
	Helipad3	11.8	6.5	0.5		18.25	76.375	0		3.4	9.5	0	12.9
	Water Treatment Unit and holding tanks	6.3	3.7	2.4	4.0	48.475392	23.0368	25.34048		9.1	2.9	3.387700236	15.3
	Misc building 1	6.9	4.5	3.0	5.0	69.67728	31.257	34.3827		13.1	3.9	4.596530172	21.5
	Trailers	6	2.5	2.4	2.8	41.4528	15	16.5		7.8	1.9	2.205840375	11.8
	Water intake building	3	3	2.4	3.3	29.2608	9	9.9		5.5	1.1	1.323504225	7.9
	Tent (fabric)	6	7.5			0	45	0		0.0	5.6	0	5.6
	Driller's Dry (fabric)	16.2	15			0	242.25	0		0.0	30.0	0	30.0
	Weatherhaven 1	7.3	5.3			0	38.69	0		0.0	4.8	0	4.8
	Weatherhaven 2	5.9	3.5			0	20.51	0		0.0	2.5	0	2.5
	Weatherhaven 3	6.9	4.5			0	31.257	0		0.0	3.9	0	3.9
	Mechanical shop	20	7.2	5.5	11.3		144			0.0	17.8		17.8
	Total Footprint	886.203	m^2					**Total**	3479.06233				
	Time to demolish	214.1	Hrs		214.1	21.40793799	3.05827686						
	Overall productivity	4.1	m^2/hr		man-hrs	man-days	weeks						
	Total Volume	3479.06	m^3										
	Time to demolish	66.9	Hrs		66.9	6.690504475	0.95578635						
	Overall productivity	52.0	m^3/hr		man-hrs	man-days	weeks						

Table B16. Earthwork Quantities for Patch Lake

Location	Length (m)	Width (m)	Area (m^2)	Source
Tank Farm			2000	
Old Tank Farm			2500	
Main Tank Farm spoil pile			2545	ACAD-PL Closure Plan Fig. 4
Soil pile west of current tank farm			1085	
Road from Shop to Patch Lake			1592	Estimated disturbance from Autocad site photo
Winter trail west of facilities	$ 2.00	935	1870	Estimated disturbance from Autocad site photo
Total Main site			6216	Estimated disturbance from Autocad site photo
Assumed Landfill area			100	Estimated based on demo volume from Patch lake

Table B17. Earthwork Quantities for Windy Camp

Reclamation Areas

Location	Itam	Total Area (m^2)	Area Regraded (m^2)	Area Requiring Fill (m^2)	Coco-matting Area (m^2)
Tank Farm	Tank Farm	1,400	1400	0	350
Main Camp	Summer debris collection area	40,000			
	Total camp area (shops+laydown+living)	24,955	1248	500	500
Winter road (to top of hill)	Area requiring fill	750		750	0
		67,105			

Bulking Factors	
Soil/Rock Pad	1.2
Cover shrinkage factor	1.1

					Area (m^2)				In-situ Volume (m^3)		Loose Volume (m^3)		
Work Area	Item	Qnty	Length (m)	Width (m)	Base Case (all off-site)	Off-site +Reuse	Height/ Thickness (m)	Side Slope (x:1)	Base Case	Off-site +Reuse	Base Case	Off-site +Reuse	Source / Comments
Tank Farm	Excavate bedding				800	800	0.2		**160**	**160**			ACAD/aerial site photo
	Remove Liner				**800**	800							ACAD/aerial site photo
	Slope buttress		50	5	250	250	2		500	500	**600**	**600**	ACAD/aerial site photo
Landfill	Bedding (crushed rock) (0.3m on each side of liner)				751	467	0.6		451	280	**518**	**322**	Area based on waste placed 3m high
	Liner				826	514							Includes 10% wastage
	Run-of-quarry cover (0.5m)				**751**	**467**	0.5		375	233	**432**	**268**	
Camp	Fill Low-lying areas				500	500	0.3		**150**	**150**	**180**	**180**	ACAD/aerial site photo
Winter road to Patch	Fill Low-lying areas				750	750	0.3		**225**	**225**	**270**	**270**	ACAD/aerial site photo

Table B18. Volumes of HC Impacted Soils for Patch Lake

Area Designation (from EBA 2012)	Location	Area (m^2)	Volume (m^3)	Source	Remediation method
P1A	North laydown area	38	76	EBA 2012 (Phase III Site Assessment)	Removal
P1B	South-west of former drill shop	13	7	EBA 2012 (Phase III Site Assessment)	In-Situ Bioremediation
P1C	Former drill shop footprint	120	18	EBA 2012 (Phase III Site Assessment)	Removal
P3	Incinerator	29	87	EBA 2012 (Phase III Site Assessment)	Removal
P5	Power generator	16	32	EBA 2012 (Phase III Site Assessment)	In-Situ Bioremediation
Other	Various	75	22	EBA 2012 (Phase III Site Assessment)	Removal
Total		**291**	**242**		

Total Removal Volume (Loose) to Hay River	**264**	
Total Bioremediation Volume	**39**	
Total Removal Volume (Loose) to Doris OVB Dump	**0**	
Backfill volume required	**349**	Assumed 1 m thick cover; loose volume based on 1.2 shrinkage factor

Bulking Factors	
Soil/Rock Pad	1.3
Cover shrinkage factor	1.2

Table B19. Volumes of HC Impacted Soils for Windy Camp

IN-SITU Volume Estimate for Hydrocarbon Contaminated Soils (EBA (2012) and assumed)				
Area Designation (from EBA (2012))	**Surface area (m^2)**	**Volume Estimate**		**Remediation Method**
		Assumed Thicknes of contaminated soil (m)	**Equivalent IN-SITU Volume of contaminated soil (m^3)**	
W1	85	0.5	42.5	Removal
W2	124	2	248	Removal
W3	23	1	23	Removal
W4	44	2.5	110	Removal
W5B	1	0.5	0.5	in situ Bioremediation
W5D	2	2	4	in situ Bioremediation
W5E	9	2	18	Removal
W5G	4	2	8	in situ Bioremediation
W5H	20	2	40	in situ Bioremediation
W6	200	0.25	50	Removal
W8	61	1	61	in situ Bioremediation
Subtotal for Areas Identified by EBA (2012)	**573**		**605**	
Area under old fuel tanks (area is 38m x 21m. Assumed to be impacted by hydrocarbons)	800	1	800	Removal
Total	**1373**		**1405**	
		Equivalent LOOSE (Excavated) Volume	**639**	
		Equivalent RECOMPACTED Volume	**590**	

Bulking factor	
Soil/Rock Pad	1.3
Cover shrinkage factor	1.2

			Notes
Total Removal Volume (Loose) to Hay River	1,613.95	m^3	
Total Bioremediation Volume	113.5	m^3	
Total Removal Volume (Loose) to Doris OVB Dump	65.0	m^3	
Backfill volume required	1,302.0	m^3	Assumed 1 m thick cover; loose volume based on 1.2 shrinkage factor

Appendix C: Detailed Comparison of SRK Model and RECLAIM

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Memo

To:	Chris Hanks	**Date:**	December 31, 2012
Company:	Hope Bay Mining Limited	**From:**	Iozsef Miskolczi Tom Sharp
Copy to:		**Project #:**	1CH008.069
Subject:	Hope Bay Project - Comparison Between RECLAIM and SRK Cost Estimating Models NWB Licenses 2AM-DOH0713, 2BB-BOS1217, and 2BE-HOP1222		

1 Introduction

The Hope Bay Project is an advanced exploration site, including the partially constructed Doris North mine, which is owned by Hope Bay Mining Limited (HBML) in Nunavut. In 2012, the site was placed into care and maintenance. The water licences (2AM-DOH0713 (NWB 2007), 2BB-BOS1217 (NWB 2012a), and 2BE-HOP1222 (NWB 2012b))and project certificate have conditions requiring HBML to prepare closure plans that include estimated closure costs. HBML retained SRK Consulting (Canada) Inc. to update the liability estimates for the property.

SRK has updated the cost estimates associated with the closure plans that were submitted to the Nunavut Water Board (SRK 2012a, 2012b, 2012c). These cost estimates were prepared using a spreadsheet model developed by SRK for estimating closure costs at mines in northern Canada.

Aboriginal Affairs and Northern Development Canada (AANDC) requires closure cost estimates to be prepared using the RECLAIM 6.1 spreadsheet model.

The purpose of this memorandum is to present the cost estimation method used by SRK and to show that this method is similar to that used in the RECLAIM 6.1 model.

2 Closure Cost Estimate Models

2.1 RECLAIM 6.1 Model

The RECLAIM model spreadsheet was originally developed by SRK in 1992 and has subsequently been modified by Brodie Consulting. The model has pre-set worksheets that can be expanded to describe a specific project.

The model template includes a default list of unit costs for most tasks and materials used in closure work, along with typical labour and equipment rates. Low and high unit rates are suggested. The default unit rates in RECLAIM 6.1 were updated in May 2011, but known unit rates can be used instead of the default rates. Some indirect costs (project management and engineering) are estimated as a user-specified percentage of direct costs. Mobilization and demobilization costs are calculated based on unit rates.

Costs for the closure of various facilities are provided on a summary sheet. This sheet splits land and water into separate liability components as required by permits and licences (NIRB 2006, NWB 2007, and NWB 2012a, 2012b).

2.2 SRK Cost Estimation Model

SRK uses a cost spreadsheet model similar to RECLAIM to estimate closure costs. Closure plans submitted to the Nunavut Water Board (NWB) included cost estimates that were initially prepared using the SRK model (SRK 2012a, 2012b, 2012c). Recently, these estimates were updated to account for changes in quantities resulting from work performed over the 2012 season. Equipment mobilization costs were also revised.

Unit rates (e.g., equipment, labour, materials, supplies, etc.), task costs (e.g., individual construction or closure activities), and quantities are used in the closure cost estimation. These costs are presented on separate worksheets.

Most cost estimating occurs on a single cost estimate sheet that contains calculations for all detailed tasks by facility or closure component. If more complicated cost calculations are needed, a separate worksheet is used and linked to the cost estimate sheet.

3 Basis of SRK Cost Estimate

3.1 Quantities

Material quantities were estimated by standard engineering calculations based on topographic maps, as-built surveys, and aerial photographs. The details of the quantity estimates are provided in separate worksheets.

3.2 Unit Costs

3.2.1 Equipment Rates

Equipment rates are based on actual 2012 contractor rates obtained from a contractor familiar with this type of work. The rates included ownership, maintenance, overhead and profit, excluding maintenance labour. Maintenance labour, overhead and profit were included in line items elsewhere in the estimate.

3.2.2 Labour Rates

2012 Labour rates were also provided by the contractor and included overhead and profit. The labour rates did not include the costs of camp accommodation, but these were included elsewhere as an indirect cost.

3.2.3 Material Costs

Actual material costs were obtained from the following sources:

- Specific vendor quotes;
- Specific costs from third party consultants;
- Cost Mine 2011;
- Environmental Remediation Cost Data–Unit Price (Means 2005); and
- Recent experience on other projects.

Older material quotes were adjusted to 2012 dollars by indexing the cost by 5% on a yearly basis.

Material costs were factored up by 15% to include freight and shipping costs to site.

3.2.4 Task Unit Rates and Costs

The Task Unit Rate worksheet calculates the cost per unit based on the labour, equipment, and materials required to complete the task. The productivity for each task was obtained from the following sources:

- Equipment specifications obtained from manufacturer's data—in this case the Caterpillar Handbook;
- Environmental Remediation Cost Data–Unit Price (Means 2005); and
- Recent experience on other projects.

The calculations used to estimate unit rates for each task are summarized below:

- The equipment cost ($/unit) is calculated as the sum of equipment hourly rates divided by task productivity (unit/hr).
- The labour cost ($/unit) is calculated as the sum of labourer and operator rates for each piece of equipment, divided by unit productivity (unit/hr).
- The material cost ($/unit) is calculated as the sum of the material unit rate multiplied by the material multiplier factor (material quantity per task unit).
- The total unit rate is equal to the sum of equipment, labour, and material costs.

3.2.5 Relocation Unit Costs

Relocation unit costs are for the transport of materials to Roberts Bay over winter or all-weather roads. The equipment chosen for relocation matches the equipment used during the construction phase. A SnowCAT pulling 20 foot cargo containers (Seacans) on skids was assumed for transport on winter roads. The skids and Seacans were assumed to be available onsite for use. Transport costs were calculated on a kilometre basis using an average travel speed of 9 km/hr and a cargo capacity of 33.2 m^3 for each Seacan.

Regular haul trucks or Seacans on trailers were assumed for all-weather road transport. Trailers were assumed to be available onsite. The tractor head would be mobilized from offsite.

Details for these calculations are provided in the Relocation Unit Cost worksheet. Costs for loading and unloading the Seacans are included elsewhere in the estimate.

3.3 Indirect Costs

Indirect costs are defined as any costs that cannot be directly associated with individual tasks.

Many of indirect costs depend on project duration. Therefore, the project duration was estimated to be the summation of the individual task quantities (units) divided by the task productivity (units/hr). The work was assumed to occur over a 10 hour work day.

3.3.1 Mobilization and Demobilization

Mobilization and demobilization costs were included as a lump sum in the cost estimate. Details for these costs are provided in the MobDemob worksheet.

The following assumptions were made for estimating mobilization and demobilization costs:

- Mobilized equipment was assumed to originate in Edmonton, AB.;
- Equipment was hauled by truck to Hay River, NT, and shipped by barge to Roberts Bay, NU; and
- A lump sum cost was included for the trucking, while the barging costs were calculated based on the footprint area for each piece of equipment.

Standby costs were also included. Standby costs cover time equipment was idle waiting for winter road construction required for access to the Boston and Patch Lake areas. It also covers time waiting for demobilization by the sealift after closure was completed. Sealift is assumed to occur once a year in September.

3.3.2 Winter Road Construction

A 59 km winter road between Boston Camp and Doris Camp is required. Winter road costs were estimated at $14,500 per km based on communications with an ice road contractor in 2009. Costs were updated by 15% to reflect 2012 costs and include road construction and maintenance for a period of two months.

3.3.3 General and Administration Costs

Labour benefits (e.g., overtime, travel allowance, worker compensation, etc.) were included in the labour unit costs.

Travel allowance of $750 per person per flight or $10,000 per charter flight (for crews larger than 12) was included in the estimate.

Camp costs were included at a rate of $150 per person per day in addition to a camp management rate of $677 per day, for the duration of the project. Camp rental of $400,000 per year was also included, based on supplier quotes for a 20-man, self-sufficient camp.

3.3.4 Field Support

It was assumed that a supervisor would be onsite throughout the duration of the project. An allowance for equipment maintenance support was included. A mechanic was assumed to be onsite for 10% of the project.

Helicopter support for travel between Doris Camp and Boston Camp was assumed to be required for six hours per day (four trips) for the duration of the project at a rate of $2,000 per hour. A helicopter would also be used for three days during the Doris Mountain demolition work.

3.3.5 Other

Contractor profit was included in the equipment and labour unit costs. Freight costs of 15% of the material costs were included in the material unit rates.

3.3.6 Engineering and Consultants Services

The costs associated with site visits, sample analysis, and reporting were included in this category. An engineering design cost was included for the ore stockpile covers and the hydrocarbon soils remediation.

3.3.7 Contingency

A contingency of 20% of direct costs was added to the estimate. This contingency was not applied to the cost of shipping and disposing of the demolition waste offsite, because these costs were known.

3.3.8 Post-closure Monitoring

Post-closure monitoring and reporting costs were assumed to be $40,000 per year for five years.

4 Model Comparison

This section compares the basis of the RECLAIM 6.1 and SRK models. The summary sheets for both methods are similar. The SRK summary sheet is organized such that the closure components were grouped by facility type, similar to the RECLAIM model. Table 1 compares how closure costs are summarized in the RECLAIM 6.1 and SRK spreadsheets.

Table 1: Table of concordance for the RECLAIM 6.1 and SRK cost estimate models for Hope Bay Closure.

RECLAIM 6.1	SRK Cost Estimate
Direct Costs	
Open Pit	N/A
Underground Mine	Portals/Adits
Tailings	Tailings Storage Facility
Rock Pile	Dumps, Stockpiles, Landfills
Buildings and Equipment	Transportation Infrastructure Borrow Areas Non-Process Ponds and Reservoirs Drill Sites/Drill Hole Abandonment Drainage/Diversion Channels Facilities Demolition Hydrocarbon Soils Remediation Off-site Shipping for Disposal Off-site Disposal Fees
Chemicals and Soil Management	Hydrocarbon Impacted Soil Remediation
Post-closure Monitoring	Post-closure Monitoring
Indirect Costs	
Mobilization/Demobilization	Mobilization and Demobilization
Project Management	General and Administration Costs Field Support
Engineering	Engineering and Consultant Services
Contingency	Contingency
Market Price Factor Adjustment	Not used

5 Conclusion

In conclusion, the methods used by RECLAIM 6.1 and SRK models to estimate costs are similar. The primary difference in the methods lies in the customization of the SRK model towards the specific project as opposed to the more generic RECLAIM approach. This customization includes developing site specific unit rates which is significantly more defensible that selecting unit rates from a pre-defined picklist as offered by RECLAIM. Should a user choose to use his own unit rates as offered in RECLAIM, there is no backup required for those user selected rates. SRK's approach bridges this shortcoming by providing complete and transparent backup to the entire cost estimating process. Because of this, the SRK cost estimate is, at minimum, an adequate alternative to the RECLAIM 6.1 estimate.

6 References

NIRB 2006. Nunavut Impact Review Board. Doris North Gold Mine Project Certificate. Issued to Miramar Hope Bay Limited. September 15, 2006.

NWB 2007. Nunavut Water Board Water Licence No. 2AM-DOH0713 Type "A". Granted to Hope Bay Mining Ltd. September 19, 2007.

NWB 2012a. Nunavut Water Board Water Licence No. 2BB-BOS1217. Granted to Hope Bay Mining Ltd. August 2, 2012.

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Regards

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