Nanisivik Mine
Contaminated Soil Remediation
2015 Progress Report

Prepared for

CanZinco Mines Ltd.

Prepared by

SRK Consulting (Canada) Inc.
1CB002.002
March 2016

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Project No: 1CB002.002

File Name: Nanisivik_1CB002-002_2015_Remediation_Progress_Report__AL_ML_20160324_FNL.docx

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Executive Summary

This report provides a summary of contaminated soil remediation completed at the former Nanisivik bulk fuel storage facility in 2015.

Key remediation activities undertaken at the former bulk fuel storage facility in 2015 included:

- Completing the excavation of contaminated soil;
- Remediation confirmation soil sampling of the base and walls of the excavated areas;
- Removing remnant liners from the former bulk fuel storage facility;
- Managing the treatment facilities;
- Monitoring biopile performance;
- Off-loading remediated soil from the treatment cells and concrete pad; and
- Vacating the former concentrate storage shed concrete pad.

New biopiles were created in the established treatment areas with soil excavated in 2015 or with the soil that had been stockpiled on the pad.

Mechanical screening, nutrient amendment, moisture content management and soil aeration has successfully reduced petroleum hydrocarbon concentrations in the soil. Concentrations of petroleum hydrocarbons in the biopiles are sufficiently low to suggest that routine aeration in 2016 will likely result in all remaining soil being treated meeting the soil quality remediation objectives before the 2017 field season.

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List of Abbreviations

BETX	benzene, ethylbenzene, toluene, xylene
CCME	Canadian Council of Ministers of the Environment
DAP	diammonium phosphate
DND	Department of National Defence
CFO	colony forming units
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+
LTA	lower treatment area
NWB	Nunavut Water Board
PHC	petroleum hydrocarbons
PQL	practical quantitation limit
QA/QC	quality assurance/ quality control
RPD	relative percent difference
SQRO	soil quality remediation objective
SSRO	site specific remediation objective
TKN	total kjeldahl nitrogen
TP	total phosphorus
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-round storage of diesel, gasoline and other fuels. Following mine closure, the 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 (DND) requested that the bulk fuel storage facility be decommissioned to allow for the construction of a naval facility. Decommissioning of the facility required remediation of petroleum hydrocarbon (PHC) contaminated soil known to be present within the facility's footprint.

Remediation is carried out using landfarming methodologies in which nutrients are added to the soil to stimulate biological activity. The remediation work commenced in 2011 under a Nunavut Water Board (NWB) approved decommissioning and reclamation plan, the *Abandonment and Reclamation Plan, Fuel Tank Farm, Former Nanisivik Mine Site, Nunavut* (Jacques Whitford Stantec Limited 2010). The abandonment and reclamation plan was updated during the 2014 Water Licence Renewal/Amendment process. The *Abandonment and Reclamation Plan for Treatment of Contaminated Soil at the Former Nanisivik Mine* (SRK Consulting 2014a) was approved by the NWB on January 29, 2015. Subsequently, site specific remedial objectives (SSRO) for PHC Fraction 2 (F2) were accepted by the NWB on July 6, 2015 (NWB 2015).

This report provides a summary of soil remediation activities completed at the former Nanisivik bulk fuel storage facility (the Site) in 2015. The report has been prepared to fulfill reporting requirements specified in Schedule B, Part J, Item 13 of NWB Water Licence No. 1AR-NAN1419.

2 Summary of Previous Remediation Activities

This section provides a brief introduction to soil remediation activities completed at the Site from 2011 to 2014. Principal reclamation and remediation work undertaken at the Site included:

- Decommissioning and removal of the petroleum storage tanks;
- Delineation of PHC contaminated soil;
- Construction of soil treatment facilities; and
- Excavation and treatment of PHC contaminated soil.

2011: Decommissioning of the tanks was undertaken in May and June 2011. Prior to demolition, the tanks were placed in a gas free state, and waste liquids and sludge were collected and placed in drums. All scrap materials and PHC contaminated waste from the tank removal were shipped off-site for disposal. Further details are provided in the 2011 Annual Report (Nyrstar 2012).

Delineation of the PHC contaminated soil was conducted to refine the estimated quantity of contaminated soil requiring treatment. Four areas of contamination were identified (Figure 1). As reported in the 2011 Annual Report, the quantities of soil requiring treatment were determined to be approximately 17,000 m^3 (Nyrstar 2012).

In 2011, eight treatment cells in which 'biopiles of PHC contaminated soil are managed were constructed. The constructed soil treatment facilities were established in two areas, the lower treatment area (LTA) and upper treatment area (UTA) (Appendix A: Figure 2). To provide supplementary treatment capacity, a temporary treatment facility was established within the footprint of the former fuel storage facility (the 'in-situ treatment area'). Soil was excavated to remove liners from the former bulk fuel storage facility in 2011 and PHC contaminated soil was placed in the treatment facilities or stockpiled above known areas of contamination. The contaminated soil in the treatment facilities were aerated every four days until winter closure. Further details are provided in the 2011 Annual Report (Nyrstar 2012).

2012: Construction of the treatment facility was completed. Details on the treatment facility design and construction are provided in the *Construction Summary Report, Nanisivik Mine Site* (WESA Inc. 2012).

Routine aeration of the soil continued. Nutrients were applied to the soil in the treatment facilities to encourage bioremediation of hydrocarbons. A vibrating screen to separate cobbles and boulders (oversized rocks) from the finer (<10 cm) contaminated soil, and to improve aeration measures, was mobilized to the Site in August. Soil previously excavated and stockpiled within the footprint of the former fuel storage facility was screened. Biopiles were established in eight new treatment cells. 2,450 m^3 of remediated soil was relocated to the former secondary containment area. Further information on the 2012 remediation activities is provided in the *Nanisivik Mine Contaminated Soil Remediation 2012 Progress Report* (SRK Consulting (Canada) Inc. and WESA, a division of BlueMetric Environmental Inc. 2013 [SRK and WESA 2013]) submitted with the 2012 Annual Report (Nyrstar 2013).

2013: The excavation and treatment of PHC contaminated soil continued. All PHC contaminated soil excavated was processed through the vibrating screen. 4,000 m^3 of oversized rocks was separated from the soil requiring treatment. The vibrating screen was shipped off-site in August. A portion of the former concentrate storage shed pad (the pad) was modified for use as a storage area for oversized rocks and PHC contaminated soil. Lead and zinc concentrate contaminated soil recovered during the modification of the pad was stored in lined crates at the edge of the pad. Biopiles were relocated from the treatment cells to the pad. Stockpiled PHC contaminated soil was relocated to treatment cells. Routine soil aeration and nutrient application continued. Further information on the 2013 remediation activities in provide in the *Nanisivik Mine Contaminated Soil Remediation 2013 Progress Report* (SRK 2014b) submitted with the 2013 Annual Report (Nyrstar 2014).

2014: The excavation and treatment of PHC contaminated soil continued. The portion of the pad utilized for the storage of PHC contaminated soil was expanded for remediation stockpiles. During expansion potentially contaminated lead and zinc concentrate scraped off the expanded pad area and stored in lined crates. Routine soil aeration and nutrient application continued. 3,650 m^3 of remediated soil was relocated from the treatment cells and pad to the former secondary containment area. Stockpiled PHC contaminated soil was relocated to treatment cells. Further information on the 2014 remediation activities is provided in the

Nanisivik Mine Contaminated Soil Remediation 2014 Progress Report (SRK 2015a) submitted with the 2014 Annual Report (Nyrstar 2015).

3 Soil Quality Remediation Objectives

Soil quality remediation objectives (SQROs) applied during the treatment of PHC contaminated soil in 2015 are listed in Table 3-1. The SQROs include a SSRO for PHC F2 developed based on an assessment of the ecotoxicity of surface soil at the Site (Hemmera 2015). The remaining objectives were derived from generic commercial land use guidelines established 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). The PHC SQROs are specified in an update to *Appendix B Soil Quality Remediation Objectives* (SRK 2015b) of the *Abandonment and Reclamation Plan for Treatment of Contaminated Soil at the Former Nanisivik Mine* (SRK 2014a).

Table 3-1: Soil Quality Remediation Objectives for the Nanisivik former bulk fuel storage facility.

Parameter	Surface Soil (mg/kg)	Subsurface Soil (mg/kg)
Benzene	110	360
Toluene	250	500
Ethylbenzene	300	600
Total Xylenes	350	700
PHC Fraction 1 (F1)	320	700
PHC Fraction 2 (F2)	410	1,000
PHC Fraction 3 (F3)	1,700	3,500
PHC Fraction 4 (F4)	3,300	10,000

Source: SRK 2015b.

The SQROs also include NWB approved SSROs for potential metals of concern developed based on a human health and ecological risk assessment (Jacques Whitford Environmental Limited 2003) as listed in Table 3-2.

Table 3-2: Soil Quality Remediation Objectives for the metals at the Nanisivik dock site.

Parameter	Soil (mg/kg)
Lead	4,500
Zinc	44,000
Cadmium	2,800
Copper	5,900

Source: Jacques Whitford Environmental Limited. 2003.

The soil sampling methodology applied in 2015 to confirm the success of contaminated soil excavation and soil remediation was described in the *Abandonment and Reclamation Plan for Treatment of Contaminated Soil at the Former Nanisivik Mine* (SRK 2014a) and its Appendix A, *Remediation Confirmatory Soil Sampling Methodology* (SRK 2014c). The sampling methodology has been reviewed and accepted by the NWB and is summarized in the following paragraphs.

The in situ sampling procedure required that each excavation area at the former Nanisivik Mine site 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 are composited over a length of 25 m. The combining of four or five evenly spaced aliquots of soil within the individual composite sample area created the composite sample. A single aliquot of soil from a specific point is a discrete sample. Discrete samples were analyzed by the laboratory as part of the quality assurance and control (QA/QC) measures.

The ex situ sampling procedure required that a composite sample to characterize a stockpile or biopile of soil be created by combining five discrete samples. Discrete remediation confirmatory samples were collected following the turning (aeration) of soil or during the placement of soil into a stockpile. The volume of soil represented by each composite sample typically ranged from 50 m^3 to 150 m^3, with no discrete sample representing more than 50 m^3.

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 and discrete QA/QC samples. The QA/QC plan requires one duplicate and three discrete samples from one composite sample for every ten composite samples submitted for laboratory analysis.

All remediation confirmation soil samples are analyzed at a laboratory accredited by the Canadian Association for Environmental Analytical Laboratories.

4 2015 Remediation Activities

4.1 Introduction

Key remediation activities undertaken at the Site in 2015 included:

- Completing the excavation of contaminated soil;
- Remediation confirmation soil sampling of the base and walls of the excavated areas;
- Removing remnant liners from the former bulk fuel storage facility;
- Managing the treatment facilities;
- Monitoring biopile performance;
- Off-loading remediated soil from the treatment cells and pad; and
- Vacating the pad.

The work plan for 2015 was overseen by SRK on behalf of CanZinco. SRK was at Site from June 25 to July 31 and August 27 to 31.

4.2 Excavation and Soil Handling

4.2.1 Overview of Contaminated Areas

Preliminary boundaries of the areas to be remediated were identified by a series of test pits excavated within the footprint of the bulk fuel storage facility in 2011. Results of the field screening measurements and analytical analysis indicated four areas of PHC contamination as shown on Figure 1. These four areas have been the focus of remedial efforts at the Site.

Area 1. Results from test pits excavated in 2011 determined that the PHC F2 contamination extended across the area formerly occupied by the Tank 101 pad. Previous testing had determined that PHC F2 contaminated soil was present in the berm (SRK 2009).

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.

Area 3. The soil at the junction of the overlapping liners between the Tank 101 pad, the light fuels pad and the Tank 102 pad exceeded PHC F1 and F2 SQROs.

Area 4. PHC F2 contaminated soil was found in a part of the secondary containment area.

4.2.2 Field Screening

Soil from potentially PHC contaminated areas was tested on site using a bag-headspace method with a portable gas detector and olfactory indications, as described in the *Remediation Confirmatory Soil Sampling Methodology* (SRK 2014c). The field screening results were then used on-site to guide further excavation and to monitor remediation performance.

The field screening readings provide an indication of the PHC concentrations, however the method is susceptible to errors when the sample preparation environment cannot be controlled (i.e. when samples are not warmed at a constant temperature over a consistent length of time). Confirmation that the SQROs are met requires laboratory analyses of samples.

4.2.3 Excavation

In 2015, the excavation of PHC contaminated soil commenced June 24 and was completed July 1. Residual contamination was excavated from areas 1, 2 and 3 as identified in 2011. Excavation of contaminated soil proceeded until field screening tests indicated that the remediation objections had been met. The limits of excavation are shown on figures 2 and 4. The following summarize the excavation areas and provides reference to site photos.

Area 1. Remnants of contaminated soil were excavated from the northeast wall of the area. (Appendix A: Photo 1).

Area 2. Remnants of contaminated soil in the north berm of the area were removed. (Appendix A: Photo 2). The liner that had remained at the base of the in-situ treatment area in the floor of Area 2 was removed and stored beside the LTA pending disposal in the CanZinco landfill. (Appendix A: Photo 3).

Area 3. Remnants of contaminated soil were removed from the west wall and a portion of the adjacent floor of Area 2. (Appendix A: Photo 4).

Area 4. The excavation of contaminated soil in Area 4 was completed in 2014. In 2015, remediated soil was placed in the excavation and the area leveled off. (Appendix A. Photo 5).

4.2.4 Stockpile Management

In 2015, soil was stockpiled in two locations (Figure 2) based on PHC concentrations as follows:

CanZinco Yard: Stockpiles of soil that has been remediated to meet the SQROs has been placed in the former secondary containment area since 2012. In 2015, the southern half of the former secondary containment area along with the footprint of Area 4 was utilized for remediated soil. This area is outside of the DND construction zone and is referred to as the CanZinco Yard. (Appendix A: Photo 5).

Concrete Pad: The pad was used until late July to store soil based on the terms of an agreement made with the surface lease holder. Stockpiles which did not meet the SQROs at the end of the 2014 field season (Pad 3-2, Pad 4-1, Pad 4-2) were consolidated before being subdivided into smaller stockpiles and sampled. Based on the analytical results the stockpiles of soil were relocated to the CanZinco Yard, or to the UTA and LTA if further treatment was required. Stockpiles of soil that lacked analytical results were relocated to the LTA at the end of July and the pad vacated by CanZinco. (Appendix A: photos 6 and 7).

4.2.5 Waste Concentrate Contaminated Soil Handling

Three crates of material collected when the surface of the pad was swept and accessible fill removed from cracks in the pad in 2013 and 2014 had been stored at the edge of the pad. At the end of July, the crates were removed and subsequently repackaged for off-site disposal. The material in the lined wooden crates was contaminated with lead and zinc concentrate. Test results had returned 2.3% lead and 17.7% zinc from one of the crates.

During the removal of the crates from the pad approximately 10 kg of lead concentrate impacted soil was spilled from one of the crates onto soil adjacent to the west side of the pad. The area of the spill was excavated and remediation confirmation samples collected at the end of July. The spill was reported to the NWT/NU Spill Report Line. Additional excavation occurred in August because one sample result from the base of the excavation exceeded the SQROs. The area was then resampled. The recovered material was placed in sturdier lined crates. (Appendix A: photos 8 and 9). Ex-situ samples were collected to characterize the soil in each new crate.

A second crate was deposited directly into the LTA (biopiles LTA2-4 and LTA3-5). The remnants of the crate's contents and soil adjacent to it was excavated and the recovered material place in the west half of the LTA stormwater retention pond. (Appendix A: photos 10 and 11).

The contents of the third crate of lead and zinc concentrate contaminated soil recovered from the pad was transferred to a sturdier lined crate.

All crates are clearly marked as hazardous waste and as the property of CanZinco Mines Ltd. (Appendix A: Photo 9).

4.3 Biopile Management

The UTA and LTA treatment facilities are a series of geosynthetic lined cells where biopiles of PHC contaminated soil are managed. (Appendix A: Photo 12). Normally, the biopiles are constructed to a height of 1.5 m and each cell stores approximately 220 m^3 of contaminated soil. The height of the biopiles in cells LTA2 thru LTA6 at the end of the season exceeded 1.5 m in order to accommodate all of the soil that either exceeded the SQROs or lacked laboratory analytical results characterizing its quality at the time the pad was vacated.

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. To enhance the microbial performance nutrients are added and moisture content managed.

4.3.1 Aeration

Gas transfer in the contaminated soil is important for two reasons: 1) the bioremediation process requires oxygen to occur, and 2) gas transfer promotes volatilization of the PHC from the soil. To achieve the gas transfer, the contaminated soil in the UTA and LTA was turned and aerated as listed in Table 4-1.

The biopiles were 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. The bottom 0.3 to 0.5 m of the biopiles was not aerated or removed during off-loading in order to reduce the risk of damaging the liner. No excavator was available after July to aerate the piles as this equipment was being fully utilized for the construction of the DND facility at Nanisivik and for the construction of a health centre in Arctic Bay.

Table 4-1: 2015 aeration schedule.

June						
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	**26**	27
28	29	30				

July						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	**15**	**16**	17	18
19	20	21	22	23	**24**	**25**
26	27	28	29	30	31	

August						
S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	**31**					

Days when biopiles were aerated

Days when biopiles in the cells were off-loaded and reloaded

4.3.2 Management of Moisture Content

Water is required for microbial respiration and therefore PHC remediation. Hydrocarbon-degrading microbes 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. The moisture content of the biopiles was measured in the field with a handheld soil moisture meter. Additional water is to be added to the biopiles to maintain an average above 5% (WESA 2013).

4.3.3 Nutrient Amendment

The nutrients needed for accelerating bioremediation are added to the soil based on the level of total PHC concentration for the microbial cells to replicate and survive. As advised by WESA, in cold region soils, nitrogen and phosphorus are the nutrients that typically limit microbial degradation. Nitrogen and phosphorus were added during biopile construction in the form of granular agricultural fertilizers Urea and diammonium phosphate (DAP). For every 400 m^3 of soil 50 kg of Urea (two bags) and 6.25 kg of DAP (¼ bag) were applied based on an assumed total PHC concentration of about 600 mg/kg.

4.4 Chemical Analysis

Samples were collected and sent to Exova Canada Inc. in Ottawa. The sampling and analysis focused on:

Impact Monitoring: Samples were collected to determine if the remediation activities are impacting adjacent soil and water quality.

Remediation Performance Monitoring: Performance monitoring included the characterization of biopiles and stockpiles.

Remediation Confirmation Sampling: Soil samples were collected along the base and walls of the excavated areas and from biopiles in accordance with the *Remediation Confirmatory Soil Sampling Methodology* (SRK 2014c) to confirm that the contaminated soil is properly remediated.

Waste Concentrate Characterization Sampling: Soil samples were collected to characterize material for potential disposal off-site due to contamination by lead and zinc concentrate.

Quality Assurance/Quality Control Sampling: QA/QC measures associated with the collection and analysis of the soil samples included the laboratory analysis of blind duplicates and discrete QA/QC samples.

5 Results

The sample locations are shown on figures 2 and 3 and the results are compared to the SQROs on tables 1 to 5 (back of report). QA/QC sample results are provided in tables 6 and 7 (back of report). The samples identified with the ending “F-C” represent composite floor samples and the samples identified with the ending “W-C” represent composite wall samples. Samples ending in “D” instead of “C” represent discrete grab samples. Samples collected from stockpiles do not contain the wall or floor identifiers.

5.1 Field Screening

For the field screening of soil samples described in Section 4.2.2, laboratory analyses of soil recovered from the excavation limits has indicated that: soil with vapour readings of 40 ppm or less will meet the SQROs; soil with vapour readings of 65 ppm or less will usually meet the SQROs; and soil with vapour readings greater than 90 ppm will exceed the SQROs. Field screening results of soil samples from the biopiles are less predictable.

5.2 Impact Monitoring Results

Analytical results acquired to monitor potential impacts to soil in areas adjacent to the remediation activities are provided in Table 1 (back of report). Samples of the following materials were analyzed for petroleum hydrocarbons:

- Remediated soil that passed through the DND contractor’s screener and placed in the laydown yard to the east of the pad (Almiq yard),
- Clayey silt that had accumulated in the sump within the pad,
- Soil below the pad sump upon removal of the liner,
- Soil below the local contractor’s fuel cache upon removal of the liner, and
- Soil from the area surrounding the portion of the pad used for soil reclamation activities following CanZinco’s evacuation of the pad.

The soil sample results indicate that there has been no significant PHC impact on soil at the pad sump, fuel cache, or adjacent to the portion of the pad used for the storage of PHC contaminated soil. The PHC concentrations in each area met the SQROs for the Site.

Several of the samples from the area surrounding the pad were also analyzed for metals. The samples tested for metals indicate that the concentrations of metals adjacent the pad did not increase as a result of the pad’s use by CanZinco. The metal concentrations met the SQROs for the Site. The sample locations are shown on Figure 3.

Water that accumulated in the sump was visually monitored in the 2015 field season. No visual sheen was observed.

In addition, water quality samples were collected at Station 159-6, located 100 m down-gradient of the CanZinco Yard on Twin Lakes Creek (Figure 2) in accordance with Water Licence 1AR-NAN1419. Station 159-6 is immediately down-gradient of a temporary garage installed in the fall of 2014 for the DND construction project. Documentation of water quality testing results is provided under separate cover in the *2015 Annual Water Quality Monitoring Report – Nanisivik Mine, Nunavut* (Stantec 2016).

5.3 Remediation Performance Monitoring Results

5.3.1 Nutrient Amendment and Microbial Colony

The nutrient content of the soil was measured as total kjeldahl nitrogen (TKN) and total phosphorus (TP). TKN is the sum of organic nitrogen, ammonia, and ammonium in the chemical analysis of soil. Analytical results for three biopiles tested in June 2015 are listed in Table 5-1. Results for the colony forming units (CFU) of bacteria that target PHC in the biopiles are also listed in the table.

In previous years, the percent TKN in the treated biopiles has ranged from 0.01 to 0.07 and the percent TP has ranged from 0.03 to 0.06. The 2015 results are within the same range as previously detected.

The populations of hydrocarbon degrading bacteria in the treated biopiles has ranged between 650.000 and >300,000,000 CFU/g in previous years. Bacteria in untreated soil has been as low as 89,000 CFU/g. The 2015 sample results demonstrate that the populations of hydrocarbon degrading bacteria continue to thrive in the biopiles.

Table 5-1: Nutrient and microbial colony performance monitoring results.

Date sampled	Location	Sample number	TKN (%)	TP (%)	Bacteria (CFU/g)
June 30, 2015	UTA4-3	15461	<0.03	0.03	9,100,000
June 30, 2015	LTA3-4	15464	0.04	0.03	62,000,000
June 30, 2015	LTA4-4	15465	<0.03	0.03	81,000,000

Source: Nanisivik_Sample_Log_20162602.xlxs

5.3.2 Moisture Content

Biopile soil moisture contents were measured in 2015. In June and July, field moisture contents of the biopiles ranged from 0.7% to 18% with an average of 7.2%. No additional water was added to the biopiles in 2015.

5.3.3 Characterization of Biopiles and Stockpiled Soil

In June and July the biopiles in the UTA and LTA were managed as described in Section 4.3. All samples collected in June and July adhered to the ex situ remediation confirmatory soil sampling procedure. In August, only samples collected from UTA 2, 4, 5 and 7 followed the ex situ sampling procedure. The results for the remaining biopiles in the UTA and LTA merely provide an indication of the range of PHC concentrations present as only the upper 0.5 m of these biopiles was sampled. Samples collected from the soil placed in the LTA stormwater retention pond are also summarized in Table 2 (back of report).

Stockpiles present at the start of the 2015 field season that exceeded the SQROs were consolidated before being subdivided into 24 smaller stockpiles (Pad 5-1 to Pad 5-24). Prior to the collection of ex situ remediation confirmation samples several of the smallest stockpiles were combined, resulting in seventeen stockpiles being sampled in mid-July. Based on the results the biopiles were relocated to either the UTA and LTA or the CanZinco Yard. Results for stockpiled soil on the pad are provided in Table 3 (back of report). The ex situ remediation confirmatory soil sampling procedure was followed when testing all stockpiles.

5.4 Remediation Confirmation Results

5.4.1 In Situ Sampling of Excavation Limits

Results for twenty in situ confirmatory soil samples analyzed for PHC are summarized in Table 4 (back of report) and illustrated on Figure 3. Table 5-2 below indicates the areas where samples were collected and the type of sample collected.

Table 5-2: Sample summary.

Area	Floor Composite (“F-C”)	Floor QA/QC (“F-Q, F-D”)	Wall Composite (“W-C”)	Wall QA/QC (“F-Q, F-D”)	Total
Area 1	1	4	-	-	5
Area 2	-	-	1	7	8
Area 3	1	6	-	-	7
Total	**2**	**10**	**1**	**7**	**20**

All samples were analyzed for the contaminants of concern as explained in Section 4.2.1. All samples were analyzed for PHC F2 to F4 and fifteen (15) samples were also analyzed for PHC F1 and benzene, ethylbenzene, toluene, xylene (BETX). All results meet the SQROs.

Results for four remediation confirmatory samples (16105-W-D, 16106-W-D, 16117-W-D and 16118-W-D) analyzed for potential metal contaminates of concern from the area where waste concentrate was spilled beside the pad are included with the background soil quality monitoring results (Table 1) and are illustrated on Figure 3. All results meet the SQROs.

Results for eight metal remediation confirmatory samples collected from biopiles LTA2-4 and LTA3-5 following the removal of potentially waste concentrate impacted soil are included with the biopile remediation progress soil sample results (Table 2). All results meet the SQROs.

5.4.2 Ex Situ Remediation Sampling of Biopiles

In 2015, 3,650 m^3 of remediated soil from UTA1-4, UTA2-3, UTA3-2, UTA3-3, UTA4-3, UTA5-4. UTA6-4, UTA7-3, UTA7-4, UTA8-3, UTA9-3, UTA10-4, LTA1-4, LTA2-3, LTA3-4, LTA4-4, LTA5-3, LTA6-3, Pad 2-4, Pad 2-5, Pad 2-7, Pad 4-3, Pad 4-4, Pad 4-5, Pad 4-6, Pad 5-10, Pad 5-7, Pad 5-7, Pad 5-3, Pad 5-17, Pad 5-18 and Pad 5-20 was relocated to the CanZinco Yard upon receipt of laboratory results (tables 2 and 3).

The PHC concentrations associated with each biopile in the treatment cells at the end of the 2015 field season are illustrated on Figure 2. Biopiles UTA-2-5, UTA-3-4, UTA-4-4, and UTA-7-6 meet remediation objectives. The remaining biopiles were not sampled according to the ex situ sampling procedure at the end of the season because only the upper 0.3 to 0.5 m of these piles could be turned without the use of an excavator.

5.5 Hazardous waste sample

Table 5 (back of report) shows that the soil stored in boxes 3, 4 and 5 exceed the SQROs. The lead concentrations are such that this material is considered a Class 9.3 dangerous waste. The soil in the other boxes meets the SQROs.

5.6 Quality Assurance and Quality Control

The complete listing of laboratory QA/QC samples and their relative percent difference (RPD) are shown in tables 6 and 7 (back of report). QA/QC sample identifiers ending in “Q” represent blind field duplicate samples. 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. QA/QC sample identifiers ending in “D” represent discrete samples which monitor the homogeneity of composite sample areas. Results that are either below the detection limit for one or both sample pairs, or below the Practical Quantitation Limit (PQL) have RPD’s identified as not applicable.

Twelve sample pairs have blind field duplicate analyses for PHC. Three of these have results that are below the PQL for all parameters. Of the remaining nine pairs, RPDs are greater than 40% for PHC F2 for one sample pair. Sample 16097-Q and its duplicate 16094-D were collected from biopile LTA2-4 and the result does not impact the conclusions of this report because LTA2-4 is to be relocated to the UTA at the start of the 2016 season for further treatment.

Twenty six composite and discrete sample pairs were analyzed for petroleum hydrocarbons. Fifteen of these have results that are below the PQL for all parameters. Of the remaining eleven sample pairs, RPDs are greater than 40% for two sample pairs. Samples 15482-D and 15483-D were collected from the east wall of Area 1 and represent the heterogeneity of the PHC concentrations insitu.

Two sample pairs have blind field duplicate analyses for potential metals of concern. RPDs are less than 40% for both pairs.

Three composite and discrete sample pairs were analyzed for potential metals of concern. RPDs are greater than 40% for lead, zinc and cadmium in each of the sample pairs and represent the heterogeneity of the concentrate concentrations following the excavation of impacted soil at the edge of the pad. The results are all below the SQROs and do not impact the conclusions of this report.

6 Discussion

6.1 Volume of Contaminated Soil

In 2015, 3,650 m^3 of soil meeting the soil quality remediation objectives was relocated from the treatment cells and pad to the former secondary containment area. An additional 600 m^3 of soil in four biopiles in the constructed treatment cells meets the SQROs. The estimated volumes of soil requiring further testing and potential treatment is summarized in Table 6-1.

Table 6-1: Estimated volume of soil requiring treatment.

Location of PHC contaminated soil	
Below ground within area of former tanks	0 m^3
Stockpiled on Pad	0 m^3
Upper Treatment Area	1,600 m^3
Lower Treatment Area	1,400 m^3
Total Volume of Soil Requiring Treatment	**3,000 m^3**

6.2 PHC Concentrations

At the end of the 2015 season sampling determined order of magnitude PHC F2 concentrations in the biopiles that were not sampled according to the ex situ sampling procedure. Table 6-2 provides the range of PHC F2 concentrations in the upper 0.5 m of these biopiles.

Table 6-2: Concentrations of PHC F2 requiring treatment.

Location of PHC contaminated soil	Minimum mg/kg	Maximum mg/kg
Upper Treatment Area	260	450
Lower Treatment Area	120	440

6.3 Remediation Rate

Due to the lack of ex situ sampling results in August 2015 no updates can be made about the remediation rate achieved in 2015. From the limited data set available it is anticipated that the remediation of the contaminated soils can be completed by the end of the 2016 field season if routinely aerated and analytical tests submitted for laboratory analysis.

6.4 Hazardous Waste

Lead concentration results showed that storage boxes 3, 4 and 5 must be shipped off site for disposal as hazardous waste. The contents of the remaining boxes and the soil placed in the LTA stormwater retention pond meet the SQROs and can be disposed of on site.

7 Recommendations

The following recommendations are provided for the 2016 field season:

- Laboratory analysis of soil is required to monitor PHC attenuation in the biopiles.
- Biopiles UTA2-4, UTA3-4, UTA4-4 and UTA7-4 are to be off-loaded to the CanZinco Yard at the start of the 2016 season as this soil meets the SQROs.
- Biopiles UTA1-5, UTA5-6, UTA8-4, UTA9-4, UTA10-5, LTA1-5 and the LTA stormwater retention pond are to be aerated and sampled following the ex situ sampling procedure and offloaded to the CanZinco Yard if the results meet the SQROs.
- The biopiles in LTA 2 to 6 are too high to permit effective aeration. The upper 1.0 m of soil in these treatment cells is to be transferred to the UTA when space becomes available in cells UTA2, 3, 4, and 7.
- The soil remaining in the LTA and the newly constructed biopiles in the UTA are to be sampled following the ex situ sampling procedure and offloaded to the CanZinco Yard if the results meet the SQROs.
- Soil that exceeds the SQROs in the LTA is to be transferred to the UTA when space becomes available throughout 2016.
- Decommissioning of the LTA can commence when the soil in the treatment cells is removed. Upon removal of the liner the soil remaining underneath is to be sampled following the in situ sampling procedure. Further decommissioning of the facility is to resume when laboratory analysis demonstrates that the soil meets the SQROs.
- The concentrate contaminated soil stored in wooden boxes 3, 4 and 5 is to be shipped off-site as TDG Class 9.3 dangerous waste and disposed of at an approved facility.
- The waste liner from the LTA is to be stored at the dock site in 2016.
- To prevent inadvertent use of the CanZinco landfill site by others all waste liner, is to be disposed of in the landfill within one field season (i.e. when the UTA is decommissioned).
- Biopiles that exceed the SQROs are to be managed with the same aeration schedule as undertaken previously, once every three or four days during dry periods.
- Biopiles remaining at the end of the field season should be tested following the ex situ sampling procedure.

8 Conclusions

Key conclusions from the 2015 soil remediation activities are as follows:

- Soil removed from the pad and constructed treatment cells and placed in the former secondary containment area was remediated in accordance with the SQROs.
- The soil remediation project has successfully reduced PHC concentrations. The maximum PHC concentrations in the Site soils are lower than documented in previous progress monitoring reports.
- Current PHC concentrations in the Site soils are sufficiently low to suggest that aeration of the remaining contaminated soils as recommended will likely result in all Site soils meeting the SQROs at the end of the 2016 field season.
- The waste concentrate contaminated soil has been securely repackaged and any impacts due to the handling of the original containers remediated.

This report, Nanisivik Mine Contaminated Soil Remediation 2015 Progress Report, was prepared by

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and reviewed by

Mark Liskowich, PGeo

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.

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Figures

LEGEND

Extent of Contaminated Soil July 2011

0 5 10 15 20 25
Scale in Metres

J:\01_SITES\Nanisivik\1040_AutoCAD\Original Areas of Contaminated Soil.dwg

srk consulting

SRK JOB NO.: 1CB002.002

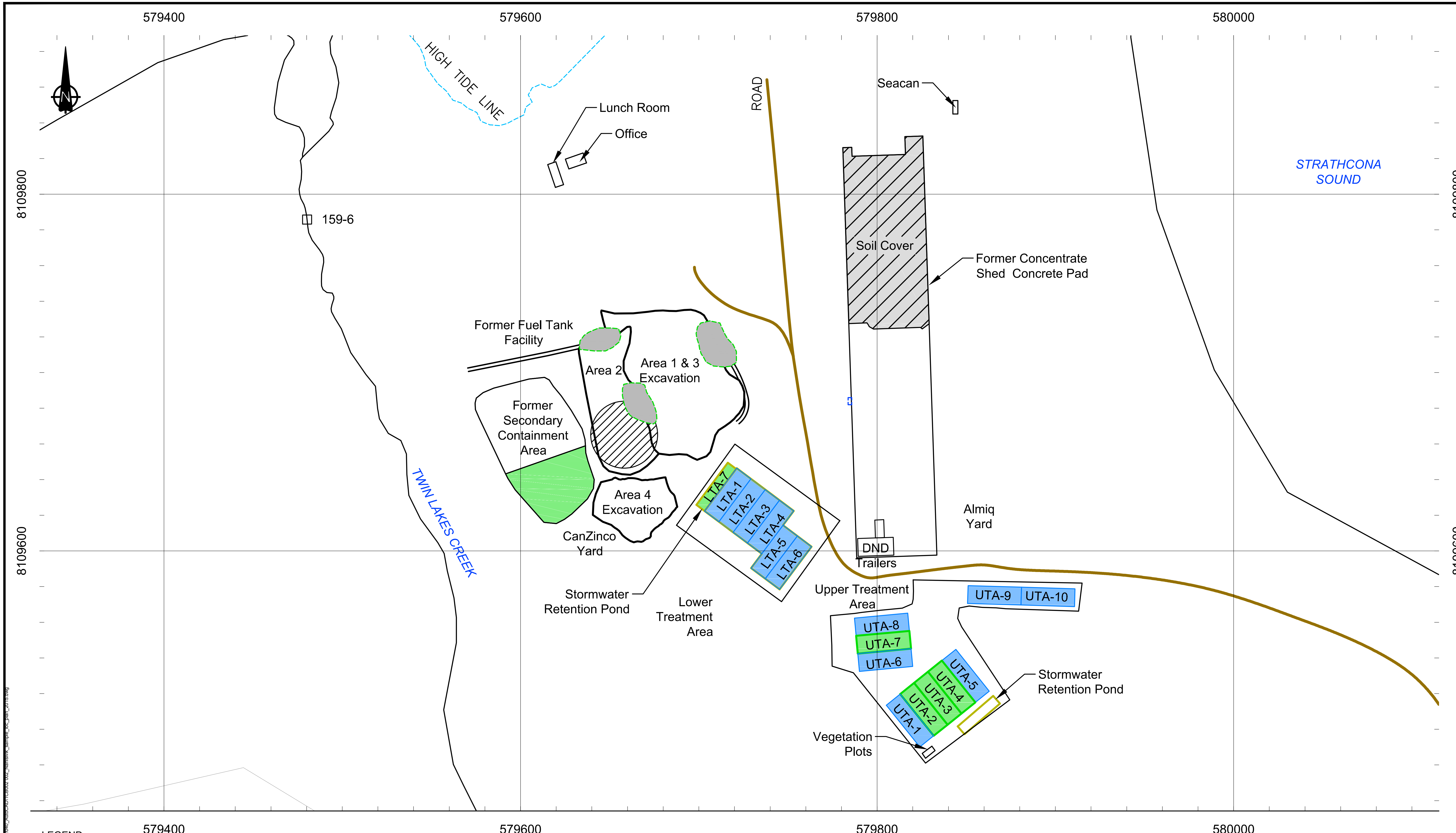
FILE NAME: Original Areas of Contaminated Soil.dwg

nyrstar

Nanisivik Mine Contaminated Soil Remediation
2015 Progress Report

Original Areas of Contaminated Soil

DATE:	APPROVED:	FIGURE:
February 2015	SM	1



LEGEND

- Soil that meets the remediation objectives
- Soil that exceeds the remediation objectives
- No remediation confirmation samples to report
- Berms
- Water Quality Monitoring Station
- 2015 Excavation Limits
- Liner Removed

0 40 80 120 160 200
Scale in Metres

NOTES
Coordinate System: UTM NAD 1983 Zone 16

srk consulting

nyrstar

Nanisivik Mine Contaminated Soil Remediation
2015 Progress Report

General Site Arrangement

SRK JOB NO.: 1CB002.002
FILE NAME: 1CB002 002_Nanisivik_sample_loc_plan_2015.dwg
DATE: Jan. 2016
APPROVED: AL
FIGURE: 2

579600 579700 579800 579900

8109700 8109600

15454-W-D
15453-W-D
15466-W-C / 15467-W-Q
15451-W-D
15450-W-D
15449-W-D
15452-W-D
Area 2
15482-F-D
15483-F-D
15491-F-C / 15492-F-Q
15487-F-D
Area 1&3 Excavation
15478-F-D
15475-F-D
15479-F-D
15488-F-C / 15489-F-Q
15476-F-D
15477-F-D
Former Secondary Containment Area
Area 4 Excavation
CanZinco Yard
TWIN LAKES CREEK
Lower Treatment Area
Road
15748-F-C
Former Fuel Cache
Soil Cover
Former Concentrate Shed Concrete Pad
16071-W-C
16072-W-C
16073-W-C
15747-F-C
15746-F-C
Former Sump
16070-W-C
16058-W-C
16069-W-C
16118-W-D
16117-W-D
16105-W-D
16059-W-C
16106-W-D
16068-W-C
16060-W-C
16067-W-C
16061-W-C
15494-F-C
Almiq Yard
16066-W-C
16062-W-C
15492-F-C
DND Trailers
16075-W-D
16063-W-C
16076-W-D
16064-W-C
16077-W-D
16065-W-C / 16078-W-Q
Upper Treatment Area

LEGEND

- Soil that meets the remediation objectives
- Soil that exceeds the remediation objectives
- Berm
- 2015 Excavation Limits
- Liner Removed
- Wall Sample

14428-W-D <Sample ID><Location><Type>

Location
- F Floor of Excavation
- W Wall of Excavation

Type
- D - Discrete
- C - Composite
- Q - Duplicate

0 10 20 30 40 50
Scale in Metres

NOTE:
Coordinate System is NAD83, UTM Zone 16.

srk consulting

SRK JOB NO.: 1CB002.002
FILE NAME: 1CB002 002_Nanisivik_sample_loc_plan_2015_v2.dwg

nyrstar

Nanisivik Mine Contaminated Soil Remediation
2015 Progress Report

Remediation Confirmation Samples

DATE:	APPROVED:	FIGURE:
March 2015	AL	3

\\srk.ad\dfs\van\Projects\91_SITES\Nanisivik\1040_AutoCAD\1CB002 002_Nanisivik_sample_loc_plan_2015_v2.dwg

Tables

Table 1: Background Soil Quality Monitoring Results

Location:			-1" screened material in Almiq Yard		Pad Sump Below Liner	Pad Sump Above Liner	Moses' Fuel Cache	Adjacent Concrete Pad				
Sample ID:			15492-C	15494-C	15746-C	15747-C	15748-C	16058-C	16059-C	16060-C	16061-C	16062-C
Sample Date:			7/1/2015	7/1/2015	7/15/2015	7/15/2015	7/15/2015	7/28/2015	7/28/2015	7/28/2015	7/28/2015	7/28/2015
Field Screen (ppm):			5	20	0	0	0	0	0	0	0	0
Moisture			7.2	6.9	4	0.6	5.6	2.4	1	1	1.6	2.5
Exova File #			1512413	1512413	1513794	1513794	1513794	1515260	1515260	1515260	1515260	1515260
Parameter	**Units**	**SQRO[a]**	**Analytical Results**									
Extractable Hydrocarbons												
F1 (C6-C10) [c,d,e]	µg/g	320	-	-	<10	<10	<10	-	-	-	-	-
F2 (C10-C16) [b]	µg/g	410	20	20	<10	50	20	<10	<10	<10	140	20
F3 (C10-C16) [c,d,e]	µg/g	1700	<20	<20	60	670	<20	<20	<20	<20	30	<20
F4 (C34-C50) [c,d,e]	µg/g	3300	<20	<20	<20	100	<20	<20	<20	<20	<20	<20
Metals												
Lead [b]	µg/g	4500	-	-	-	-	-	189	162	237	252	145
Zinc [b]	µg/g	44000	-	-	-	-	-	1980	1510	1460	880	948
Cadmium [b]	µg/g	2800	-	-	-	-	-	5.4	4.8	3.8	2.7	2.8
Copper [b]	µg/g	5900	-	-	-	-	-	27	25	24	26	25

Bold Concentration greater than or equal to the SQROs

Notes:

"<" = Less than analytical method detection limit.

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

a) Former Nanisivik Mine Soil Quality Remediation Objectives (SQROs)

b) Site-specific Soil Remediation Objective (SSRO)

c) Canadian Council of Ministers of the Environment (CCME) petroleum hydrocarbon soil quality guidelines for commercial land use. The site-specific exposure pathways used to determine the standards include: soil ingestion, soil contact and management limits.

d) Guidelines are dependant upon depth of sample (surface, subsoil >1.5m depth). All samples are surface samples.

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

Table 1: Background Soil Quality Monitoring Results

Location:			Adjacent Concrete Pad									
Sample ID:			16063-C	16064-C	16065-C	16066-C	16067-C	16068-C	16069-C	16070-C	16071-C	16072-C
Sample Date:			7/28/2015	7/28/2015	7/28/2015	7/28/2015	7/28/2015	7/28/2015	7/28/2015	7/28/2015	7/28/2015	7/28/2015
Field Screen (ppm):			0	0	0	0	0	0	0	0	0	0
Moisture			3	1.4	1.9	1.4	1.8	1.8	0.1	1.2	2.5	1.4
Exova File #			1515260	1515260	1515260	1515260	1515260	1515253	1515253	1515253	1515260	1515260
Parameter	**Units**	**SQRO[a]**	**Analytical Results**									
Extractable Hydrocarbons												
F1 (C6-C10) [c,d,e]	µg/g	320	-	-	-	-	-	-	-	-	-	-
F2 (C10-C16) [b]	µg/g	410	10	<10	<10	<10	<10	<10	20	<10	<10	<10
F3 (C10-C16) [c,d,e]	µg/g	1700	<20	<20	<20	<20	<20	<20	<20	<20	60	40
F4 (C34-C50) [c,d,e]	µg/g	3300	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Metals												
Lead [b]	µg/g	4500	183	2000	1090	2010	2210	-	-	-	-	-
Zinc [b]	µg/g	44000	760	1760	1040	1540	1620	-	-	-	-	-
Cadmium [b]	µg/g	2800	2	4.7	3	3.9	4.4	-	-	-	-	-
Copper [b]	µg/g	5900	22	26	24	42	32	-	-	-	-	-

Bold Concentration greater than or equal to the SQROs

Notes:

"<" = Less than analytical method detection limit.

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

a) Former Nanisivik Mine Soil Quality Remediation Objectives (SQROs)

b) Site-specific Soil Remediation Objective (SSRO)

c) Canadian Council of Ministers of the Environment (CCME) petroleum hydrocarbon soil quality guidelines for commercial land use. The site-specific exposure pathways used to determine the standards include: soil ingestion, soil contact and management limits.

d) Guidelines are dependant upon depth of sample (surface, subsoil >1.5m depth). All samples are surface samples.

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

Table 1: Background Soil Quality Monitoring Results

Location:			Adjacent Concrete Pad								
Sample ID:			16073-C	16075-D	16076-D	16077-D	16078-Q	16105-D	16106-D	16117-D	16118-D
Sample Date:			7/28/2015	7/29/2015	7/29/2015	7/29/2015	duplicate of	7/30/2015	7/30/2015	8/28/2015	8/28/2015
Field Screen (ppm):			0	0	0	0	16065-C	-	-	-	-
Moisture			2.8	1.1	1	2	1.8	-	-	-	-
Exova File #			1515260	1515260	1515260	1515260	1515260	1518285	1518285	1518285	1518285
Parameter	**Units**	**SQRO[a]**	**Analytical Results**								
Extractable Hydrocarbons											
F1 (C6-C10) [c,d,e]	µg/g	320	-	-	-	-	-	-	-	-	-
F2 (C10-C16) [b]	µg/g	410	<10	10	10	<10	<10	-	-	-	-
F3 (C10-C16) [c,d,e]	µg/g	1700	<20	30	<20	60	<20	-	-	-	-
F4 (C34-C50) [c,d,e]	µg/g	3300	<20	<20	<20	<20	<20	-	-	-	-
Metals											
Lead [b]	µg/g	4500	-	192	178	499	942	2950	2440	120	184
Zinc [b]	µg/g	44000	-	1740	1640	7450	1200	18100	14900	579	950
Cadmium [b]	µg/g	2800	-	4.9	4.5	19.2	2.9	54.2	45.3	1.6	2.9
Copper [b]	µg/g	5900	-	24	24	31	25	50	46	20	21

Bold Concentration greater than or equal to the SQROs

Notes:

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b) Site-specific Soil Remediation Objective (SSRO)

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d) Guidelines are dependant upon depth of sample (surface, subsoil >1.5m depth). All samples are surface samples.

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

Table 2: Biopile Remediation Progress Soil Samples

Location:			UTA1-4	UTA1-5		UTA2-4		UTA3-2					UTA3-3	UTA3-4	UTA4-3	UTA4-4	
Sample ID:			15455-C	15979-C	16133-C [f]	15985-C	16132-C	15458-D	15459-D	15460-D	15462-C	15463-Q	15991-C	16147-C	15461-C	15997-C	16131-C
Sample Date:			6/30/2015	7/28/2015	8/30/2015	7/28/2015	8/30/2015	6/30/2015	6/30/2015	6/30/2015	6/30/2015	duplicate of	7/28/2015	8/31/2015	6/30/2015	7/28/2015	8/30/2015
Field Screen (ppm):			135	50	75	20	120	35	25	20	145	15462-C	30		65	30	165
Moisture			8.1	6.4	7.1	7	6.6	6	4.4	2	5.7	4.9	6.5	6.5	5.8	5.5	7
Exova File #			1512413	1515253	1518285	1515253	1518285	1512413	1512413	1512413	1512413	1512413	1515253	1518285	1512413	1515253	1518285
Parameter	Units	SQRO[a]	**Analytical Results**														
Extractable Hydrocarbons																	
F1 (C6-C10) [c,d,e]	µg/g	320	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F2 (C10-C16) [b]	µg/g	410	390	**600**	390	**470**	320	200	160	140	200	270	340	310	370	**510**	330
F3 (C10-C16) [c,d,e]	µg/g	1700	40	70	50	60	50	50	40	30	40	50	40	50	40	60	50
F4 (C34-C50) [c,d,e]	µg/g	3300	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Metals																	
Lead [b]	µg/g	4500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc [b]	µg/g	44000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium [b]	µg/g	2800	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper [b]	µg/g	5900	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Bold Concentration greater than or equal to the SQROs

Notes:

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d) Guidelines are dependant upon depth of sample (surface, subsoil >1.5m depth). All samples are surface samples.

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

f) Composite sample not collected in accordance with remediation sampling procedure.

Table 2: Biopile Remediation Progress Soil Samples

Location:			UTA5-6		UT6-6		UTA7-4	UTA7-5					UTA8-4		UTA9-5	
Sample ID:			16009-C	16130-C [f]	16015-C	16129-C [f]	16057-C	16120-D	16121-D	16123-D	16123-C	16124-Q	16026-C	16128-C [f]	16056-C	16127-C [f]
Sample Date:			7/28/2015	8/30/2015	7/28/2015	8/30/2015	7/28/2015	8/30/2015	8/30/2015	8/30/2015	8/30/2015	duplicate of	7/28/2015	8/30/2015	7/28/2015	8/30/2015
Field Screen (ppm):			25	120	70	135	175	75	35	15	10	16120-D	125	125	105	155
Moisture			6.3	7.2	5.3	33.8	6.7	6.7	6.8	4.9	6.6	7.1	6.8	7.1	5.7	7.6
Exova File #			1515253	1518285	1515253	1518285	1515253	1518285	1518285	1518285	1518285	1518285	1515253	1518285	1515253	1518285
Parameter	Units	SQRO[a]	**Analytical Results**													
Extractable Hydrocarbons																
F1 (C6-C10) [c,d,e]	µg/g	320	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F2 (C10-C16) [b]	µg/g	410	**630**	290	**410**	**450**	360	140	70	<10	20	150	**480**	260	**530**	320
F3 (C10-C16) [c,d,e]	µg/g	1700	80	40	50	70	40	<20	<20	<20	<20	<20	30	40	50	40
F4 (C34-C50) [c,d,e]	µg/g	3300	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Metals																
Lead [b]	µg/g	4500	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc [b]	µg/g	44000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium [b]	µg/g	2800	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper [b]	µg/g	5900	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Bold Concentration greater than or equal to the SQROs

Notes:

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d) Guidelines are dependant upon depth of sample (surface, subsoil >1.5m depth). All samples are surface samples.

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

f) Composite sample not collected in accordance with remediation sampling procedure.

Table 2: Biopile Remediation Progress Soil Samples

Location:			UTA-10-5						LTA1-5			LTA2-4					
Sample ID:			16029-D	16030-D	16031-D	16032-C	16033-Q	16126-C [f]	16050-C	16134-D	16148-D	16079-C	16080-C	16084-D	16085-D	16088-D	16094-D
Sample Date:			7/28/2015	7/28/2015	7/28/2015	7/28/2015	7/28/2015	8/30/2015	7/28/2015	8/31/2015	8/31/2015	7/30/2015	7/30/2015	7/30/2015	7/30/2015	7/30/2015	7/30/2015
Field Screen (ppm):			50	70	65	60	16032-C	125		55							
Moisture			6.2	5.6	6	6.8	4.1	7.1	5.4	5.4	6.6	6.6	4.4	4.5	4.6	4.9	3.5
Exova File #			1515253	1515253	1515253	1515253	1515253	1518285	1515253	1518285	1518285	1515263	1515263	1515263	1515263	1515263	1515263
Parameter	Units	SQRO[a]	**Analytical Results**														
Extractable Hydrocarbons																	
F1 (C6-C10) [c,d,e]	µg/g	320	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F2 (C10-C16) [b]	µg/g	410	**430**	**440**	**440**	**520**	**520**	270	390	170	120	**480**	**420**	220	90	110	70
F3 (C10-C16) [c,d,e]	µg/g	1700	70	60	70	50	50	40	50	30	20	50	60	50	30	<20	<20
F4 (C34-C50) [c,d,e]	µg/g	3300	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Metals																	
Lead [b]	µg/g	4500	-	-	-	-	-	-	-	-	-	-	-	224	156	438	399
Zinc [b]	µg/g	44000	-	-	-	-	-	-	-	-	-	-	-	1280	1210	1530	949
Cadmium [b]	µg/g	2800	-	-	-	-	-	-	-	-	-	-	-	3.3	3.4	4.4	2.9
Copper [b]	µg/g	5900	-	-	-	-	-	-	-	-	-	-	-	25	23	23	28

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

f) Composite sample not collected in accordance with remediation sampling procedure.

Table 2: Biopile Remediation Progress Soil Samples

Location:			LTA2-4							LTA3-4	LTA3-5					LTA4-4
Sample ID:			16095-D	16096-D	16103-Q	16137-D	16138-D	16145-Q	16097-Q	15464-C	16086-D	16087-D	16081-D	16139-D	16140-D	15465-C
Sample Date:			7/30/2015	7/30/2015	duplicate of	8/31/2015	8/31/2015	duplicate of	duplicate of	6/30/2015	7/30/2015	7/30/2015	7/30/2015	8/31/2015	8/31/2015	6/30/2015
Field Screen (ppm):					16080-C	20	120	16137-D	16094-D	135				90	105	100
Moisture			3.9	5.5	6.8	6.4	5.5	5.8	4.7	6.1	5.5	5.2	6	6	6.7	5
Exova File #			1515263	1515263	1515263	1518285	1518285	1518285	1515263	1512413	1515263	1515263	1515263	1518285	1518285	1512413
Parameter	Units	SQRO[a]	**Analytical Results**													
Extractable Hydrocarbons																
F1 (C6-C10) [c,d,e]	µg/g	320	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F2 (C10-C16) [b]	µg/g	410	150	380	350	230	270	170	50	340	360	190	400	240	**410**	290
F3 (C10-C16) [c,d,e]	µg/g	1700	50	60	40	40	50	30	<20	40	80	60	60	40	50	40
F4 (C34-C50) [c,d,e]	µg/g	3300	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Metals																
Lead [b]	µg/g	4500	846	104	-	-	-	-	293	-	54	491	-	-	-	-
Zinc [b]	µg/g	44000	4110	699	-	-	-	-	1010	-	515	1640	-	-	-	-
Cadmium [b]	µg/g	2800	12.6	2	-	-	-	-	2.9	-	1.4	4.7	-	-	-	-
Copper [b]	µg/g	5900	30	22	-	-	-	-	28	-	23	31	-	-	-	-

Bold Concentration greater than or equal to the SQROs

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

f) Composite sample not collected in accordance with remediation sampling procedure.

Table 2: Biopile Remediation Progress Soil Samples

Location:			LTA4-5				LTA5-4				LTA6-4	LTA Stormwater Retention Pond				
Sample ID:			16045-C	16141-D	16142-D	16146-Q	16082-D	16083-D	16143-D	16144-D	16039-C	16089-D	16090-D	16091-D	16092-D	16093-D
Sample Date:			7/28/2015	8/31/2015	8/31/2015	duplicate of	7/30/2015	7/30/2015	8/31/2015	8/31/2015	7/28/2015	7/30/2015	7/30/2015	7/30/2015	7/30/2015	7/30/2015
Field Screen (ppm):				90	75	16142-D			120	60						
Moisture			6.9	7.5	7.1	5.9	5.1	7.2	6.7	7.3	5.8	4.6	6.2	4.4	4.5	6.9
Exova File #			1515253	1518285	1518285	1518285	1515263	1515263	1518285	1518285	1515253	1515263	1515263	1515263	1515263	1515263
Parameter	Units	SQRO[a]	**Analytical Results**													
Extractable Hydrocarbons																
F1 (C6-C10) [c,d,e]	µg/g	320	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F2 (C10-C16) [b]	µg/g	410	**410**	340	**440**	340	**440**	**610**	370	360	**430**	170	360	120	340	360
F3 (C10-C16) [c,d,e]	µg/g	1700	60	50	60	60	50	80	50	50	40	30	40	50	50	50
F4 (C34-C50) [c,d,e]	µg/g	3300	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Metals																
Lead [b]	µg/g	4500	-	-	-	-	-	-	-	-	-	455	69	694	203	64
Zinc [b]	µg/g	44000	-	-	-	-	-	-	-	-	-	2710	601	2430	1330	559
Cadmium [b]	µg/g	2800	-	-	-	-	-	-	-	-	-	7.5	1.6	7.9	4	1.6
Copper [b]	µg/g	5900	-	-	-	-	-	-	-	-	-	26	23	25	22	22

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

f) Composite sample not collected in accordance with remediation sampling procedure.

Table 3: Stockpile Characterization Soil Samples

Location:			Pad-5-1	Pad-5-3	Pad-5-5	Pad-5-7	Pad-5-8	Pad-5-9	Pad-5-10	Pad-5-11	Pad-5-12	Pad-5-13	Pad-5-14	Pad-5-15	Pad-5-16					Pad-5-17	Pad-5-18	Pad-5-20	Pad-5-23
Sample ID:			15701-C	15707-C	15705-C	15706-C	15704-C	15595-C	15596-C	15597-C	15598-C	15599-C	15709-C	15710-C	15680-D	15682-D	15684-D	15711-C	15712-Q	15713-C	15714-C	15716-C	15719-C
Sample Date:			7/14/2015	7/14/2015	7/14/2015	7/14/2015	7/14/2015	7/10/2015	7/10/2015	7/10/2015	7/10/2015	7/10/2015	7/14/2015	7/14/2015	7/13/2015	7/13/2015	7/13/2015	7/14/2015	duplicate of	7/14/2015	7/14/2015	7/14/2015	7/15/2015
Field Screen (ppm):			70	55	100	90	80	145	110	115	85	95	100	100	45	50	30	60	15711-C	75	100	55	60
Moisture			6.5	7.5	7.4	7.5	7.2	7.1	8.1	7.5	7.2	7.7	7.8	6.6	7.4	6.5	8	7	6.8	6.3	7.3	7	6.4
Exova File #			1513794	1513794	1513794	1513794	1513794	1513794	1513794	1513794	1513794	1513794	1513794	1513794	1513794	1513794	1513794	1513794	1513794	1513794	1513794	1513794	1513794
Parameter	Units	SQRO[a]	**Analytical Results**																				
Extractable Hydrocarbons																							
F1 (C6-C10) [c,d,e]	µg/g	320	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F2 (C10-C16) [b]	µg/g	410	440	370	490	370	550	620	330	450	500	470	700	550	480	520	490	450	400	340	290	260	450
F3 (C10-C16) [c,d,e]	µg/g	1700	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
F4 (C34-C50) [c,d,e]	µg/g	3300	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20

Bold Concentration greater than or equal to the SQROs

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d) Guidelines are dependant upon depth of sample (surface, subsoil >1.5m depth). All samples are surface samples.

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

Location:			Area 2 Berm								Area 3							Area 1				
Sample ID:			15449-D	15450-D	15451-D	15452-D	15453-D	15454-D	15466-C	15467-Q	15475-D	15476-D	15477-D	15478-D	15479-D	15488-C	15489-Q	15482-D	15483-D	15487-D	15490-C	15491-Q
Sample Date:			6/30/2015	6/30/2015	6/30/2015	6/30/2015	6/30/2015	6/30/2015	7/1/2015	duplicate of	7/1/2015	7/1/2015	7/1/2015	7/1/2015	7/1/2015	7/1/2015	duplicate of	7/1/2015	7/1/2015	7/1/2015	7/1/2015	duplicate of
Field Screen (ppm):			25	20	20	25	10	45	20	15466-C	15	20	15	25	20	10	15488-C	30	20	20	15	15490-C
Moisture			10.4	5	6.6	5.6	5.4	9.5	5.9	6.6	5.9	8.6	4.2	7.3	6.4	5.3	7.3	7.8	9.9	6.5	6.2	8.8
Exova File #			1512412	1512412	1512412	1512412	1512412	1512412	1512413	1512413	1512412	1512412	1512412	1512412	1512412	1512412	1512412	1512412	1512412	1512412	1512412	1512412
Parameter	Units	SQROs[a]	Analytical Results																			
Volatile Organic Compounds																						
Ethylbenzene [c,d]	µg/g	300	<0.05	<0.05	0.08	<0.05	<0.05	0.08	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	0.09	<0.05
Toluene [c,d]	µg/g	250	<0.20	<0.20	0.52	1.14	<0.20	<0.20	-	-	<0.20	<0.20	<0.20	<0.20	0.21	<0.20	<0.20	-	-	-	<0.20	<0.20
Benzene [c,d]	µg/g	110	<0.02	<0.02	0.07	0.14	<0.02	<0.02	-	-	<0.02	<0.02	<0.02	0.02	0.07	<0.02	<0.02	-	-	-	<0.02	<0.02
m/p-xylene	µg/g		<0.05	<0.05	0.35	0.67	0.12	0.25	-	-	0.14	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	-	-	-	0.21	0.09
o-xylene	µg/g		<0.05	<0.05	0.26	0.27	0.08	0.1	-	-	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	0.1	0.07
Xylenes (Total) [c,d]	µg/g	350	<0.10	<0.10	0.61	0.94	0.2	0.35	-	-	0.22	<0.10	<0.13	<0.10	<0.10	<0.10	<0.10	-	-	-	0.31	0.16
Extractable Hydrocarbons																						
F1 (C6-C10) [c,d,e]	µg/g	320	<10	<10	<10	20	<10	20	-	-	<10	<10	<10	<10	<10	<10	<10	-	-	-	20	20
F2 (C10-C16) [b]	µg/g	410	<10	<10	<10	<10	20	10	<10	<10	70	<10	80	20	<10	30	30	140	180	<10	290	220
F3 (C10-C16) [c,d,e]	µg/g	1700	40	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	30	20
F4 (C34-C50) [c,d,e]	µg/g	3300	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20

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"<" = Less than analytical method detection limit.

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

a) Former Nanisivik Mine Soil Quality Remediation Objectives (SQROs)

b) Site-specific Soil Remediation Objective (SSRO)

c) Canadian Council of Ministers of the Environment (CCME) petroleum hydrocarbon soil quality guidelines for commercial land use. The site-specific exposure pathways used to determine the standards include: soil ingestion, soil contact and management limits.

d) Guidelines are dependant upon depth of sample (surface, subsoil >1.5m depth). All samples are surface samples.

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

Table 5: Waste Concentrate Characterization Samples

Location:			Box 1	Box 2	Box 3				Box 4	Box 5	Box 6	Box 7
Sample ID:			16107-C	16108-C	16109-C	16110-D	16111-D	16112-D	16114-C	16113-C	16116-C	16115-C
Sample Date:			7/30/2015	7/30/2015	7/30/2015	7/30/2015	7/30/2015	7/30/2015	8/28/2015	8/28/2015	8/28/2015	8/28/2015
Exova File #			1515263	1515263	1515263	1515263	1515263	1515263	1518285	1518285	1518285	1518285
Parameter	**Units**	**SQROs[a]**	**Analytical Results**									
Metals												
Lead [b]	µg/g	4500	1700	2390	2820	**23900**	**21000**	**29800**	**23100**	**41800**	219	718
Zinc [b]	µg/g	44000	9080	16600	18100	**134000**	**122000**	**128000**	21000	**52500**	991	1450
Cadmium [b]	µg/g	2800	30.8	45.8	51.7	364	334	333	57.5	139	2.9	4.2
Copper [b]	µg/g	5900	58	47	48	235	222	210	66	179	20	20

Bold Concentration greater than or equal to the SQROs

Notes:

"<" = Less than analytical method detection limit.

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

a) Former Nanisivik Mine Soil Quality Remediation Objectives (SQROs)

b) Site-specific Soil Remediation Objective (SSRO)

Table 6: Quality Assurance and Quality Control Soil Samples - Hydrocarbons

Location:				Area 1				Area 2						Area 3			
Sample Parent:				15490-C				15466-C						15488-C			
Sample ID:				15490-C	15490-C	15490-C	15490-C	15466-C	15466-C	15466-C	15466-C	15466-C	15466-C	15488-C	15488-C	15488-C	15488-C
Duplicate ID:				15482-D	15483-D	15487-D	15491-Q	15449-D	15450-D	15451-D	15452-D	15453-D	15467-Q	15475-D	15476-D	15477-D	15489-Q
Parameter	Units	MRL	PQL	Analytical Results													
PHC Fraction 1																	
Sample Result	µg/g	10	50	20	20	20	20	-	-	-	-	-	-	<10	<10	<10	<10
Duplicate Result	µg/g	10	50	-	-	-	-	<10	<10	<10	20	<10	-	<10	<10	<10	<10
RpD	%			na	na	na	na	na	na	na	na	na	na	na	na	na	na
PHC Fraction 2																	
Sample Result	µg/g	10	50	290	290	290	290	<10	<10	<10	<10	<10	<10	30	30	30	30
Duplicate Result	µg/g	10	50	140	180	<10	220	<10	<10	<10	<10	20	<10	70	<10	80	30
RpD	%			70%	47%	na	27%	na	na	na	na	na	na	na	na	na	na
PHC Fraction 3																	
Sample Result	µg/g	20	100	30	30	30	30	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Duplicate Result	µg/g	20	100	<20	<20	30	30	40	<20	<20	<20	<20	<20	<20	<20	<20	<20
RpD	%			na	na	na	na	na	na	na	na	na	na	na	na	na	na
PHC Fraction 4																	
Sample Result	µg/g	20	100	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Duplicate Result	µg/g	20	100	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
RpD	%			na	na	na	na	na	na	na	na	na	na	na	na	na	na

Bold RpD value is greater than or equal to 40% 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*

Table 6: Quality Assurance and Quality Control Soil Samples - Hydrocarbons

Location:				UTA3-2				UTA7-5				UTA-10-5			
Sample Parent:				15462-C				16124-C			16120-D	16032-C			
Sample ID:				15462-C	15462-C	15462-C	15462-C	16124-C	16124-C	16124-C	16120-D	16032-C	16032-C	16032-C	16032-C
Duplicate ID:				15458-D	15459-D	15460-D	15463-Q	16120-D	16121-D	16123-D	16125-Q	16029-D	16030-D	16031-D	16033-Q
Parameter	Units	MRL	PQL	Analytical Results											
PHC Fraction 1															
Sample Result	µg/g	10	50	-	-	-	-	-	-	-	-	-	-	-	-
Duplicate Result	µg/g	10	50	-	-	-	-	-	-	-	-	-	-	-	-
RpD	%			na	na	na	na	na	na	na	na	na	na	na	na
PHC Fraction 2															
Sample Result	µg/g	10	50	200	200	200	200	20	20	20	140	520	520	520	520
Duplicate Result	µg/g	10	50	200	160	140	270	140	70	<10	150	430	440	440	520
RpD	%			0%	22%	35%	30%	na	na	na	7%	19%	17%	17%	0%
PHC Fraction 3															
Sample Result	µg/g	20	100	40	40	40	40	<20	<20	<20	<20	50	50	50	50
Duplicate Result	µg/g	20	100	50	40	30	50	<20	<20	<20	<20	70	60	70	50
RpD	%			na	na	na	na	na	na	na	na	na	na	na	na
PHC Fraction 4															
Sample Result	µg/g	20	100	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Duplicate Result	µg/g	20	100	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
RpD	%			na	na	na	na	na	na	na	na	na	na	na	na

Bold RpD value is greater than or equal to 40% 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*

Table 6: Quality Assurance and Quality Control Soil Samples - Hydrocarbons

Location:				LTA2-4				Pad-5-16				Concrete Pad			
Sample Parent:				16094-D	16080-C	16137-D	16142-D	15711-C				16065-C			
Sample ID:				16094-D	16080-C	16137-D	16142-D	15711-C	15711-C	15711-C	15711-C	16065-C	16065-C	16065-C	16065-C
Duplicate ID:				16097-Q	16103-Q	16145-Q	16146-Q	15680-D	15682-D	15684-D	15712-Q	16075-D	16076-D	16077-D	16078-Q
Parameter	Units	MRL	PQL	Analytical Results											
PHC Fraction 1															
Sample Result	µg/g	10	50	-	-	-	-	-	-	-	-	-	-	-	-
Duplicate Result	µg/g	10	50	-	-	-	-	-	-	-	-	-	-	-	-
RpD	%			na	na	na	na	na	na	na	na	na	na	na	na
PHC Fraction 2															
Sample Result	µg/g	10	50	420	420	230	440	450	450	450	450	<10	<10	<10	<10
Duplicate Result	µg/g	10	50	50	350	170	340	480	520	490	400	<10	10	10	<10
RpD	%			157%	18%	30%	26%	6%	14%	9%	12%	na	na	na	na
PHC Fraction 3															
Sample Result	µg/g	20	100	60	60	40	60	<20	<20	<20	<20	60	60	60	60
Duplicate Result	µg/g	20	100	<20	40	30	60	<20	<20	<20	<20	<20	30	<20	<20
RpD	%			na	na	na	na	na	na	na	na	na	na	na	na
PHC Fraction 4															
Sample Result	µg/g	20	100	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Duplicate Result	µg/g	20	100	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
RpD	%			na	na	na	na	na	na	na	na	na	na	na	na

Bold RpD value is greater than or equal to 40% 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*

Table 7: Quality Assurance and Quality Control Soil Samples - Metals of Concern

Location:				LTA2-4	Concrete Pad			
Sample Parent:				16094-D	16065-C			
Sample ID:				16094-D	16065-C	16065-C	16065-C	16065-C
Duplicate ID:				16097-Q	16075-D	16076-D	16077-D	16078-Q
Parameter	**Units**	**MRL**	**PQL**	**Analytical Results**				
Lead								
Sample Result	µg/g	1	5	399	1090	1090	1090	1090
Duplicate Result	µg/g	1	5	293	192	178	499	942
RpD	%			31%	**140%**	**144%**	**74%**	15%
Zinc								
Sample Result	µg/g	2	10	949	1040	1040	1040	1040
Duplicate Result	µg/g	2	10	1010	1740	1640	7450	1200
RpD	%			6%	**50%**	**45%**	**151%**	14%
Cadmium								
Sample Result	µg/g	0.5	2.5	2.9	3	3	3	3
Duplicate Result	µg/g	0.5	2.5	2.9	4.9	4.5	19.2	2.9
RpD	%			0%	**48%**	**40%**	**146%**	3%
Copper								
Sample Result	µg/g	1	5	28	24	24	24	24
Duplicate Result	µg/g	1	5	28	24	24	31	25
RpD	%			0%	0%	0%	-25%	4%

Bold RpD value is greater than or equal to 40% 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*

Appendix A – Photographic Record

Photo 1: Final excavation of Area 1 outlined in orange. Facing north.

Photo 2: Final excavation of Area 2 north berm outlined in orange. Facing west.

Photo 3: Waste liner secured for winter between LTA and DND construction zone. Facing north.

Photo 4: Final excavation of Area 3 west wall and Area 2 floor outlined in orange. Facing west.

Photo 5: CanZinco Yard showing location of Area 4 excavation backfilled and regraded in orange. Facing west.

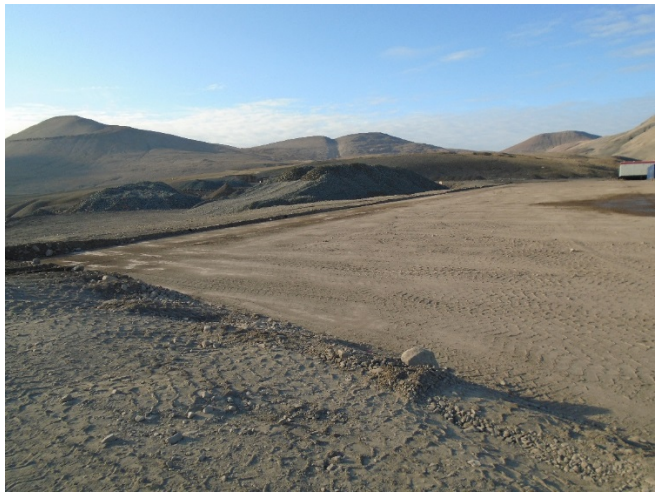

Photo 6: East side concrete pad following evacuation by CanZinco in July. Facing southeast.

Photo 7: West side of the pad adjacent to the DND trailers following evacuation by CanZinco in July. Facing north.

Photo 8: Lead and zinc concentrate contaminated soil was shoveled into bags and then a backhoe used to scrape the underlying soil. The bags and soil were deposited in the wood boxes. Facing southeast.

Photo 9: Boxes of waste lead and zinc concentrate contaminated soil pending shipment off-site for disposal.

Photo 10: Excavation of waste concentrate contaminated soil from LTA2 and LTA3. Facing northwest.

Photo 11: Soil recovered from LTA2 and LTA3 is placed in LTA stormwater retention pond and covered. Facing west.

Photo 12: Treatment cells containing PHC contaminated soils**.** Facing north.