Nanisivik Mine
Contaminated Soil Remediation
2012 Progress Report

Prepared for

CanZinco Ltd.

Prepared by

SRK Consulting (Canada) Inc.
1CB002.002
March 2013

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Executive Summary

This report provides a summary of contaminated soil remediation completed at the Nanisivik former bulk fuel storage facility in 2012.

Key reclamation work undertaken at the former bulk fuel storage facility in 2012 included:

- Completion of soil treatment cell construction,
- Excavation of petroleum hydrocarbon (PHC) contaminated soil,
- Processing of the PHC contaminated soil through a vibrating screen, and
- Biopile management and performance monitoring.

In 2012, a total of eight new treatment cells were constructed bringing the total number of treatment cells to sixteen: ten at the upper treatment area (UTA) and six at the lower treatment area (LTA).

Excavation of the contaminated soil continued in 2012. In August, the vibrating screening plant arrived. The light fuel (gasoline, Jet A1) contaminated soil being treated in-situ and the diesel contaminated soil stockpiled within the footprint of the former bulk fuel storage facility was processed through the screener. The process separated cobbles and boulders larger than 10 cm from the contaminated soil. The screening process reduces the volume of material pending placement in the treatment cells and promotes volatilization of PHC components.

Soil with low or no detectable concentrations of PHCs following screening was transferred to the footprint of the former secondary containment area. Based on confirmatory sample analytical results the soil stockpiled in the former secondary containment area is considered remediated and suitable for commercial and light industrial use. The cobbles and boulders separated out with the screening plant were confirmed to be free from PHC contamination.

Biopiles of contaminated soil were placed in the treatment cells and regularly aerated by an excavator. The biopiles were treated initially in July with an amendment of nutrients to support the bioremediation process. In August, additional nutrients were added to the biopiles in the UTA and LTA, and to the screened stockpile of contaminated soil within the footprint of the former bulk fuel storage facility. Laboratory results confirm that nutrient amendment and soil aeration has successfully reduced PHC concentration in the biopiles.

In order to achieve the soil remediation objectives by the targeted completion date, Q3 2015, an aggressive soil handling campaign is required during 2013. The soil handling plan must be developed to allow for:

- Aeration of the biopiles once every four days,
- Excavation of all areas of contaminated soil,
- Screening of all accessible contaminated soil prior to the removal of the vibrating screening plant in September 2013,

- Processing of all oversized rocks through the screener a second time during dry weather to remove residual soil adhering to the rocks,
- Nutrient amendment of PHC contaminated soil that has not yet been treated with nutrients,
- Removal of biopiles from the treatment cells, maintenance of the cells and reloading of the cells with soil that exhibits some of the highest PHC concentrations following screening,
- Relocation of biopiles from the treatment cells that appear to have low levels of PHC contamination to the in-situ area for further treatment,
- Removal and confirmation sampling of biopiles from treatment areas that appear to meet the remediation objectives,
- Securing of additional storage areas for stockpiles of material that are considered remediated pending laboratory confirmation,
- Securing of temporary storage areas for stockpiles of PHC contaminated soil that cannot be placed directly into the treatment cells during the 2013 field season, and
- Relocation of all stockpiles of PHC contaminated soil to within the excavation at the end of the 2013 field season.

Use of areas outside of the footprint of the former bulk fuel storage facility will be required for the temporary stockpiling of soil during the 2013 field season. To prevent contaminating the clean soils, it is suggested that a portion of the concrete pad from the former concentrate shed be used for locating temporary contaminated soil stockpiles. Prior to its use, agreement from the Department of National Defence and the Department of Fisheries and Oceans would be required and the area prepared. Preparation of the area would involve sealing the cracks in the floor and establishing surface run off diversions and a leachate collection sump.

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List of Abbreviations

bgl	below ground level
CCME	Canadian Council of Ministers of the Environment
CEQG	Canadian Environmental Quality Guidelines
CFU	Colony Forming Units
C :N :P	Carbon : Nitrogen: Phosphorous
DAP	Diammonium Phosphate
F1	Hydrocarbon Fraction encompasses the range of equivalent carbon number from C6 to C10
F2	Hydrocarbon Fraction encompasses the range of equivalent carbon number from C11 to C16
F3	Hydrocarbon Fraction encompasses the range of equivalent carbon number from C17 to C34
F4	Hydrocarbon Fraction encompasses the range of equivalent carbon number from C35 to C50+
HCN	Hydrocarbonoclastes
ISTA	In-Situ Treatment Area
LTA	lower treatment area
NWB	Nunavut Water Board
PHC	petroleum hydrocarbons
PID	photo-ionization detector
PQL	practical quantitation limit
QA/QC	quality assurance/ quality control
RPD	relative percent difference
SQRO	soil quality remediation objective
TKN	Total Kjeldahl Nitrogen
TP	Total Phosphorus
TPH	total petroleum hydrocarbons
UTA	upper treatment area

1 Introduction

The Nanisivik Mine produced lead and zinc mineral concentrates from 1976 to 2002. The mine infrastructure included a large tank farm providing year-around storage of diesel, gasoline and other fuels. Following mine closure, the bulk fuel storage facility was operated by a third party to supply fuel for commercial shipping and the Canadian Coast Guard. In February 2009 the Department of National Defence requested that the facility be decommissioned to give room for the construction of a naval facility. Decommissioning of the facility required remediation of petroleum hydrocarbon (PHC) contaminated soil known to be present around some of the tanks.

The remediation work commenced in 2011 and is completed under an *Abandonment and Reclamation Plan* (Stantec Consulting Ltd. 2010) approved by the Nunavut Water Board (NWB) on April 26, 2010. Remediation is completed by placing excavated soil in lined treatment cells where the soil is treated through a mixture of volatilization and bioremediation.

This report provides a summary of soil remediation activities completed at the former Nanisivik bulk fuel storage facility (the Site) in 2012. The report has been prepared to fulfill reporting requirements specified in Schedule B, Part J, Item 13 of Water Licence No. 1AR-NAN0914, issued by the Nunavut Water Board (NWB). The report has been prepared jointly by SRK Consulting Inc. and WESA, a division of BluMetric Environmental Inc. The responsibility by section is as follows:

- SRK is responsible for Sections 1, 2, 3, 4.1, 4.3, 4.5, 5.7, 6, 7, 8.1 to 8.5, 8.7 and 9.
- WESA is responsible for Sections 4.2, 4.4, 5.1 to 5.6 and 8.6.

2 Summary of Previous Remediation Activities

This section provides a brief introduction to soil remediation activities completed at the Site in 2011. Further information about 2011 remediation activities is provided in the 2011 Annual Report submitted by CanZinco to the NWB on March 24, 2012.

Principal reclamation and remediation work undertaken at the Site in 2011 included: decommissioning and removal of petroleum storage tanks and associated infrastructure; delineation of PHC contaminated soil; construction of soil treatment facilities; and excavation and treatment of PHC contaminated soil.

Decommissioning of the storage tanks commenced in May 2011 and was completed by the end of June. Scrap materials and PHC contaminated waste from the tanks were removed from the Site and hazardous waste was disposed of in an off-site facility. The demolition contractor demobilized during the 2011 sealift season.

Delineation of the PHC contaminated soil was conducted in 2011. The boundary of the area to be remediated was identified by field measurements and analytical laboratory results. The extent of the contamination was determined to be restricted to the eastern half of the former bulk fuel storage facility and to a maximum depth of 2.45 m below ground level (bgl).

Construction of the soil treatment facilities commenced in July 2011. The facilities constructed involve a lower treatment area (LTA) and an upper treatment area (UTA). A total of eight treatment cells were constructed in 2011 (four in the LTA and four in the UTA).

In addition to the constructed treatment facilities, an ‘in-situ’ treatment area was established in the area of the former 100’ diameter tank (Tank 102). The soil between the tank and the underlying liner 1.8 m bgl was uncontaminated. To provide supplementary treatment capacity the liner and an overlying 0.3 to 0.5 m of the uncontaminated soil was left in place and earthen berms were established to divert surface water runoff from the area.

Excavation of the contaminated soil commenced in 2011. Excavated soil contaminated by light fuels was moved to the in-situ treatment area. Soil with high concentrations of PHC was placed in the LTA and UTA treatment cells or was stockpiled in the area of the former 60’ diameter diesel fuel tank (Tank 101). The contaminated soil in the treatment facilities was aerated mechanically about every four days using an excavator or bulldozer until winter closure.

3 Soil Quality Remediation Objectives

The NWB approved soil quality remediation objectives (SQROs) for the Site are listed in Table 3.1. The objectives were derived from guidelines issued by The Canadian Council of Ministers of the Environment (CCME) in *Canadian Environmental Quality Guidelines* (CCME, 1999) and *Canada-Wide Standards for Petroleum Hydrocarbons in Soil* (CCME, 2008).

Table 3.1: SQROs for the Nanisivik former Bulk Fuel Storage Facility.

Parameter	Surface Soil (mg/kg)	Subsurface Soil [1] (mg/kg)
Benzene	110	360
Toluene	250	500
Ethylbenzene	300	600
Xylenes	350	700
PHC Fraction 1 (F1)	320	700
PHC Fraction 2 (F2)	260	1,000
PHC Fraction 3 (F3)	1,700	3,500
PHC Fraction 4 (F4)	3,300	10,000
PAH Anthracene	32	32
PAH Benzo(a)pyrene	72	72
PAH Fluoranthene	180	180

Source: (Stantec 2010)

Note:

(1) No guidance is given for depths between 1.5 and 3 m bgl by the CCME. At depths greater than 3 m bgl, it is expected that the ecological surface soil criteria will no longer be relevant but that management factors will still apply to site cleanup. For Nanisivik it is expected that the ecological surface soil criteria are no longer relevant at depths greater than 1.5 m bgl given the shallow plant root depths.

4 2012 Remediation Activities

4.1 Introduction

Key remediation activities undertaken at the Site in 2012 included:

- Completion of soil treatment cell construction,
- Excavation of PHC contaminated soil,
- Processing of the PHC contaminated soil through a vibrating screen, and
- Biopile management and performance monitoring.

The site work plan for 2012 was overseen by SRK on behalf of CanZinco. SRK was also on site from August 12 to 31 to manage soil excavation and soil handling activities. WESA was present for three site visits in 2012 (June 19 to 23; July 12 to 21; and August 18 to 30). Activities completed by WESA included supervision of treatment cell construction, biopile management and performance monitoring. Heavy equipment was provided by Arqvartuuq Services Ltd. of Arctic Bay.

4.2 Soil Treatment Facility Design and Construction

The treatment facilities comprise a series of cells in which biopiles of PHC contaminated soil are placed. In 2012, a total of eight new treatment cells were constructed: six at the UTA and two at the LTA (see Figure 1 and Appendix A: Photos 1 to 3). These new cells bring the total number of treatment cells at the end of 2012 to sixteen: ten at the UTA and six at the LTA. Two storm water retention ponds were constructed: one at the UTA and one at the LTA.

The base of the treatment cells were constructed of coarse grained sand and gravel. The base and berms of each soil treatment cell were covered with 36 mil Reinforced Linear Low Density Polyethylene geomembrane liner; prefabricated to 10 by 30 m dimensions. The conceptual plan estimated that each cell would hold 400 to 500 m^3 of contaminated soil (Stantec, 2010); however the as-built soil volume in each cell is closer to 200 m^3. The reduction in volume is attributed to the lower height of the biopiles (1.5 m as opposed to the 2.0 m proposed); necessary to effectively remediate the soil. The construction of water sumps within the lined treatment cells also reduced the total volume of soil contained in each cell.

Mitigation measures undertaken during the 2012 construction included stormwater retention ponds, water diversion ditches and silt fencing (Appendix A: Photo 4).

Further details on the treatment facility design and construction are provided in the *Construction Summary Report, Nanisivik Mine Site* (WESA 2012). The report was submitted to the NWB on 29 November 2012; in accordance with Part D Section 9 of Water Licence No. 1AR-NAN0914.

4.3 Excavation and Soil Handling

4.3.1 Overview of Contaminated Areas

Preliminary boundaries of the areas to be remediated were identified based on the results of the 2008 remediation program (SRK 2009) and from a series of test pits excavated within the tank farm footprint in 2011. Field screening measurements and analytical laboratory results from samples indicated four areas of contamination (Figure 2):

1. Area 1. PHC contaminated soil remained in the berm between the former pipe to the dock and the former truck loading terminal. PHC F2 was the only fraction to exceed the SQROs in the berm (Gartner Lee Limited 2008). Results from test pits excavated in 2011 determined that the contamination extended within the footprint of the tank farm. The soil on the 60' diameter tank (Tank 101) pad was found to be contaminated to the depth of the underlying liner, 1.3 m bgl.

2. Area 2. The soil in the light fuels pad area was found to have isolated pockets of PHC F1 and F2 that exceeded the SQROs between surface and 0.6 to 1.6 m bgl. A liner was located 0.6 m below the light fuel tanks. This liner was underlain by the Tank 101 pad liner at 1.3 m bgl on its east side and the 100' diameter tank (Tank 102) pad liner at 1.8 m bgl on its south side.

3. Area 3. The soil at the junction of the overlapping liners between the berm and the 100' diameter tank pad exceeded PHC F1 and F2 SQROs to 2.5 m bgl.

4. Area 4. PHC contaminated soil was found in the southern corner of the secondary containment area. PHC F2 concentrations exceed the SQRO between 0.6 and 1.9 m bgl. No liner was encountered in this portion of the secondary containment. The lateral extent of the contamination was delineated in 2011 with test pits.

4.3.2 Excavation

In 2011, soil was excavated and stockpiled during the removal of the liners. Soil from Area 1 and Area 3 was either loaded in the treatment cells or consolidated into a stockpile in Area 1. The contaminated soil in the light fuels pad area (Area 2) was spread out across the in-situ treatment area. Contaminated soil in Area 4 remained in place. At the end of the 2011 field season the excavation was contoured to inhibit snowfall accumulation and the formation of ponds of water in the spring.

Soil excavation at the Site in 2012 focused on soil that had been backfilled into areas 1 and 3 in 2011 (Appendix A: Photo 5). The soil was consolidated into a stockpile in Area 1.

No excavation of the berm was undertaken in 2012 in order to maintain an elevated permafrost horizon along its down gradient length. The elevated zone of permafrost is intended to act as a subsurface barricade to inhibit the migration of contaminated groundwater.

4.3.3 Field Analysis

Field screening of soil samples was completed in accordance with CanZinco protocols and by personnel trained by SRK. Field screening protocols were developed in alignment with the *Nanisivik Mine Reclamation and Closure Monitoring Plan* (GLL 2004).

Since 2002, soil samples from potentially PHC contaminated areas have been tested using a bag-headspace method and a photo-ionization detector (PID). This method involves placing soil in a sealable polyethylene bag, sealing the bag, disaggregating the soil in the bag and allowing organic vapours to accumulate in the bag's headspace. The concentration of organic vapour is then measured using the PID. For field screening purposes, laboratory analyses has indicated that: soil with vapour readings of 30 ppm or less will meet the PHC F2 SQRO; soil with vapour readings of 60 ppm or less will usually meet the PHC F2 SQRO; and soil with vapour readings greater than 120 ppm will exceed the PHC F2 SQRO.

The PID measurements provide an indication of the PHC components, however the method is susceptible to errors due to elevated background levels of PHC vapours (as experienced when heavy equipment was operating nearby or the Canadian Coast Guard refueled ships at the dock) and equipment and sample handling malfunctions. Laboratory analyses of samples are required to confirm SQROs are met.

4.3.4 Screening of Soil to Remove Oversize Particles

On August 13, 2012 a vibrating screening plant (Scalper 107D) was delivered to the Nanisivik dock site by sealift.

Soil from the in-situ treatment area and from the stockpile in Area 1 was processed to separate cobbles and boulders larger than 10 cm from the contaminated soil (Appendix A: Photos 6 and 7). The screening process is intended to reduce the volume of soil requiring treatment and to also promote the volatilization of PHC components.

4.3.5 Stockpile Management

The soil requiring treatment exceeds the available treatment cell capacity and therefore contaminated soil remains unexcavated and in stockpiles within the footprint of the former bulk fuel storage facility. In 2012, soil was stockpiled based on PHC concentrations indicated by field analysis as follows:

1. Stockpiles of soil in the former secondary containment area that, pending laboratory confirmation, meet the SQROs;
2. Stockpiles of soil in the in-situ treatment area that appear to have low levels of PHC contamination and/or are contaminated with light fuels (PHC F1);
3. Stockpiles of soil that exhibit high levels of PHC contamination in Area 1; and
4. Stockpiles of oversized rocks generated from the screening process in areas 1 and 2.

4.4 Biopile Management

To build the biopiles in the treatment cells the haul truck deposited a load PHC contaminated soil at one end of the cell and a bulldozer then pushed it into the cells to create a base layer on the liner (Appendix A: Photos 8 to 11). As described in section 4.2, the biopiles are constructed to a height of 1.5 m and each biopile has a volume of approximately 200 m^3.

Biopiles in UTA cells 7, 8, 9 and 10 and LTA cells 5 and 6 were created with screened fines. These cells were constructed with a base layer consisting of 0.3 to 0.5 m of screened soil from the in-situ treatment area which exhibited low levels of PHC contamination. The soil in the in-situ area was pushed by bulldozer from Area 2 onto the adjacent 100’ diameter tank pad liner.

Once constructed, the biopiles of PHC contaminated soil are treated through two principal mechanisms: volatilization and bioremediation. Volatilization occurs when the soil is aerated. In the bioremediation process, microorganisms are responsible for the degradation of the PHC in the soil.

4.4.1 Aeration

Gas transfer in the contaminated soil is important for two reasons: (i) the bioremediation process requires oxygen to occur, and (ii) gas transfer promotes volatilization of the petroleum hydrocarbons from the soil. To achieve the gas transfer, the contaminated soil in the treatment facilities was turned and aerated about every four days. In addition, the soil in the stockpile area was aerated for two days in June and six days in July to promote volatilization.

The soil in the treatment cells was typically aerated to a depth of 1.0 m using an excavator. Each full bucket was lifted to the vertical extent of the bucket arm and then let to fall from elevation to achieve an air exchange (Appendix A: Photo 12). The bottom 0.3 to 0.5 m of soil on top of the lined treatment cells is typically not aerated in order to reduce the risk of damaging the liner. The soil in the in-situ treatment area was turned by pushing the material into windrows with a bulldozer. East-west windrows approximately 2.0 m high were moved from the north end of the treatment area to the south of the treatment area to expose fresh surfaces (Appendix A: Photo 13).

Under the same climatic conditions a wet soil will volatilize less mass of hydrocarbons than will a dryer soil and therefore soil aeration was primarily performed on fair days (days with sun) under dry conditions.

4.4.2 Management of Moisture Content

Water is an essential component of microbial respiration and therefore also for PHC remediation. Hydrocarbon-degrading microbes (hydrocarbonoclastes) need to come into contact with solubilised nutrients in order for PHC bioremediation to occur; this contact is largely governed by the soil moisture content. Microbial activity is known to occur at soil moisture content between 4 and 35 %. Percent moisture of the soil was determined in the laboratory in accordance with the Canada-Wide Standard for Petroleum Hydrocarbons in Soil (CCME, 2001). The results of the moisture analysis are described in section 5.3.

Visual observations made in 2011 and 2012 identified little to no water accumulation in the treatment cells. In the case that excess water accumulates within the cells, it will be pumped from the sump in each cell to the collection ponds, where it will be stored and recirculated back onto the biopiles as needed to optimize soil moisture conditions for bioremediation.

4.4.3 Nutrient Amendment

The nutrients needed for accelerating bioremediation are added to the soil in appropriate levels for the microbial cells to replicate and survive. Research studies on remediation of hydrocarbon contaminated soils in the Arctic have shown success applying a Carbon:Nitrogen:Phosphorus (C:N:P) nutrient amendment ratio of 100:7.5:0.5 (Paudyn et.al. 2008). Nitrogen and phosphorus are the nutrients most often limiting microbial degradation in cold region soils. Nitrogen and phosphorus were added to the constructed biopiles in the form of granular agricultural fertilizers Urea and diammonium phosphate (DAP). For every one bag of DAP applied, between six and eight bags of Urea were applied depending on the PHC concentration in the biopile. Additional supplies were received on the 2012 sealift and nutrients were added to the remaining biopiles and the stockpile of screened PHC contaminated soil within the former tank farm footprint later in August 2012.

Table 4.1 shows the dates of biopile construction and nutrient amendment schedule.

Table 4.1: Biopile construction and nutrient amendment schedule.

PHC Treatment Area	Soil Screened	Date of Biopile Construction	Date of Nutrient Addition
In-situ treatment area	No	17 August 2011	14 July 2012
LTA-1	No	July 2011	14 July 2012 and 30 August 2012
LTA-2	No	July 2011	14 July 2012 and 30 August 2012
LTA-3	No	July 2011	14 July 2012 and 30 August 2012
LTA-4	No	July 2011	14 July 2012 and30 August 2012
LTA-5	Yes	24 August 2012	25 August 2012
LTA-6	Yes	24 August 2012	25 August 2012
UTA-1	No	21 August 2011	14 July 2012 and 21 August 2012
UTA-2	No	21 August 2011	14 July 2012 and 21 August 2012
UTA-3	No	21 August 2011	14 July 2012 and 21 August 2012
UTA-4	No	21 August 2011	14 July 2012 and 21 August 2012
UTA-5	No	16 July 2012	21 August 2012 and 25 August 2012
UTA-6	No	18 July 2012	21 August 2012
UTA-7	Yes	21 August 2012	21 August 2012
UTA-8	Yes	20 August 2012	21 August 2012
UTA-9	Yes	21 August 2012	25 August 2012
UTA-10	Yes	24 August 2012	25 August 2012

4.4.4 Biopile Covers

At the end of the 2011 field season, the biopile treatment cells were covered in accordance with the original 2010 remediation program proposed for the Site (Stantec 2010). Insufficient supplies were available to cover all of the bioplies. Cells UTA-1 and part of UTA-2 remained uncovered during the 2011/2012 winter season (Appendix A: Photo 14). In June 2012, field observations indicated that the soil within the uncovered biopiles did not show evidence of washout or erosion. Water was not observed to be pooling and the moisture content of the soil was observed to be within the ideal range for bioremediation. Surface soil samples were collected from both the uncovered and covered biopiles and submitted for laboratory analyses of PHC F1-F4.

Three soil samples were collected from outside of the biopiles and in the path of snowmelt which have confirmed that contaminated soil was not displaced from the uncovered cells (Table 4.2, Figure 4.1). As a result of these findings, no cover was placed on the biopiles for the 2012/2013 winter season.

Table 4.2: Soil sampling at the UTA cover.

Sample No.	Sample Description	Depth (m)	2012 Sample Date	Moisture	F1 (C6-C10)	F2 (C10-C16)	F3 (C16-C34)	F4 (C34-C50)
			Units	%	mg/kg	mg/kg	mg/kg	mg/kg
12021	UTA-1 - Uncovered	0.0-0.20	21-Jun	6.9	40	920	70	<20
12022	UTA-4 -Covered	0.0-0.20	21-Jun	6.2	20	960	120	<20
12023	LTA-2 – Covered	0.0-0.20	21-Jun	5.6	20	950	100	<20
12018[1]	West of LTA (5-10 m)	0.0-0.20	19-Jun	6.9	<10	<10	<20	<20
12019[1]	Southwest of LTA (5-10 m)	0.0-0.20	19-Jun	8.6	<10	<10	<20	<20
12020[1]	Southwest of LTA (10-20 m)	0.0-0.20	19-Jun	8.3	<10	<10	<20	<20

Note:

(1) Outside of containment and down gradient from UTA Cells

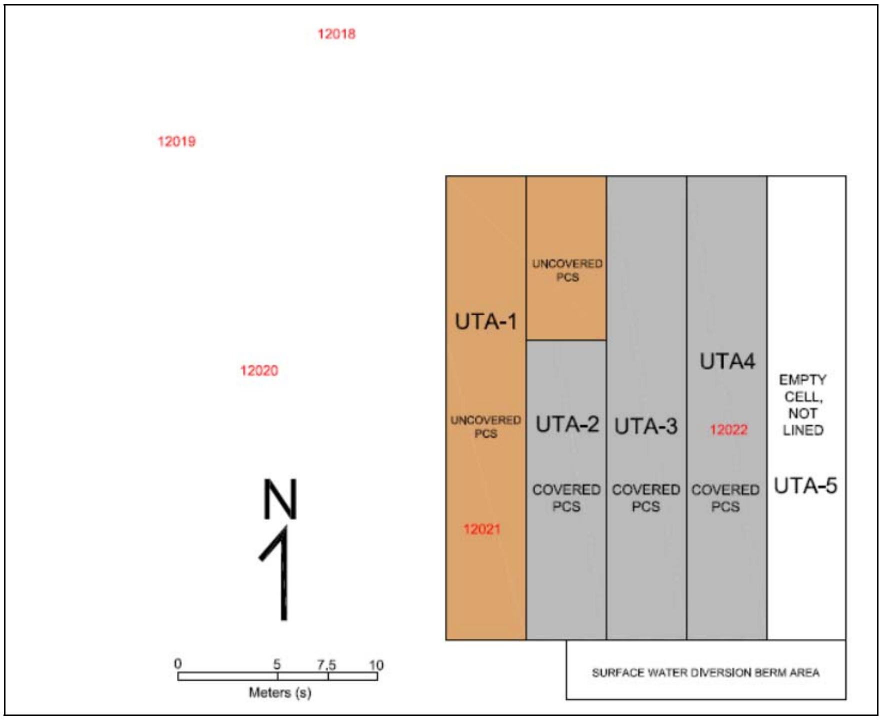


Figure 4.1: Soil sampling locations at the UTA cover.

Note:

PCS = petroleum hydrocarbon contaminated soil

4.5 Chemical Analysis

Soil samples were collected and sent to an external laboratory, Exova Canada Inc. in Ottawa, for chemical analysis. Samples to characterize the oversized rocks were submitted to the Iqaluit Analytical Services Unit (operated by Queens University School of Environmental Studies). The sampling and analysis focused on:

- Characterization of soil stockpiled in the in-situ treatment area and in Area 1. A total of seven grab samples (including one duplicate) were collected and submitted for analysis.
- Characterization of soil stockpiled in the secondary containment area (Appendix A: Photo 15) to determine if this soil meets SQROs (confirmatory sampling). One sample for every 85 m^3 of soil, for a total of fourteen soil samples (including two duplicates), were submitted for analysis.
- Characterization of soil from biopiles to evaluate remediation performance and progress. The biopiles were sampled in June, July and August, however the July sample shipment to Exova was lost by the courier. The samples submitted for analytical testing included surface grab samples and samples from test pits. One metre deep test pits were excavated in each UTA and LTA treatment cell and soil along the entire vertical length of the test pit was combined to create a sample. Multiple faces of the test pit were occasionally sampled.
- Characterization of oversized rocks generated from the screening process. Swab samples were collected from the screened oversized rocks to assess the degree of PHC

contamination on this material and to determine whether further remediation of the oversized rocks was necessary. Swab sampling methodology consisted of removing fines from the surface of the stone to be sampled, saturating a sterile gauze pad with hexane and wiping clean a 5 cm^2 area of the stone surface (Appendix A: Photo 16). The swab sample was immediately placed in a laboratory prepared glass amber jar; labelled with a sample number and date; and packed in an insulated cooler with ice packs. The swab samples were submitted to Iqaluit Analytical Services Unit laboratory in Iqaluit, Nunavut, the following day for analysis of Total Petroleum Hydrocarbons (TPH). A total of five samples were analyzed.

5 Remediation Performance Monitoring Results

5.1 Nutrient Amendment

The nutrient content of the soil was measured before and after fertilizer application to the soil as Total Kjeldahl Nitrogen (TKN) and Total Phosphorus (TP). TKN is the sum of organic nitrogen, ammonia (NH_3), and ammonium (NH_4^+) in the chemical analysis of soil.

Analyzed samples indicated that nitrogen and phosphorous levels were within required levels in all of the constructed biopiles. The results of the TKN and TP analyses are presented in Table 1.

5.2 Microbial Colony

Microorganisms that target PHC, hydrocarbonoclastes (HCN), were measured in soils from both the UTA and the LTA. Each soil sample demonstrated presence of colony forming units (CFU) for hydrocarbonoclastes. Monitoring CFU over time is necessary to ensure that the microbial colony is surviving under the treatment regime implemented. The CFU level in each of the LTA and UTA was considered to be sufficient in 2011 to achieve success with respect to the bioremediation aspect of biopiles. Correspondingly, the CFU level in the 2012 season was found to be acceptable before and after nutrient amendment. The results of the hydrocarbonoclastes analyses are presented in Table 1.

5.3 Moisture Content

The moisture content of the soil in the biopiles was measured analytically. The range of moisture content was monitored during each soil sampling event and was observed to be between 4% and 9%. The average soil moisture content in June (2012) was 5.9% and in August (2012) 6.2%. As a result of the soil moisture content being within the acceptable range, no water was purposely added to the biopiles. The results of the moisture analyses are presented in Table 1.

5.4 Characterization of Stockpiled Soil

Results for seven grab samples collected to characterize stockpiled soil are summarized in Table 2. The grab samples indicated that: stockpiled soil in the in-situ treatment area meets the SQROs; and stockpiled soil in Area 1 did not meet the SQRO for PHC F2. Confirmatory soil sampling and analysis is required to validate that the soil stockpiled in the in-situ treatment area meets the SQROs.

5.5 Characterization of Screened Oversize Materials

Analytical results for the five swab samples collected from the oversized rocks are summarized in Table 5.1. All five swab samples were reported to have TPH concentrations below the analytical detection limit of 100 µg.

The total volume of screened oversize materials is approximately 1,350 m^3.

Table 5.1: Swab analysis results for oversized materials.

Swab Sample No.	Sample Location	TPH (µg/swab)
12626	Area 1 oversized rock Stockpile	<100
12627	Area 1 oversized rock Stockpile	<100
12628	Area 2 oversized rock Stockpile	<100
12629	Area 2 oversized rock Stockpile	<100
12630	UTA	<100

5.6 Characterization of Soil in Biopiles

Analytical results from August 2012 samples indicated that all soil samples from the biopiles in the treatment cells meet criteria for PHC F1, F3 and F4. Concentrations of PHC F2 exceeded the SQRO but demonstrated clear evidence of remediation progress (i.e. declining concentrations). The full results from the characterization of soil in the biopiles are available in Table 3.

5.7 Remediation Confirmation

Fourteen confirmatory soil samples (including two duplicates) were taken from soil stockpiled in the secondary containment area. All samples were analyzed for PHC F2 to F4 and five of the samples were also analyzed for PHC F1. The analytical results from these samples are summarized in Table 4.

All confirmatory soil samples returned results that meet the SQROs. The total volume of soil stockpiled in the secondary containment area and that meet the remediation criteria is approximately 1,000 m^3.

6 Quality Assurance and Control

Quality assurance and control (QA/QC) measures associated with the collection and analysis of the soil samples included the comparison of field screening results with laboratory data and laboratory analysis of blind duplicates.

Field screening results were compared to laboratory data as presented in Tables 2, 3 and 4. The comparisons show that the field screening limits used for PHC contamination are successful in distinguishing between soil that meets the SQROs and that which requires further remediation. The results also suggest that on June 21 and August 28 the PID was not properly calibrated or otherwise malfunctioning or that the sample testing protocol was not strictly followed.

The complete listing of laboratory QA/QC samples and their relative percent difference (RPD) are shown in Table 5. These monitor a combination of the precision of the laboratory analyses, sample preparation errors, sample collection errors and genuine short scale variations in soil geochemistry. Results that are either below the detection limit for one or both sample pairs, or below the practical quantitation limit (PQL) have RPDs identified as not applicable.

Eight sample pairs have blind field duplicate analyses for PHC. One of these has results that are below the PQL for all parameters. Of the remaining seven pairs, RPDs are greater than 50% for PHC F2 for one sample pair (11196) from the in-situ treatment area. The results do not impact the conclusions of this report because the soil in this area continued to be treated following sample collection. This data reflects the heterogeneity of PHC in the soil prior to being processed through the vibrating screener.

Samples 12038, 12041, 12044 and 12047 suggest heterogeneity of the soil being treated in the constructed cells. Samples 12569, 12631 and 12650 demonstrate the homogeneity of the PHC achieved by processing the soil through the vibrating screener.

7 Summary of Soil Quantities

Table 7.1 provides a summary of PHC contaminated soil volumes exceeding SQROs and that remains to be treated. As per the table, 2,450 m^3 of soil were treated in 2012.

Table 7.1: Volume of contaminated soil remaining to be treated

Location	Maximum Depth	Soil to be Excavated	2012 Working Volume[1]
Below Ground within Secondary Containment	1.9 m	1,400 m^3	1,800 m^3
Below Ground within area of Former Tanks	2.5 m	5,200 m^3	6,750 m^3
Stockpiled within Tank Farm Footprint			800 m^3
Temporary Treatment Area within Tank Farm[2]			450 m^3
Upper Treatment Area			2,200 m^3
Lower Treatment Area			1,300 m^3
Total Volume of Soil Requiring Treatment			**13,300 m^3**

Reconciliation with 2011 Volume Estimate	
Revised 2011 Working Volume	**15,750 m^3**
Total Volume of Soil Treated	**2,450 m^3**
End of 2012 Volume of Soil Requiring Treatment	**13,300 m^3**

Source: !SRK/!PROJECTS/1CB002_Nanisivik/2013/Reporting/Field Season Report/Tables/Volume_est_and_Schedule_20121009.xlsx

Note:

(1) Working volume is based on a bulking factor of 1.3

(2) Results from grab samples indicate that the soil meets the SQROs, confirmation soil samples are to be collected at the start of the 2013 field season.

8 Discussion and Recommendations

8.1 Delineation

Visual references to locate the areas of contaminated soil are largely based on features that have been removed (Figure 2). The survey stakes demarcating the extent of the areas of contamination need to be re-established at the start of the 2013 field season and maintained in place until the excavation is complete.

8.2 Field Screening

The organic vapour readings for several samples submitted for analytical testing were unusually low compared to the PHC F2 results. In order to be able to rely on PID results, CanZinco's standard operating procedure calls for two PIDs to be available during intensive sampling events and that the instructions in the PID operating manual are adhered to.

8.3 Excavation

Excavation of the contaminated soil is to continue in 2013. A methodical approach to excavation is required to reduce the risk of contaminating areas previously remediated. A figure illustrating the plan of excavation should be reviewed with all equipment operators and posted in the lunchroom.

The upper 0.6 m of soil in Area 4 meets the SQROs. This layer should be excavated and stockpiled separately from the underlying contaminated soil. Should contamination of the soil from the shallow horizon become compromised, the soil is to be processed through the vibrating screener and samples collected.

8.4 Oversized Screening

The screening process to remove rocks larger than 10 cm reduced the volume of soil requiring treatment by approximately 15%. The process effectively promoted the volatilization of PHC components and it homogenized the PHC soil quality. Removal of the large rocks from the soil loaded into the treatment cells also reduced the risk of damage to the liner. The ease at which the soil passed through the screener suggests that a smaller screen grid could be used and thereby increase the volume of rocks removed.

Due to the wet conditions during screening in 2012 aggregates of soil remained on the surface of the oversized rock. The oversized rock is to be processed through the screener a second time when a dry weather opportunity presents itself.

8.5 Stockpile Management

The soil was stockpiled in designated areas based on suspected PHC concentrations in 2012. Each area became very congested as the screening process advanced. Delays in the processing occurred as stockpiles were relocated and consolidated.

Twice as much soil will need to be screened in 2013 as was processed in 2012. During excavation, temporary storage areas will be required to stockpile the screened soil considered likely to exceed the PHC SQROs. Once excavation is completed for 2013, the temporary stockpiles of contaminated soil could be relocated to within the footprint of the excavation.

The soil that exhibits the highest concentration of PHC from areas 1 and 3 should be placed directly into available treatment cells.

Soil that appears to exceed the SQROs, but not to the extent described above, will need to be removed from the footprint of the former tank farm during excavation. Options available for temporary storage of this material include:

- A portion of the exposed concrete floor of the former concentrate storage shed,
- The in-situ treatment area, and
- The laydown yard.

Soil that appears to meet the SQROs following processing through the screener should continue to be relocated to the former secondary containment area. The existing stockpiles should be leveled off and resloped to ensure that surface runoff water continues to be directed towards the excavation.

Additional areas for stockpiling soil likely to meet the SQROs will be required as remediation progress advances. In 2013 it is suggested that an area on the north side of the tank farm berm opposite the former secondary containment area be prepared for the placement of soil that appears to meet the SQROs (Figure 3). The base is to be graded so that surface runoff water is directed eastward to the Area 1 excavation.

Given the homogeneity achieved with the screening process, a maximum stockpile size for soil that appears to meet the SQROs of 250 m^3 is recommended.

Oversized rocks passed through the screener a second time are expected to meet the SQROs and can be stockpiled in a prepared area on the laydown yard. The Canadian Coast Guard has indicated an interest in obtaining the stockpiles of oversized rocks to conduct repairs to the dock cells. Additional swab analyses would be required and only rocks separated from soil that appear to meet the SQROs should be considered for use in the marine environment.

Use of the concentrate shed concrete pad would require that all cracks be sealed and surface water runoff diversions be established as well as leachate collection areas. Agreement from the

Department of Fisheries and Oceans and the Department of National Offence is needed before the area can be utilized during the 2013 field season.

8.6 Biopile Management

Based on treatment progress achieved in 2012, most of the biopiles are likely to achieve the SQROs before the end of August 2013. The exception to this is soil in LTA-1 and LTA-3 which will require additional treatment beyond 2013. Soil samples will be collected in June 2013 from each biopile to confirm the progress of remediation.

Newly constructed (in 2012) biopiles in cells LTA-5, LTA-6, UTA- 5, UTA- 6, UTA- 7, UTA- 8, UTA-9, and UTA-10 were sampled in August 2012 and their performance will be measured in the June 2013 initial sampling event.

It is recommended that the soil be managed with the same seasonal aeration program as 2012 (once every four days, as practicable).

8.7 Confirmation Sampling

8.7.1 Excavation Limits

Once field screening results indicate that the materials remaining in the excavation meet the SQROs, then confirmation samples for laboratory analysis are to be collected in accordance with accepted sampling procedures and protocols.

Each excavation area is to be subdivided into individual composite sampling areas of approximately 25 m by 25 m (or less) as required to cover the floor of the excavation. Wall samples will be composited over a length of 25 m on the wall of the excavation. Combining four or five evenly spaced aliquots of soil within the individual composite sample area will create the composite sample (Gartner Lee Limited 2004).

A single aliquot of soil from a specific point is a discrete QA/QC sample. Additional QA/QC samples are to be obtained by collecting field duplicates. For every ten composite samples collected, one duplicate and three discrete samples from one of the composite sample area should be submitted for laboratory analysis. All samples are to be provided unique sample identifiers.

Further excavation is to be undertaken in areas where the laboratory analytical results do not meet the SQROs and additional confirmatory samples are to be taken upon completion of the excavation.

8.7.2 Stockpiles

Once field screening results indicate that the stockpiled soil meet the SQROs, then confirmation samples for laboratory analysis are to be collected.

One composite sample per 250 m^3 of material stockpiled is to be submitted for laboratory analysis. For every ten composite samples collected, one duplicate and three discrete samples are to be submitted. The QA/QC samples are to be obtained from a single stockpile.

A soil stockpile that fails to meet the SQROs is to be returned to the in-situ area for further treatment.

8.7.3 Biopiles

Once field screening results indicate that a biopile meets the SQROs, then confirmation samples for laboratory analysis are to be collected.

One composite sample per 250 m^3 of material or each biopile is to be submitted for laboratory analysis. For every ten composite samples, one duplicate and three discrete samples should be sent for analysis.

Biopiles are not to be off-loaded without confirmation that the soil meets the SQROs unless the soil is destined for further treatment through the vibrating screener or in the in-situ area.

8.7.4 Oversized Rocks

Once the amount of fine particles attached to the oversized rocks has been minimized, one representative swab sample for each 50 m^3 of oversized rock is to be collected. One duplicate is required for every ten swab samples.

Should a stockpile of oversized rock exhibit PHC contamination, the rock stockpile is to be retained within the in-situ area or the excavation for further treatment.

9 Conclusions

Key results and conclusions from the 2012 soil remediation activities are as follows:

- Soil removed from the in-situ treatment area and soil stockpiled in the former secondary containment area is remediated in accordance with the SQROs. The soil is considered suitable for commercial and light industrial use.
- Nutrient amendment and soil aeration successfully reduce PHC concentrations.
- Processing of soil through the screening plant improved biopile performance and management. Based on acquired analytical results, oversized rocks separated out with the screening plant show no indication of PHC contamination.

In order to achieve the soil remediation objectives by the targeted completion date, Q3 2015, an aggressive soil handling campaign is required during 2013. A soil handling plan must be developed to allow for:

- Aeration of the biopiles once every four days,
- Excavation of all areas of contaminated soil,
- Screening of all accessible contaminated soil prior to the removal of the vibrating screening plant in September 2013,
- Processing of all oversized rocks through the screener a second time during dry weather to remove residual soil adhering to the rocks,
- Nutrient amendment of PHC contaminated soil that has not yet been treated with nutrients,
- Removal of the soil from the treatment cells, maintenance of the cells and reloading of the cells with soil that exhibits some of the highest PHC concentrations following screening,
- Ongoing use of the in-situ area for the treatment of soil exhibiting low levels of PHC contamination and/or soil contaminated with light fuels,
- Securing of additional storage areas for stockpiles of soil and oversized rock that are considered remediated pending laboratory confirmation,
- Securing of temporary storage areas for stockpiles of PHC contaminated soil that cannot be placed directly into the treatment cells during the 2013 field season, and
- Relocation of all stockpiles of PHC contaminated soil to within the excavation at the end of the 2013 field season.

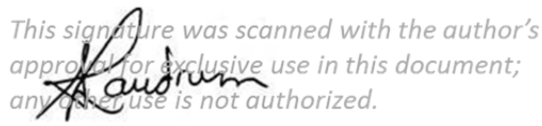
Final confirmatory sampling of the excavation floor cannot be completed in 2013 based on the above plan. Samples will be collected to characterize the floor; however final confirmation samples cannot be collected until the stockpiles are removed. Confirmatory samples are to be collected from the walls of the excavation in 2013.

Use of areas outside of the footprint of the former bulk fuel storage facility will be required for the temporary stockpiling of soil during the 2013 field season. To prevent contaminating the clean soils, it is suggested that the concrete pad from the former concentrate shed be used for locating temporary contaminated soil stockpiles. Prior to its use, agreement from the Department of National Defence and the Department of Fisheries and Oceans would be required and the area prepared.

It is recommended that the CanZinco confirmation sampling protocol be updated to include procedures for sampling stockpiled materials and the biopiles as described in Section 8.7.

This report, Nanisivik Mine, Contaminated Soil Remediation 2012 Progress Report, was prepared by:

SRK Consulting (Canada) Inc.



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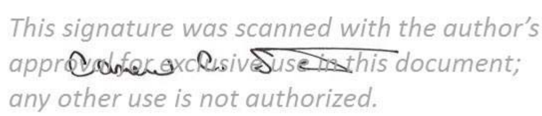

Cam Scott, PEng

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. The conclusions presented in this report represent our professional opinion and are based upon the work described in this report and any limiting conditions in the terms of reference, scope of work, or conditions noted herein.

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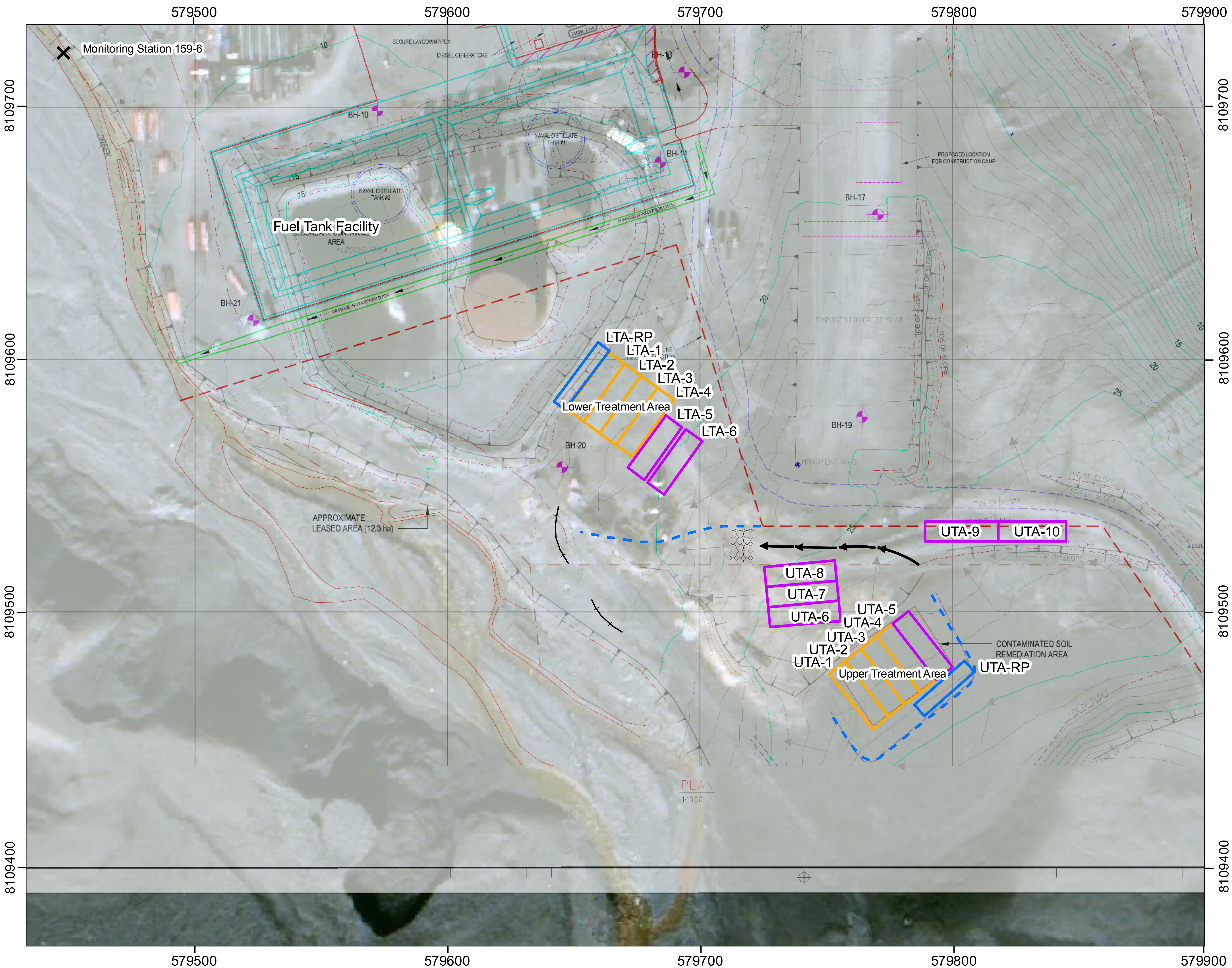
Figures



Legend:

- Department of National Defence borehole location
- Drainage Diversion Berm
- Treatment cells constructed in 2011
- Treatment cells constructed in 2012
- Stormwater Retention Pond
- Surface Water Drainage Flow
- Silt Fencing
- Stone Rip Rap
- Constructed Drainage Ditch

Notes:
i. Photo underlay taken August 15, 2007 prior to the demolition of the Fuel Tank Farm.
ii. Preliminary site plan for future Nanisivik Naval Facility provided by the Government of Canada and dated May 23, 2012.
iii. Topographical survey data provided by the Department of National Defence.
iv. Coordinate system is NAD83, UTM Zone 16.
v. Location of the treatment cells are approximate and were not surveyed with high precision GPS equipment.

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

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DO NOT SCALE DRAWING.
THIS DRAWING MAY HAVE BEEN REDUCED. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS.

North American 1983, UTM Zone 16
Quickbird Imagery (2007-08-15)
DND Survey - Site Plan (2012/05/23)
-Nanisivik Naval Facility, DWG.No C-N143-1216/03-Sketch 01

N W E S

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Meters

PROJECT

Nyrstar - PHC Biopile Management-Nanisivik

TITLE

Constructed Soil Treatment Cells

WESA, a division of BluMetric Environmental Inc.

WESA
a BluMetric™ company

4901 - 48 St., Ground floor,
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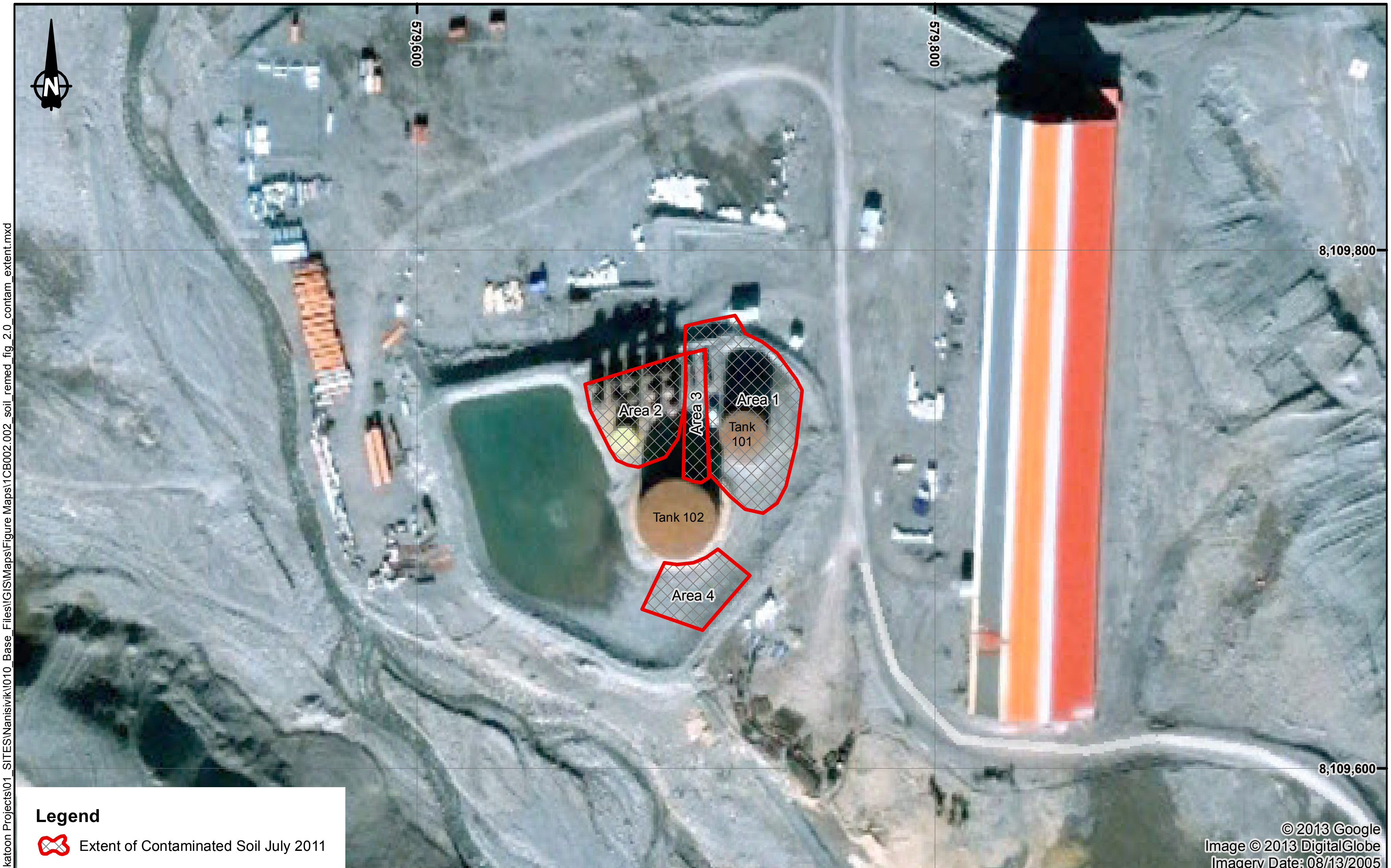
BluMetric includes WESA, Seprotech, WESAtech, Envir-Eau, OEL-HydroSys, WESAtechnologies

PROJECT #		*DATE*	
Y-B9977-00-05		March 22, 2013	
DRAWN	*CHECKED*	*FIG NO.*	*REV*
KC	JVS/SV	01	0



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Notes:
1. Coordinate system is NAD83, UTM Zone 16

0 12.5 25 50 75 100 Meters

srk consulting

Job No: 1CB002.002

Filename: 1CB002.002_soil_remed_fig_2.0_contam_extent

Nanisivik Mine
Contaminated Soil Remediation
2012 Progess Report

Areas of Contaminated Soil

Date:	Approved:	Figure:
Mar 2013	A.L.	2

Legend

- Area for Excavation
- Area for temporary stockpiles of soil requiring treatment
- Areas for soil that appears to meet remediation objectives
- In-Situ Treatment Area

srk consulting

Job No: 1CB002.002

Filename: 1CB002.002_soil_remed_fig_3.0_future_workings

Nanisivik Mine
Contaminated Soil Remediation
2012 Progess Report

Proposed Working
Areas for 2013

Date:	Approved:	Figure:
Mar 2013	A.L.	3

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Tables

Table 1. Biopile Performance Monitoring

	Initial Sampling Results (Start 2012 Season)										Final Sampling Results (End 2012 Season)									
Sample Location	Soil Sample No.	2012 Sample Date	Moisture	F1 (C6-C10)	F2 (C10-C16)	F3 (C16-C34)	F4 (C34-C50)	Total Kjeldahl Nitrogen	Total Phosphorus	Hydro-carbonoclastes	Soil Sample No.	2012 Sample Date	Moisture	F1 (C6-C10)	F2 (C10-C16)	F3 (C16-C34)	F4 (C34-C50)	Total Kjeldahl Nitrogen	Total Phosphorus	Hydro-carbonoclastes
		Units:	%	ug/g	ug/g	ug/g	ug/g	%	%	CFU/g		Units:	%	ug/g	ug/g	ug/g	ug/g	%	%	CFU/g
		MRL:	0.01	10	10	20	20	0.01	0.01	-		MRL:	0.01	10	10	20	20	0.01	0.01	n/a
		CCME (I):	-	320	260	1700	3300	-	-	-		CCME (I):	-	320	260	1700	3300	-	-	-
ISTA	12001	Jun-19	7.20	80	160	<20	<20	0.02	0.04	5100000	12646	29-Aug-12	6.00	30	140	30	<20	-	-	-
LTA-4	12024	21-Jun	5.60	30	680	40	<20	-	-	-	12622	30-Aug-12	7.00	30	630	90	<20	0.04	0.04	12000000
LTA-4	12025	21-Jun	6.20	40	670	40	<20	-	-	-	-	30-Aug-12	-	-	-	-	-	-	-	-
LTA-4	12026	21-Jun	6.70	30	870	60	<20	-	-	-	-	30-Aug-12	-	-	-	-	-	-	-	-
LTA-3	12027	21-Jun	5.70	90	1330	80	<20	-	-	-	12621	30-Aug-12	5.00	30	970	150	<20	0.05	0.05	-
LTA-3	12028	21-Jun	4.90	90	1560	90	<20	-	-	-	-	30-Aug-12	-	-	-	-	-	-	-	-
LTA-3	12029	21-Jun	4.70	90	1770	1000	<20	-	-	-	-	30-Aug-12	-	-	-	-	-	-	-	-
LTA-2	12030	21-Jun	6.00	60	810	50	<20	0.02	0.03	260000000	12620	30-Aug-12	7.00	40	720	80	<20	0.04	0.06	-
LTA-2	12031	21-Jun	4.30	30	710	40	<20	-	-	-	-	30-Aug-12	-	-	-	-	-	-	-	-
LTA-2	12032	21-Jun	5.40	40	770	50	<20	-	-	-	-	30-Aug-12	-	-	-	-	-	-	-	-
LTA-1	12033	21-Jun	7.50	250	2350	180	<20	-	-	-	12619	30-Aug-12	6.00	20	290	40	<20	0.03	0.07	-
LTA-1	12034	21-Jun	7.30	250	1470	110	<20	-	-	-	-	30-Aug-12	-	-	-	-	-	-	-	-
LTA-1	12035	21-Jun	8.30	270	2490	190	<20	-	-	-	-	30-Aug-12	-	-	-	-	-	-	-	-
LTA-5	-	-	-	-	-	-	-	-	-	-	12623	30-Aug-12	7.00	70	1180	40	<20	0.08	0.06	2100000
LTA-6	-	-	-	-	-	-	-	-	-	-	12624	30-Aug-12	5.00	50	700	40	<20	0.07	0.07	-
UTA-4	12039	23-Jun	4.70	60	1750	100	<20	-	-	-	12610	30-Aug-12	7.00	20	720	120	<20	0.05	0.05	18000000
UTA-4	12040	23-Jun	4.70	70	910	60	<20	-	-	-	-	30-Aug-12	-	-	-	-	-	-	-	-
UTA-4	12041	23-Jun	5.20	80	1160	60	<20	-	-	-	-	30-Aug-12	-	-	-	-	-	-	-	-
UTA-4	12041FD	23-Jun	5.40	80	820	50	<20	-	-	-	-	30-Aug-12	-	-	-	-	-	-	-	-
UTA-3	12036	23-Jun	4.30	120	2680	180	<20	0.01	0.04	48000	12609	30-Aug-12	4.00	40	1050	130	<20	0.05	0.07	-
UTA-3	12037	23-Jun	5.40	100	2040	140	<20	-	-	-		30-Aug-12	6.00	30	1060	140	<20	0.05	0.06	-
UTA-3	12038	23-Jun	5.70	90	2710	180	<20	-	-	-	-	30-Aug-12	-	-	-	-	-	-	-	-
UTA-3	12038FD	23-Jun	5.60	110	2630	170	<20	-	-	-	-	30-Aug-12	-	-	-	-	-	-	-	-
UTA-2	12042	23-Jun	5.40	130	1110	60	<20	-	-	-	12608	30-Aug-12	7.00	20	830	100	<20	0.08	0.07	-
UTA-2	12043	23-Jun	5.50	100	1580	90	<20	-	-	-	-	30-Aug-12	-	-	-	-	-	-	-	-
UTA-2	12044	23-Jun	5.90	100	1320	80	<20	-	-	-	-	30-Aug-12	-	-	-	-	-	-	-	-
UTA-2	12044FD	23-Jun	6.20	150	1580	100	<20	-	-	-	-	30-Aug-12	-	-	-	-	-	-	-	-
UTA-1	12045	23-Jun	6.50	60	920	80	<20	-	-	-	12607	30-Aug-12	7.00	20	570	80	<20	0.06	0.06	-
UTA-1	12046	23-Jun	7.20	60	1410	100	<20	-	-	-	-	30-Aug-12	-	-	-	-	-	-	-	-
UTA-1	12047	23-Jun	6.60	90	1840	50	<20	0.02	0.02	6300000	-	30-Aug-12	-	-	-	-	-	-	-	-
UTA-1	12047FD	23-Jun	6.60	50	1630	120	<20	0.01	0.03	3800000	-	30-Aug-12	-	-	-	-	-	-	-	-
UTA-5	-	-	-	-	-	-	-	-	-	-	12612	30-Aug-12	7.00	60	2210	120	<20	0.13	0.07	4900000
UTA-6	-	-	-	-	-	-	-	-	-	-	12613	30-Aug-12	6.00	30	1240	60	<20	0.14	0.07	-
UTA-6	-	-	-	-	-	-	-	-	-	-	12614	30-Aug-12	6.00	40	1020	40	<20	0.11	0.07	-
UTA-7	-	-	-	-	-	-	-	-	-	-	12615	30-Aug-12	6.00	70	980	60	<20	0.4	0.07	170000
UTA-8	-	-	-	-	-	-	-	-	-	-	12616	30-Aug-12	5.00	60	1080	70	<20	0.16	0.08	-
UTA-9	-	-	-	-	-	-	-	-	-	-	12617	30-Aug-12	6.00	60	1220	50	<20	0.04	0.06	-
UTA-10	-	-	-	-	-	-	-	-	-	-	12618	30-Aug-12	5.00	40	300	30	<20	0.09	0.08	-

FD FD Field Duplicate
- No sample available / analysis not requested
Meets CCME criteria Industrial (I)

Table 2: Stockpile Characterization Samples

PARAMETER	UNITS	SQRO	overs soil AREA1	SP In-situ Treatment Area			SP AREA1			
Sample ID:			12625	12646	12647	12648*	12649	12650	12651	12652
Sample Date:			8/29/2012	8/29/2012	8/29/2012	8/29/2012	8/29/2012	8/29/2012	8/29/2012	8/29/2012
Sample Depth (m):										
Field Screen (ppm)[d]:				5	5	5	110	85	90	110
ACCUTEST File #:			1218844	1218843	1218843	1218843	1218843	1218843	1218843	1218843
Extractable Hydrocarbons[a]										
F1 (C6-C10) surface [b,c]	ug/g	320	10	30	40	40	-	-	-	-
F1 (C6-C10) subsoil [b,c]	ug/g	700								
F2 (C10-C16) surface [b,c]	ug/g	260	170	140	150	190	**1990**	**1610**	**1560**	**1790**
F2 (C10-C16) subsoil [b,c]	ug/g	1000								
F3 (C16-C34) surface [b,c]	ug/g	1700	40	30	30	30	70	70	60	80
F3 (C16-C34) subsoil [b,c]	ug/g	3500								
F4 (C34-C50) surface [b,c]	ug/g	3300	<20	<20	<20	<20	<20	<20	<20	<20
F4 (C34-C50) subsoil [b,c]	ug/g	10000								

Bold *Concentration greater than or equal to the CCME soil guideline for commercial (CL) land use.*

Notes:

"<" = Less than analytical method detection lim * sample identified in lab report as 12647

"-" = Analysis not conducted, or no guideline.

SQRO =Soil Quality Remediation Objective.

a) Canadian Environmental Quality Guidelines (CEQG). The site-specific factors used for determining the soil quality guideline include: soil ingestion, soil contact and nutrient cycling.

b) Guidelines are dependant upon depth of sample (surface, subsoil >1.5m depth). Surface guidelines applied.

c) Guideline is dependant on medium grain size of soil analyzed (Fine <75 µm, Coarse >75 µm). Median grain size of soil sampled is coarse.

d) Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.

Table 3: Remediation Progress Soil Samples

		Location:	In-Situ Treatment Area								
		Sample ID:	12001	12003	12004	12005	12006	12007	12011	12014	12015
		Sample Date:	6/19/2012	6/19/2012	6/19/2012	6/19/2012	6/19/2012	6/19/2012	6/19/2012	6/20/2012	6/20/2012
		Sample Depth (m):	0-0.1	0-0.1	0-0.1	0-0.1	0-0.1	0-0.1	0-0.1	0-0.1	0-0.1
		Field Screen (ppm)[d]:	120	90	65	85	85	110	65	60	15
		ACCUTEST File #:	1213419	1213419	1213419	1213419	1213419	1213419	1213419	1213419	1213419
PARAMETER	**UNITS**	**SQRO**	**Analytical Results**								
Extractable Hydrocarbons[a]											
F1 (C6-C10) surface [b,c]	ug/g	320	80	70	60	80	70	60	80	30	20
F1 (C6-C10) subsoil [b,c]	ug/g	700									
F2 (C10-C16) surface [b,c]	ug/g	260	160	170	180	170	90	190	140	20	<10
F2 (C10-C16) subsoil [b,c]	ug/g	1000									
F3 (C16-C34) surface [b,c]	ug/g	1700	<20	<20	<20	<20	<20	<20	<20	<20	<20
F3 (C16-C34) subsoil [b,c]	ug/g	3500									
F4 (C34-C50) surface [b,c]	ug/g	3300	<20	<20	<20	<20	<20	<20	<20	<20	<20
F4 (C34-C50) subsoil [b,c]	ug/g	10000									

Bold *Concentration greater than or equal to the CCME soil guideline for commercial (CL) land use.*

Notes:

"<" = Less than analytical method detection limit.

"-" = Analysis not conducted, or no guideline.

SQRO =Soil Quality Remediation Objective.

a) Canadian Environmental Quality Guidelines (CEQG). The site-specific factors used for determining the soil quality guideline include: soil ingestion, soil contact and nutrient cycling.

b) Guidelines are dependant upon depth of sample (surface, subsoil >1.5m depth). Surface guidelines applied.

c) Guideline is dependant on medium grain size of soil analyzed (Fine <75 µm, Coarse >75 µm). Median grain size of soil sampled is coarse.

d) Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.

Table 3: Remediation Progress Soil Samples

		Location:	SP In-situ Treatment Area			UTA-1	UTA-1				UTA-1
		Sample ID:	12646	12647	12648	12021	12045	12046	12047	12047FD	12607
		Sample Date:	8/29/2012	8/29/2012	8/29/2012	6/21/2012	6/23/2012	6/23/2012	6/23/2012	duplicate of 12047	8/28/2012
		Sample Depth (m):	0-0.1	0-0.1	0-0.1	0-0.2	0-1	0-1	0-1		0-1.0
		Field Screen (ppm)[d]:	5	5	5	40	-	-	130	130	25
		ACCUTEST File #:	1218843	1218843	1218843	1213419	1213419	1213419	1213419	1213419	1218843
PARAMETER	**UNITS**	**SQRO**	**Analytical Results**								
Extractable Hydrocarbons[a]											
F1 (C6-C10) surface [b,c]	ug/g	320	30	40	40	40	60	60	90	50	20
F1 (C6-C10) subsoil [b,c]	ug/g	700									
F2 (C10-C16) surface [b,c]	ug/g	260	140	150	190	**920**	**920**	**1410**	**1840**	**1630**	**720**
F2 (C10-C16) subsoil [b,c]	ug/g	1000									
F3 (C16-C34) surface [b,c]	ug/g	1700	30	30	30	70	80	100	50	120	120
F3 (C16-C34) subsoil [b,c]	ug/g	3500									
F4 (C34-C50) surface [b,c]	ug/g	3300	<20	<20	<20	<20	<20	<20	<20	<20	<20
F4 (C34-C50) subsoil [b,c]	ug/g	10000									

Bold *Concentration greater than or equal to the CCME soil guideline for commercial (CL) land use.*

Notes:
"<" = Less than analytical method detection limit.
"-" = Analysis not conducted, or no guideline.
SQRO =Soil Quality Remediation Objective.
a) Canadian Environmental Quality Guidelines (CEQG). The site-specific factors used for determining the soil quality guideline include: soil ingestion, soil contact and nutrient cycling.
b) Guidelines are dependant upon depth of sample (surface, subsoil >1.5m depth). Surface guidelines applied.
c) Guideline is dependant on medium grain size of soil analyzed (Fine <75 µm, Coarse >75 µm). Median grain size of soil sampled is coarse.
d) Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.

Table 3: Remediation Progress Soil Samples

		Location:	UTA-2				UTA-2		UTA-3		
		Sample ID:	12042	12043	12044	12044FD	12608	12609	12036	12037	12038
		Sample Date:	6/23/2012	6/23/2012	6/23/2012	duplicate of 12044	8/28/2012	8/28/2012	6/23/2012	6/23/2012	6/23/2012
		Sample Depth (m):	0-1	0-1	0-1		0-1.0	0-1.0	0-1	0-1	0-1
		Field Screen (ppm)[d]:	-	-	200	200	85	90	-	-	240
		ACCUTEST File #:	1213419	1213419	1213419	1213419	1218843	1218843	1213419	1213419	1213419
PARAMETER	**UNITS**	**SQRO**	**Analytical Results**								
Extractable Hydrocarbons[a]											
F1 (C6-C10) surface [b,c]	ug/g	320	130	100	100	150	40	30	120	100	90
F1 (C6-C10) subsoil [b,c]	ug/g	700									
F2 (C10-C16) surface [b,c]	ug/g	260	**1110**	**1580**	**1320**	**1580**	**1050**	**1060**	**2680**	**2040**	**2710**
F2 (C10-C16) subsoil [b,c]	ug/g	1000									
F3 (C16-C34) surface [b,c]	ug/g	1700	60	90	80	100	130	140	180	140	180
F3 (C16-C34) subsoil [b,c]	ug/g	3500									
F4 (C34-C50) surface [b,c]	ug/g	3300	<20	<20	<20	<20	<20	<20	<20	<20	<20
F4 (C34-C50) subsoil [b,c]	ug/g	10000									

Bold *Concentration greater than or equal to the CCME soil guideline for commercial (CL) land use.*

Notes:

"<" = Less than analytical method detection limit.

"-" = Analysis not conducted, or no guideline.

SQRO =Soil Quality Remediation Objective.

a) Canadian Environmental Quality Guidelines (CEQG). The site-specific factors used for determining the soil quality guideline include: soil ingestion, soil contact and nutrient cycling.

b) Guidelines are dependant upon depth of sample (surface, subsoil >1.5m depth). Surface guidelines applied.

c) Guideline is dependant on medium grain size of soil analyzed (Fine <75 µm, Coarse >75 µm). Median grain size of soil sampled is coarse.

d) Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.

Table 3: Remediation Progress Soil Samples

		Location:	UTA-3	UTA-3	UTA-4	UTA-4				UTA-4	UTA-5
		Sample ID:	12038FD	12610	12022	12039	12040	12041	12041FD	12611	12612
		Sample Date:	duplicate of 12038	8/28/2012	6/21/2012	6/23/2012	6/23/2012	6/23/2012	duplicate of 12041	8/28/2012	8/28/2012
		Sample Depth (m):		0-1.0	0-0.2	0-1	0-1	0-1		0-1.0	0-1.0
		Field Screen (ppm)[d]:	240	40	5	-	-	270	270	50	110
		ACCUTEST File #:	1213419	1218844	1213419	1213419	1213419	1213419	1213419	1218844	1218844
PARAMETER	**UNITS**	**SQRO**	**Analytical Results**								
Extractable Hydrocarbons[a]											
F1 (C6-C10) surface [b,c]	ug/g	320	110	20	20	60	70	80	80	20	60
F1 (C6-C10) subsoil [b,c]	ug/g	700									
F2 (C10-C16) surface [b,c]	ug/g	260	**2630**	**830**	**960**	**1750**	**910**	**1160**	**820**	**570**	**2210**
F2 (C10-C16) subsoil [b,c]	ug/g	1000									
F3 (C16-C34) surface [b,c]	ug/g	1700	170	100	120	100	60	60	50	80	120
F3 (C16-C34) subsoil [b,c]	ug/g	3500									
F4 (C34-C50) surface [b,c]	ug/g	3300	<20	<20	<20	<20	<20	<20	<20	<20	<20
F4 (C34-C50) subsoil [b,c]	ug/g	10000									

Bold *Concentration greater than or equal to the CCME soil guideline for commercial (CL) land use.*

Notes:

"<" = Less than analytical method detection limit.

"-" = Analysis not conducted, or no guideline.

SQRO =Soil Quality Remediation Objective.

a) Canadian Environmental Quality Guidelines (CEQG). The site-specific factors used for determining the soil quality guideline include: soil ingestion, soil contact and nutrient cycling.

b) Guidelines are dependant upon depth of sample (surface, subsoil >1.5m depth). Surface guidelines applied.

c) Guideline is dependant on medium grain size of soil analyzed (Fine <75 µm, Coarse >75 µm). Median grain size of soil sampled is coarse.

d) Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.

Table 3: Remediation Progress Soil Samples

		Location:	UTA-6		UTA-7	UTA-8	UTA-9	UTA-10	LTA-1		
		Sample ID:	12613	12614	12615	12616	12617	12618	12033	12034	12035
		Sample Date:	8/28/2012	8/28/2012	8/28/2012	8/28/2012	8/28/2012	8/28/2012	6/21/2012	6/21/2012	6/21/2012
		Sample Depth (m):	0-1.0	0-1.0	0-1.0	0-1.0	0-1.0	0-1.0	0-1	0-1	0-1
		Field Screen (ppm)[d]:	75	75	100	65	110	30	180	-	-
		ACCUTEST File #:	1218844	1218844	1218844	1218844	1218844	1218844	1213420	1213420	1213420
PARAMETER	**UNITS**	**SQRO**	**Analytical Results**								
Extractable Hydrocarbons[a]											
F1 (C6-C10) surface [b,c]	ug/g	320	30	40	70	60	60	40	250	250	270
F1 (C6-C10) subsoil [b,c]	ug/g	700									
F2 (C10-C16) surface [b,c]	ug/g	260	**1240**	**1020**	**980**	**1080**	**1220**	**300**	**2350**	**1470**	**2490**
F2 (C10-C16) subsoil [b,c]	ug/g	1000									
F3 (C16-C34) surface [b,c]	ug/g	1700	60	40	60	70	50	30	180	110	190
F3 (C16-C34) subsoil [b,c]	ug/g	3500									
F4 (C34-C50) surface [b,c]	ug/g	3300	<20	<20	<20	<20	<20	<20	<20	<20	<20
F4 (C34-C50) subsoil [b,c]	ug/g	10000									

Bold *Concentration greater than or equal to the CCME soil guideline for commercial (CL) land use.*

Notes:
"<" = Less than analytical method detection limit.
"-" = Analysis not conducted, or no guideline.
SQRO =Soil Quality Remediation Objective.
a) Canadian Environmental Quality Guidelines (CEQG). The site-specific factors used for determining the soil quality guideline include: soil ingestion, soil contact and nutrient cycling.
b) Guidelines are dependant upon depth of sample (surface, subsoil >1.5m depth). Surface guidelines applied.
c) Guideline is dependant on medium grain size of soil analyzed (Fine <75 µm, Coarse >75 µm). Median grain size of soil sampled is coarse.
d) Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.

Table 3: Remediation Progress Soil Samples

		Location:	LTA-1	LTA-2	LTA-2			LTA-2	LTA-3		
		Sample ID:	12619	12023	12030	12031	12032	12620	12027	12028	12029
		Sample Date:	8/28/2012	6/21/2012	6/21/2012	6/21/2012	6/21/2012	8/28/2012	6/21/2012	6/21/2012	6/21/2012
		Sample Depth (m):	0-1.0	0-0.2	0-1	0-1	0-1	0-1.0	0-1	0-1	0-1
		Field Screen (ppm)[d]:	5	30	120	-	-	45	310	-	-
		ACCUTEST File #:	1218844	1213419	1213420	1213420	1213420	1218844	1213419	1213420	1213420
PARAMETER	**UNITS**	**SQRO**	**Analytical Results**								
Extractable Hydrocarbons[a]											
F1 (C6-C10) surface [b,c]	ug/g	320	30	20	60	30	40	30	90	90	90
F1 (C6-C10) subsoil [b,c]	ug/g	700									
F2 (C10-C16) surface [b,c]	ug/g	260	**630**	**950**	**810**	**710**	**770**	**970**	**1330**	**1560**	**1770**
F2 (C10-C16) subsoil [b,c]	ug/g	1000									
F3 (C16-C34) surface [b,c]	ug/g	1700	90	100	50	40	50	150	80	90	1000
F3 (C16-C34) subsoil [b,c]	ug/g	3500									
F4 (C34-C50) surface [b,c]	ug/g	3300	<20	<20	<20	<20	<20	<20	<20	<20	<20
F4 (C34-C50) subsoil [b,c]	ug/g	10000									

Bold *Concentration greater than or equal to the CCME soil guideline for commercial (CL) land use.*

Notes:

"<" = Less than analytical method detection limit.

"-" = Analysis not conducted, or no guideline.

SQRO =Soil Quality Remediation Objective.

a) Canadian Environmental Quality Guidelines (CEQG). The site-specific factors used for determining the soil quality guideline include: soil ingestion, soil contact and nutrient cycling.

b) Guidelines are dependant upon depth of sample (surface, subsoil >1.5m depth). Surface guidelines applied.

c) Guideline is dependant on medium grain size of soil analyzed (Fine <75 µm, Coarse >75 µm). Median grain size of soil sampled is coarse.

d) Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.

Table 3: Remediation Progress Soil Samples

		Location:	LTA-3	LTA-4			LTA-4	LTA-5	LTA-6
		Sample ID:	12621	12024	12025	12026	12622	12623	12624
		Sample Date:	8/28/2012	6/21/2012	6/21/2012	6/21/2012	8/28/2012	8/28/2012	8/28/2012
		Sample Depth (m):	0-1.0	0-1	0-1	0-1	0-1.0	0-1.0	0-1.0
		Field Screen (ppm)[d]:	45	70	-	-	5	90	55
		ACCUTEST File #:	1218844	1213419	1213419	1213419	1218844	1218844	1218844
PARAMETER	**UNITS**	**SQRO**	**Analytical Results**						
Extractable Hydrocarbons[a]									
F1 (C6-C10) surface [b,c]	ug/g	320	40	30	40	30	20	70	50
F1 (C6-C10) subsoil [b,c]	ug/g	700							
F2 (C10-C16) surface [b,c]	ug/g	260	**720**	**680**	**670**	**870**	**290**	**1180**	**700**
F2 (C10-C16) subsoil [b,c]	ug/g	1000							
F3 (C16-C34) surface [b,c]	ug/g	1700	80	40	40	60	40	40	40
F3 (C16-C34) subsoil [b,c]	ug/g	3500							
F4 (C34-C50) surface [b,c]	ug/g	3300	<20	<20	<20	<20	<20	<20	<20
F4 (C34-C50) subsoil [b,c]	ug/g	10000							

Bold *Concentration greater than or equal to the CCME soil guideline for commercial (CL) land use.*

Notes:
"<" = Less than analytical method detection limit.
"-" = Analysis not conducted, or no guideline.
SQRO =Soil Quality Remediation Objective.
a) Canadian Environmental Quality Guidelines (CEQG). The site-specific factors used for determining the soil quality guideline include: soil ingestion, soil contact and nutrient cycling.
b) Guidelines are dependant upon depth of sample (surface, subsoil >1.5m depth). Surface guidelines applied.
c) Guideline is dependant on medium grain size of soil analyzed (Fine <75 µm, Coarse >75 µm). Median grain size of soil sampled is coarse.
d) Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.

Table 4: Remediation confirmation soil samples

		Location:	Stockpile in the former secondary containment area.								
		Stockpile ID:	PCP1	PCP2	PCP3	PCP3	PCP5	PCP10	PCP15	PCP19	PCP36
		Sample ID:	12567	12568	12569	12570	12572	12577	12583	12587	12606
		Sample Date:	8/28/2012	8/28/2012	8/28/2012	8/28/2012	8/28/2012	8/28/2012	8/28/2012	8/28/2012	8/29/2012
		Sample Depth (m):	0.1-0.15	0.1-0.15	0.1-0.15	0.1-0.15	0.1-0.15	0.1-0.15	0.1-0.15	0.1-0.15	0.1-0.15
		Field Screen (ppm)[d]:	15	5	5	0	0	0	0	5	0
		ACCUTEST File #:	1218843	1218843	1218843	1218843	1218843	1218843	1218843	1218843	1218843
PARAMETER	**UNITS**	**SQRO**	**Analytical Results**								
Extractable Hydrocarbons[a]											
F1 (C6-C10) surface [b,c]	ug/g	320	-	-	30	-	-	20	-	-	-
F1 (C6-C10) subsoil [b,c]	ug/g	700									
F2 (C10-C16) surface [b,c]	ug/g	260	100	120	130	130	160	100	80	130	140
F2 (C10-C16) subsoil [b,c]	ug/g	1000									
F3 (C16-C34) surface [b,c]	ug/g	1700	20	20	20	40	30	<20	<20	<20	<20
F3 (C16-C34) subsoil [b,c]	ug/g	3500									
F4 (C34-C50) surface [b,c]	ug/g	3300	<20	<20	<20	<20	<20	<20	<20	<20	<20
F4 (C34-C50) subsoil [b,c]	ug/g	10000									

Bold *Concentration greater than or equal to the CCME soil guideline for commercial (CL) land use.*

Notes:

"<" = Less than analytical method detection limit.

"-" = Analysis not conducted, or no guideline.

SQRO =Soil Quality Remediation Objective.

a) Canadian Environmental Quality Guidelines (CEQG). The site-specific factors used for determining the soil quality guideline include: soil ingestion, soil contact and nutrient cycling.

b) Guidelines are dependant upon depth of sample (surface, subsoil >1.5m depth). Surface guidelines applied.

c) Guideline is dependant on medium grain size of soil analyzed (Fine <75 µm, Coarse >75 µm). Median grain size of soil sampled is coarse.

d) Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.

Table 4: Remediation confirmation soil samples

		Location:	Stockpile in the former secondary containment area.				
		Stockpile ID:	PCP37	PCP37	PCP41	PCP45	PCP47
		Sample ID:	12631	12632	12636	12640	12643
		Sample Date:	8/29/2012	8/29/2012	8/29/2012	8/29/2012	8/29/2012
		Sample Depth (m):	0.1-0.15	0.1-0.15	0.1-0.15	0.1-0.15	0.1-0.15
		Field Screen (ppm)[d]:	15	20	15	10	5
		ACCUTEST File #:	1218843	1218843	1218843	1218843	1218843
PARAMETER	**UNITS**	**SQRO**	**Analytical Results**				
Extractable Hydrocarbons[a]							
F1 (C6-C10) surface [b,c]	ug/g	320	30	30	-	30	-
F1 (C6-C10) subsoil [b,c]	ug/g	700					
F2 (C10-C16) surface [b,c]	ug/g	260	120	80	140	140	160
F2 (C10-C16) subsoil [b,c]	ug/g	1000					
F3 (C16-C34) surface [b,c]	ug/g	1700	<20	<20	<20	30	30
F3 (C16-C34) subsoil [b,c]	ug/g	3500					
F4 (C34-C50) surface [b,c]	ug/g	3300	<20	<20	<20	<20	<20
F4 (C34-C50) subsoil [b,c]	ug/g	10000					

Bold *Concentration greater than or equal to the CCME soil guideline for commercial (CL) land use.*

Notes:

"<" = Less than analytical method detection limit.

"-" = Analysis not conducted, or no guideline.

SQRO =Soil Quality Remediation Objective.

a) Canadian Environmental Quality Guidelines (CEQG). The site-specific factors used for determining the soil quality guideline include: soil ingestion, soil contact and nutrient cycling.

b) Guidelines are dependant upon depth of sample (surface, subsoil >1.5m depth). Surface guidelines applied.

c) Guideline is dependant on medium grain size of soil analyzed (Fine <75 µm, Coarse >75 µm). Median grain size of soil sampled is coarse.

d) Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.

Table 5: Quality Assurance and Quality Control Remediation Soil Samples

			Sample Parent:	ISTA	UTA3	UTA4	UTA2	UTA1	PCP	PCP	SP-AREA1
			Sample ID:	11196	12038	12041	12044	12047	12569	12631	12650
			Duplicate ID:	11199	12038FD	12041FD	12044FD	12047FD	12570	12632	12651
Parameter	**Units**	**MRL**	**PQL**	**Analytical Results**							
PHC Fraction 1											
Sample Result	ug/g	20	100	20	90	80	100	90	30	30	-
Duplicate Result	ug/g	20	100	20	110	80	150	50	-	30	-
RpD	%			*na*	*na*	*na*	-40%	*na*	*na*	*na*	*na*
PHC Fraction 2											
Sample Result	ug/g	20	100	470	2710	1160	1320	1840	130	120	1610
Duplicate Result	ug/g	20	100	260	2630	820	1580	1630	130	80	1560
RpD	%			**58%**	3%	34%	-18%	12%	0%	na	3%
PHC Fraction 3											
Sample Result	ug/g	20	100	40	180	60	80	80	20	<20	70
Duplicate Result	ug/g	20	100	30	170	50	100	120	40	<20	60
RpD	%			*na*	6%	*na*	*na*	*na*	*na*	*na*	*na*
PHC Fraction 4											
Sample Result	ug/g	20	100	<20	<20	<20	<20	<20	<20	<20	<20
Duplicate Result	ug/g	20	100	<20	<20	<20	<20	<20	<20	<20	<20
RpD	%			*na*	*na*	*na*	*na*	*na*	*na*	*na*	*na*

Bold *RpD Value is greater than or equal to 50% and the concentrations of both samples are greater than the PQL.*

Notes:
na RpD value is not applicable because one or both results are less than the PQL.
*RpD Relative Percent Difference = (Difference/Average)*100.*
*PQL Practical Quantitation Limit = 5 * Method Reporting Limit (MRL).*
MRL Method Reporting Limit of analysis.

Appendix A: Photographic Record

Photo 1: Berm construction for UTA-9
(August 20, 2012)

Photo 2: RLLDPE liner placement in UTA-9
(August 20, 2012)

Photo 3: Liner placed and secured in UTA-10
(August 20, 2012)

Photo 4: Aerial view of LTA and drainage diversion
berm and silt fencing (August 30, 2012)
(photo courtesy of Canadian Coast Guard)

Photo 5: Excavation of Area 1 with exterior berm being maintained (August 12, 2012)


Photo 6: Screening of oversized rock from stockpile in Area 1 (August 18, 2012)


Photo 7: Collecting sample of soil from in-situ area following screening of oversized rock (August 22, 2012)

Photo 8: Bulldozer pushes screened low level PHC contaminated soil into UTA-7 to create base layer (August 20, 2012)

Photo 9: Base and ramp completed in UTA-7
(August 20, 2012)

Photo 10: Loading contaminated soil into
UTA-5; material hauled from Area 1 (July 16, 2012)

Photo 11: Screened contaminated soil loaded in LTA-5 and
LTA-6 (August 24, 2012)

Photo 12: Fertilizer being mixed into the soil
at LTA (July 14, 2012)

Photo 13: Windrows within in-situ treatment area

Photo 14: UTA and LTA prior to cover removal (June 19, 2012)

Photo 15: Stockpiles of soil in former secondary containment area pending laboratory confirmation that they meet the SQROs (August 26, 2012)

Photo 16: Collecting a swab sample from the surface of a rock that had been screened (August 30, 2012)