PHASE I/II ENVIRONMENTAL SITE ASSESSMENT

VEHICLE DUMP AND COMMUNITY LANDFILL, IQALUIT, NUNAVUT

Prepared for:
Public Works & Government Services Canada
800 Burrard Street
Vancouver, BC
V6Z 2V8

On behalf of Transport Canada

Prepared by:
Franz Environmental Inc.
308-1080 Mainland Street
Vancouver, BC
V6B 2T4

Project No. 1584-0801
February 2009

REPORT

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EXECUTIVE SUMMARY

The Iqaluit Vehicle Dump and Community Landfill is situated approximately 1.7 km southwest of the city of Iqaluit, Nunavut. Universal Transverse Mercator (UTM) co-ordinates taken from the center of the site are E521904.94, N7067812.69. Only the top section of the site is accessible by road. The site is located adjacent to Sylvia Grinnell Territorial Park.

The total area of the Landfill and Vehicle dump occupies an area of approximately 7.25 ha (72,500 m^2), which includes the up-gradient debris area. The area has been used as a military and municipal landfill since the late 1950's to early 1960's.

The United States Air Force (USAF) used this site from between 1955 to 1963 as a metal dump for vehicles, truck bodies, barrels and scrap metal. The majority of materials were deposited in 1963 when the US Military left Frobisher Bay. Shops, buildings, and other materials were simply bulldozed over the cliff. The cliff is a bedrock outcrop rising approximately 50 m above the tidal area where the Sylvia Grinnell River meets Frobisher Bay. The area to the north side of the slope was used by the USAF and the community of Iqaluit as a landfill site for household garbage until sometime in the 1970's.

The study area was found to contain known and discrete PHC, PCB, metals, and pesticide soil, sediment, and surface water impacts associated with the historical waste disposal activities. Elevated metals (particularly cadmium, copper, lead, and zinc) are widespread; however, spatial distribution appears to be concentrated mostly at the toe of the main landfill and the central portion of the vehicle dump.

Waste disposal practices have attributed to a slow release of metals into the environment. It was concluded that the leaching of metals from the waste debris represents a measureable loading risk to the aquatic environment on site and possibly other surface water bodies (Sylvia Grinnell River). However, further studies are recommended to measure seasonal variances in order to better understand the contaminant migration pathway and receptor relationship.

It is our opinion that remediation/risk management priorities should be based on the removal of physical hazards and source area impacts, as well as the containment and control of metals in the surface water pathways (i.e., Main Drainage through Vehicle Dump) discharging to Sylvia Grinnell River.

The long-term strategy for the Vehicle Dump and Community Landfill should be based on the following goals, in order of priority:

- Removal of Physical Hazards and contaminant source areas;
    a. Vehicles in Vehicle Dump
    b. Waste Debris- Main Landfill
- Containment and control, including risk management, passive treatment systems and monitoring of surface water drainage systems (AEC 3);
- Risk management/remediation of PHC, PCB, and pesticide impacted soils/sediments; and
- Site monitoring and inspections.

For all the options, Class D (+/- 50%) cost estimates were calculated. Based on our evaluation, the cost estimates range from approximately $3.98 M to $7.63 M.

The CCME National Classification System for Contaminated Sites (NCSCS) was used to score the site in terms of priority ranking. The site score was 84.1 which classifies the Vehicle Dump and Community Landfill as a Class 1 site (Action Required).

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1.0 INTRODUCTION

Franz Environmental Inc. (FRANZ) was retained by Public Works and Government Services Canada (PWGSC) Pacific Region and Transport Canada (TC), Prairie and Northern Region and Environmental Affairs Division to complete a Phase I/II Environmental Site Assessment (ESA) of the Vehicle Dump/Community Landfill, Iqaluit, Nunavut (**Figure 1**).

This project was completed based on the FRANZ proposal, P-2704, dated August, 2008 which followed the tasks outlined in PWGSC/Transport Canada's Terms of Reference (ToR), dated May 20, 2008.

1.1 Purpose and Project Objectives

The purpose of this project was to undertake a Phase I and Phase II Environmental Site Assessment (ESA) at the vehicle dump/landfill site adjacent to the Iqaluit Airport. Transport Canada will use this report to demonstrate due diligence and reduce liabilities in order to remediate/risk manage the site to an acceptable level. Previous assessments have been completed at the vehicle dump/landfill site. The purpose of this Phase I/II ESA was to determine the current environmental and physical conditions at the site. This included the identification and quantification of environmental impacts to soil, sediment, surface water, and vegetation, as well as the identification of hazardous and non-hazardous materials at the site.

To accomplish this goal, the objectives included the following:

Phase I ESA

- Complete a historical property land use search;
- Review previous studies and reports regarding the site;
- Complete a site visit in order to characterize the site including identifying the type and volume of material in the metal dump and household landfill;
- Prepare site plans to present general information and relevant environmental concerns;
- Identify actual and/or potential liabilities and site contamination;

- The investigation and reporting will follow the requirements and format for a Phase I Environmental Site Assessment as prescribed under the Canadian Standards Association CSA Z768-01.

Phase II ESA

- Obtain representative samples of soil, water, sediment, and vegetation in suspect areas;
- Determine the source, type, and nature of contamination in soil, surface water, sediment, and vegetation;
- Complete the National Classification Score (NCS) for this site based on: CCME, 2008 National Classification System for Contaminated Sites: Guidance Document. Canadian Council of Ministers of the Environment, Winnipeg;
- Develop a detailed remedial action plan that includes 3 different methods to remediate/manage the site, and provide related indicative cost estimate, associated with each of the 3 methods described above; and
- The investigation will follow the requirements for a Phase II Environmental Site Assessment as prescribed under the Canadian Standards Association CSA Z769-00.

1.2 Site Features and Background

Iqaluit (formerly named Frobisher Bay) is located on the southern tip of Baffin Island (**Figure 1**). Prior to July 1, 1995 Iqaluit Airport was owned by the Government of Canada and operated by the Quebec Region of the Department of Transport. From July 1, 1995 until April 1, 1999 the airport was owned by the Government of Northwest Territories and operated by the Arctic Airports Division of the Department of Transportation. Since April 1, 1999 the airport has been owned by the Government of Nunavut (GN) and operated by the Nunavut Airports Division of the Nunavut Department of Community Government, Housing and Transportation.

The Hudson's Bay Company set up a trading post along the shores of Frobisher Bay in 1914. Much of the development of the community occurred as a result of both World War II and the Cold War. Between 1941 and 1945 the USAF occupied this region as it served as an air base in the North Atlantic Ferry Route to supply Europe during WWII. In the summer of 1942, 550 personnel and 15,000 tons of equipment were shipped to Iqaluit. In 1943 the airport runway was completed and over 300 airport arrivals were recorded. The site was never used as a ferry route and the US military left Iqaluit in 1945. In 1952, construction of the Distant Early Warning (DEW) Line sites began. The US Military returned and used Iqaluit as a Strategic Air Command Base and one of the stations of the Pole Vault communication systems. The site was also used as a major trans-shipment, communications, and construction center for the establishment of the eastern sites of the DEW line (Härtling, 1988).

The study area is located at the West 40 area on the border of Sylvia Grinnell Park, 1.7 km southwest of the City of Iqaluit. The United States Air Force (USAF) used this site from between 1955 to 1963 as a metal dump for vehicles, truck bodies, barrels and scrap metal. The majority of materials were deposited in 1963 when the US Military left Frobisher Bay. Shops, buildings, and other materials were simply bulldozed over the cliff. The cliff is a bedrock outcrop rising approximately 50 m above the tidal area where the Sylvia Grinnell River meets Frobisher Bay. The area to the north side of the slope was used by the USAF and the community of Iqaluit as a landfill site for household garbage until sometime in the 1970's.

1.3 Previous Environmental Investigations

Environmental investigations have previously been carried out including chemical analysis of selected media and a volume estimate of metal waste.

Any reference to specific documents is clearly documented in this report. Significant reports for this study include:

- Avati Ltd., 1993. Remediation Options For an Abandoned US Airforce Base and Two Waste Sites at Iqaluit, NWT. October 1993.
- Earth Tech Canada Inc., 2001. Desk Top Review of Scrap Metal Dump Site West of Iqaluit Airport, Iqaluit, Nunavut, Canada. Prepared for Transport Canada, Prairie and Northern Region-Programs.
- Härtling, J., 1988. PCB and Trace Metal Pollution from a Former Military Waste Disposal Site at Iqaluit, Northwest Territories. Master's Thesis.
- Peramaki, L.A and J.D. Decker, Lead in Soil and Sediment in Iqaluit, Nunavut, Canada and Links with Human Health, Environmental Monitoring and Assessment, 63: 329 – 339, 2000.
- Public Works Canada Literature Review, 1992.

- Royal Military College – Environmental Sciences Group, Victoria, BC, 1995. Environmental Study of a Military Installation and Six Waste Disposal Sites at Iqaluit, NWT. Prepared for Department of Indian and Northern Affairs Canada & Environment Canada.

1.4 Project Team

This project was undertaken by a multi-disciplinary team. Key individuals and their respective roles are summarized below:

- Steve Livingstone, M.Sc., P.Geo(l). Senior Hydrogeologist, Reviewer
- Richard Wells, P.Eng., Project Manager
- Ryan Fletcher, C.Tech., CEPIT, Environmental Technician
- Tina Ranger, Dip. Tech., Environmental Technologist
- Marta Rosa, B.Sc., Environmental Geoscientist
- Tamra Reynolds, M.Sc., P.Geo., Hydrogeologist

2.0 STUDY AREA CHARACTERISTICS

2.1 Site Overview

Iqaluit (formerly named Frobisher Bay) is located on the southern tip of Baffin Island in the Nunavut region of the Northwest Territories. With a population of approximately 6100, Iqaluit is the largest community in the eastern Arctic and serves as a regional service and administrative centre. Solid waste disposal both from military activities and the community itself have resulted in the creation of several landfill sites. Historically, the subject site has been referred to as Sylvia Grinnell Park Dump and West 40 – Dump Site # 1. For the purpose of this report, the subject property will be referred to as the Vehicle Dump and Community Landfill or simply “site”.

As shown in **Figure 2**, the study area is divided into two distinct areas:

- The main debris/community landfill area which includes exposed metal debris. A portion of the waste including 45 gallon drum dumps are located at the toe of the bedrock escarpment; and
- the vehicle dump approximately to the south and parallel with the main landfill;

The landfill site is situated on the slope of an escarpment leading to the Sylvia Grinnell River and has several shallow ravines and coulees partially filled with metal debris. The debris is scattered over a large area and consists of vehicles, equipment, barrels, and scrap metal. Areas of concern include the low areas within the ravines, containing the scrap metal; the base of the escarpment; and the soft bog area where the barrels are stockpiled at the base of the escarpment.

2.2 Current Use of the Landfill Site and Adjacent Lands

Due to the remote location of the landfill, current use of the site is minimal. Deposition of landfill waste has been discontinued. Local residents occasionally use the site for dumping personal waste and as an access point to Silvia Grinnell Park. The Sylvia Grinnell River is located on the southern side of the landfill site (see **Figure 2**).

Sylvia Grinnell Territorial Park, the oldest of Nunavut's territorial parks borders the site to the north-western extent. Sylvia Grinnell Park is divided in two by the Sylvia Grinnell River. The park plays a vital role in the community of Iqaluit by providing an important fishing ground for Arctic Char.

2.3 Current Permit Information and Future Land Use

FRANZ understands that there are no current plans for the use of the property. The property remains undeveloped and part of Transport Canada's inventory of sites. A request put in to INAC mining records department, on November 17, 2008, to search for past and present mineral claims on the property turned up negative. No land claims have been made on the subject property.

2.4 Climate Conditions

Iqaluit is located within an arctic climatic zone despite being well outside of the Arctic Circle. The average daily temperature range is -28^{o}C to 7.7 ^{o}C. The area is characterized by very cold winters and short summers that permit the growth of very small, stunted trees. The average monthly temperature is below freezing for eight months of the year. The average annual precipitation is 412.1 mm, which is much wetter than many other localities in the Canadian Arctic islands. There is 198.3 mm annual rainfall and 235.8 mm annual snowfall (www.climate.weatheroffice.ec.gc.ca).

2.5 Natural Environment – Overview

The landfill site covers an area of approximately 72,500 m^2. Iqaluit lies within the low arctic tundra zone, which is ecologically sensitive. The area is underlain by continuous permafrost. Soils are nutrient-poor, silty, shallow and have little, if any profile development (Peramaki and Decker, 2000). The topography, structural geology and drainage of the study area follow a northwest-southeast trend. Ground cover is a combination of black, silty sand with organic soil, bedrock outcrops, grass and lichens.

Sylvia Grinnell Park is also home to Arctic Hare, Arctic Fox, Caribou, lemmings and other small mammals. Polar Bear have even been sighted on occasion, although they do not frequent the area.

The park also plays a significant role in bird migration and over 40 species have been recorded in the park at different times of the year. The park is also the most southern breeding ground for the Ringed Plover. The local vegetation above and below the cliff consists of wet grassland tundra species including mosses, grasses and sedges. On the cliff and bedrock outcrops vegetation is sparse and consists of lichens with patches of grasses and mosses.

3.0 HISTORICAL REVIEW AND EVALUATION

3.1 Sources of Information

The main historical sources of information for this report were obtained from interviews, historical reports and archives, historical maps, plans, online databases, and previous environmental reports. The historical information reviewed included:

3.2 Interviews

The list of people interviewed for this investigation included:

Interviewee	Title/Role	Date	Location
Rob Eno	Manager, Pollution Control Environmental Protection Service Department of Sustainable Development Government of Nunavut	Sept 4, 2008	Iqaluit, Nu
John Graham	Manager, Iqaluit Airport – Government of Nunavut	Sept 4, 2008	Iqaluit, Nu
Paul Burrino	Heavy Machine Operator – City of Iqaluit	Sept 4, 2008	Iqaluit, Nu
Michelle Burtol	Acting Head of Engineering (Temporary) – City of Iqaluit	Sept 4, 2008	Iqaluit, Nu
Jose Trembley	Assistant Manager – Iqaluit Airport – Government of Nunavut	Sept 5, 2008	Iqaluit, Nu
Mike Bowser	City of Iqaluit – long standing citizen of Iqaluit	Sept 5, 2008	Iqaluit, Nu
Amanda Wells	Lands Department – City of Iqaluit	Sept 5, 2008	Iqaluit, Nu
Reception	DIAND – Contaminated Sites Division	Sept 5, 2008	Iqaluit, Nu
Reception	NRCan (Surveys and Cadastral Lands Division)	Sept 5, 2008	Iqaluit, Nu
John Craig	Assistant Land Administrator Operations – DIAND (Lands Division)	Sept 5, 2008	Iqaluit, Nu
Claude Martel	Manager/shareholder – Nunavut Construction Corp.	Sept 7, 2008	Iqaluit, Nu
Allain Carriere	Owner – Nunatta Environmental Services Inc.	Sept 10, 2008	Iqaluit, Nu

Salient issues from the telephone interviews and e-mail exchanges are outlined in the relevant portions of the text. It is noted that the statements made by the interviewees were not made categorically and are limited by their personal knowledge of, and experience with, the subject property to the best of their memory. Therefore, no issues of environmental concern were discounted solely on the basis of these statements.

All relevant historical materials (documents, drawings, maps and photographs) are provided in the text or in **Appendix A** through **C**, and are to be used as supporting documentation for the text included in the report.

3.3 Reports and Historical Archives

- Avati Ltd., 1993. Remediation Options For an Abandoned US Airforce Base and Two Waste Sites at Iqaluit, NWT. October 1993.
- Earth Tech Canada Inc., 2001. Desk Top Review of Scrap Metal Dump Site West of Iqaluit Airport, Iqaluit, Nunavut, Canada. Prepared for Transport Canada, Prairie and Northern Region-Programs.
- Härtling, J., 1988. PCB and Trace Metal Pollution from a Former Military Waste Disposal Site at Iqaluit, Northwest Territories. Master's Thesis.
- Peramaki, L.A and J.D. Decker, Lead in Soil and Sediment in Iqaluit, Nunavut, Canada and Links with Human Health, Environmental Monitoring and Assessment, 63: 329 – 339, 2000.
- Public Works Canada Literature Review, 1992.
- Royal Military College – Environmental Sciences Group, Victoria, BC, 1995. Environmental Study of a Military Installation and Six Waste Disposal Sites at Iqaluit, NWT. Prepared for Department of Indian and Northern Affairs Canada & Environment Canada.

3.4 Maps and Plans

A visit to the Iqaluit Airport and interview with the current airport manager, John Graham took place on September 4, 2008. Historical maps and plans of the airport property were investigated at this time. No relevant information pertaining to the official boundaries of the airport property were obtained during this interview and investigation.

On September 5, 2008 a visit was made to Natural Resource Canada – Department of Surveys and Cadastral Lands Division. An official site survey was obtained during this visit and is presented in **Appendix A**.

Google Earth (Google, 2008) provided a detailed and relatively high resolution aerial view of the site. The Google Earth images were used in conjunction with the above mentioned articles in the creation of the site base map figures for this report.

3.5 Databases

The database searches included:

- NWT Archives, Prince of Wales Heritage Centre;
- Environmental Protection Service of the GNWT www.e-ngine.ca/eps_spillreport/;
- National Archives, Ottawa; and
- Canadian Museum of Civilization, Gatineau, QC.

3.5.1 Historical Overview

Based on the available historical information, the Vehicle Dump and Community Landfill has had a varied history since the mid 1940s and the construction of the Iqaluit Airport. The known uses, from the past to present, are outlined as follows:

Site Use	Approximate Timelines
1. Vacant Land	1930s to 1940s
2. Airport Runway – End of the old airstrip terminated at this point. Actual site use remained vacant.	1942/43 to late 1940s
3. Landfill and Metal Dump	Late 1950s-Present

3.5.2 Historical Site Features and Overview

Based on a review of the available information, and the interpretation completed by Royal Military College – Environmental Sciences Group in 1995, the historical development is described as follows:

The Iqaluit Airport was constructed in the year of 1942-1943 in an effort by the joint effort of a United States and Canadian military initiative known as the “Crimson Route”. This route was mandated as a flight path designed to ferry aircraft and equipment to Europe during World War II. The city of Iqaluit was formed as part of an airbase for military support purposes. Activities in Iqaluit eventually diminished with the end of the Second World War.

However, the spark of the Cold War inspired a resurgence of activity at the Iqaluit Airport and the City of Iqaluit as a whole. The main function of this new activity was the construction of the Distant Early Warning (DEW) Line, a series of radar stations stretching from Greenland on the Yukon-Alaska border. The Iqaluit Airport served as a base station for much of the construction activities in the eastern arctic region.

The study area was vacant from the conception of the airbase until a time between 1958 and 1964 as noted during aerial photographs review. According to Härtling, 1988; it is believed that the site was first used as a disposal facility in 1963. These dates concur with the United States Air Force (USAF) withdrawal from the area. The nature of the debris in the main landfill and scrap metal dump suggest that the USAF was likely responsible for depositing a large portion of the wastes currently found on the site.

The site was believed to be used for the disposal of small quantities of municipal waste from the town of Iqaluit in the 1960's, but was abandoned in the early 1970's in favour of the newly constructed Apex dump site. Upon closure of the site, it is believed that a cap consisting of granular material was placed on top and on the face of the landfill site to cover much of the debris (ESG, 1994). A few examples of municipal wastes disposed of at the site include food cans and bottles, kitchen appliances, bicycles, tires, wooden pallets, animal remains, water heaters, toys, etc.

The site has seen little activity since its abandonment in the 1970's. The site is now used as a location for burning of wood debris and a rogue dumping area for residents of the community (these types of activities were observed during the field investigation). Some residents occasionally scavenge the vehicle dump for parts and useful items.

3.5.3 Aerial Photographs and Databases

Aerial photographs (recent and historical) of the study area were obtained from the National Air Photo Library in Ottawa, Ontario. Historical land use changes as well as potential sources of environmental impacts observed from the photographs were noted. Aerial photographs of the area taken in 1948, 1953, 1955, 1964, 1976, and 1985 were available and are presented in **Appendix B.** The following table describes observations about current and historical land use for the subject property and surrounding properties that were noted during review of aerial photographs.

Date	Roll # (Scale)	Review
1948 1948/07/23	A11535-43 (1:20,000)	The immediate area does not appear to be impacted by human activity at this point. No evidence of debris or disturbed land is present on the subject property. The runway does not appear to be in use for aircraft at the time of the air photo. This is supported by the presence of debris and drums stacked in rows on the tarmac. One single roadway runs off the center of the runway heading east to the location of the current tank farm and municipal landfill. Visible drainage patterns and water pounding appears to be unchanged with respect to the 2008 site visit observations and the Google (2008) satellite images.
1952 1952/07/21	A13519-343 (1:15,000)	The immediate area does not appear to be impacted by human activity at this point. No evidence of debris or disturbed land is present on the subject property. The runway is not in use for aircraft at the time of the air photo. There is a large quantity of debris stacked in the center of the airstrip and a roadway is clearly visible down the center of the airstrip. No roadways or paths are visible extending from the southeast extent of the runway. One single roadway runs from the center of the runway heading east to what appears to be three large above ground storage tanks (likely the construction of the current tank farm area). Drainage patterns on site appear in the same as those observed during the 2008 site visit.
1955 1955/07/23	A14869-3 (1:15,000)	The immediate area does not appear to be impacted by human activities. No evidence of debris or disturbed land is evident in the current position of the landfill. The runway is no longer in use for aircraft. Large quantities of debris are present stacked in rows on the far southeast portion of the airstrip. Items visible include vehicles and drums. Vehicle tracks are visible north of the subject property in the marshy area. A small road is beginning off the southeast extent of the runway. Drainage patterns on site appear in the same as those observed during the 2008 site visit.
1964 1964/08/14	VRR2618-195 (1:6000)	The main landfill area (APEC 3) is clearly impacted by dumping activities. The extents of the main landfill appear to coincide with the current landfill extents. The landfill does not appear to be capped and scattered debris is also visible throughout all landfill areas. The vehicle dump (APEC 2) area appears to be more centrally located in the drainage gully than was observed in this past field investigation (2008). The land surrounding the up

Date	Roll # (Scale)	Review
		gradient suspected dumping area (APEC 1) seems to be disturbed by heavy machinery. This is evidenced by many tracks crossing the tundra all throughout the area and clearly disturbed soil in parts of the area. The runway appears to be completely decommissioned and a heavy roadway runs down the center of it. One rough roadway leads from the southeast extent to the vehicle dump and one defined roadway leads from the southeast extent to the main landfill area. Drainage is difficult to see on this aerial photograph, but appears to be the same as that observed during the 2008 site visit.
1976 1976/08/19	A24492-70 (1:20,000)	The main landfill area (APEC 3) is clearly impacted by dumping activities. The extents of the main landfill appear to coincide with those observed during the 2008 site investigation. The vehicle dump (APEC 2) area appears to be more centrally located and not spread up the hillside as was observed during the field program. No evidence of dumping is noticeable in the up gradient (APEC 1) area. The runway is no longer in use for aircraft and a defined roadway (in its current position) is seen down the center of the airstrip. One roadway runs off the far southeast end of the runway leading to the landfill area. One other, less defined, roadway also leads off the southeast extent of the airstrip and heads east across the marshy area and to the top of the adjacent hillside. A roadway also leads off to the west (also in its current position). Drainage appears concurrent with 2008 observations.
1985 1985/07/10	A26763-22 (1:10,000)	Observations of the immediate area remain unchanged from the previous (1976) aerial photo. The less defined roadway is now intermittent and does not appear to be in use. It appears that the tank farm has been expanded from the previous aerial photo reviewed. Drainage appears concurrent with 2008 observations.
2008	Google Earth	Observations of the immediate area remain unchanged from the previous (1976 & 1985) aerial photos. The less defined roadway is now gone and no evidence of its use exists. The tank farm appears in its current state. Drainage is as observed during the 2008 site visit.

After a review of the aerial photographs, it appears that the debris was stored for a period of time and then simply bulldozed off the cliff to lie in its current position. The aerial photographs confirmed that the landfill site was created between 1955 and 1964.

3.5.4 Environmental Database Search

The following table provides a summary of findings related to potential environmental issues.

Item of Concern	**Findings**
Accidents/Spills	There are no spill records on file with the Environmental Protection Service of the Government of Nunavut and Northwest Territories (GN and GNT). www.e-engine.ca/eps_spillreport/ However, with the site usage and history of fuel handling and storage, there were very likely spills and discharges over the time.
Previous Use of Site	• No previous uses are known • Possibly used as a camp area for historical fishing prior to US Military Presence (pre 1942)
Geology, Mineral claims, wildlife areas, mineral deposits	INAC-SID reviewer was queried for updated physical and site characteristics data. www.ainc-inac.gc.ca
Maintenance/ Operational Areas	There are no maintenance areas at the site.
Water and land permits	Mackenzie Valley Land and Water Board was contacted through www.mvlwb.com. No work is proposed at the site.
Hazardous Materials Storage	Storage of hazardous materials on the site is not likely, however disposal of such chemicals is suspected.
Fuel Storage Tanks	Approximately 300-400 empty drums are located throughout the site. There has been extensive history of fuel storage and handling at the airport and historical air photos show storage of drums in the vicinity of the site.
Odours	Faint greasy odours are present near the vehicle dump and main landfill areas based on the preliminary site investigations.
Potable Water	The site is presently not serviced with water. However, the site is adjacent to the Sylvia Grinnell River and Territorial Park.
Pesticides and Herbicides	Given the time frame that the site was in use, the use and disposal of pesticides and/or herbicides is possible, during the operational period of the site.
Mould	No mould related issues were identified.
Major Mechanical Equipment	Older equipment including vehicles, tractors, trailers, generators, and boilers have been observed at the site. Mostly in the vehicle dump area (APEC 2).
Waste oils, Solvents, Batteries	Evidence of the disposal of waste oils, solvents and batteries were apparent on site.
PCBs	Based on the historical testing completed on-site disposal of PCB-containing equipment is likely, however; most PCB containing transformers were removed during previous site remediation attempts.

Item of Concern	Findings
Soil and Water Conditions	Surficial soil and waters have been impacted by the fuels, metals and other COCs originating from the vehicle dump (APEC 2) and the main Landfill (APEC 3). Transport Canada provided us with all known environmental studies completed to date.
Waste Disposal	The entire site area was used for waste disposal as outlined in section 3.5.2.
Asbestos	No evidence of asbestos containing material (ACM) was directly observed during the initial site visit, however; it is expected that ACMs do exist in the brake lining of the vehicles (APEC 2) and possibly within the debris of the main landfill area (APEC 3).
Physical Hazards	Metal debris, vehicles piled on top of one another, and steep slopes of the landfill are considered physical hazards on site.

3.6 Previous Environmental Investigations and Outcomes

Numerous environmental investigations have been carried out including chemical analysis of selected media. To date, much of the work has focused on historical reviews and the potential for impacted soil and surface water with metals, polychlorinated biphenyls (PCBs), and to a lesser degree with petroleum hydrocarbons (PHCs), pesticides, and polycyclic aromatic hydrocarbons (PAHs).

The following is a brief description of the previous environmental investigations reviewed by FRANZ as well as information obtained from the historical environmental investigations.

Härtling, 1988

Sylvia Grinnell Park was the focus of a thesis paper written by Härtling, and Joachim Walter titled “PCB and Trace Metal Pollution from a Former Military Waste Disposal Site at Iqaluit, Northwest Territories”. The purpose of Härtling’s Thesis was to study the concentrations of PCBs and inorganics in soil, surface water, and sediments within the vicinity of the Sylvia Grinnell Landfill Site.

This thesis states that historical PCB sampling was completed in the fall of 1984 by the Environmental Protection Service. Two of the samples showed “significant” levels of Aroclor 1260 (actual concentration unavailable for review). PCB and inorganic elements in soil and sediments were sampled in the summer of 1987 for the purpose of producing the thesis paper.

It was found that soil concentrations of inorganic elements at the toe of the main landfill (APEC 3), namely arsenic and zinc, exceeded DCC Tier II levels (ESG, 1995). The Härtling thesis did not make comparisons against any specific environmental criteria. Elevated levels of PCBs were detected at the toe of the main landfill and below the vehicle dump site (APEC 2), these PCB levels ranged from 0.02 to 0.5 ppm (µg/g). One elevated (in comparison to the remainder of results) surface water sample was collected from an oily puddle and produced PCB concentrations of 11.1 ppb (µg/L); however, this sample is not expected to be representative of the average surface water conditions at the site.

PCB concentrations were found at minor concentrations in soil and sediments below the main landfill in the area directly impacted by landfill debris. PCB concentrations were also present in the surface sediments of the ponds directly down gradient of the main landfill area and the vehicle dump.

It was concluded that several series of parallel bedrock outcrops are limiting the migration of both PCB and inorganics in soils and surface waters within the site. Minor amounts of the contaminants of concern could be migrating to the River; however, these elements are in trace amounts.

PWGSC, 1992

Public Works and Government Services Canada, Pacific-Western Region, Manitoba Division conducted a literature review in 1992 titled “Literature Review on Abandoned and Waste Disposal Sites in the Iqaluit Area, Northwest Territories.” The review focused on all landfill sites around Iqaluit, but summarizes data obtained mainly by Härtling, 1988 on pages 6 and 7 of the review.

During the years of 1986-1989 DIAND initiated a cleanup of the area which included the removal of 97 pieces of electrical equipment and steel drums thought to contain PCBs. These items were removed from the site, stored in barrels in a concrete building near the landfill and then transported to the Ministry of Transport PCB storage facility at the airport. Drums from the landfill were also collected and piled in their current positions at the toe of the main landfill (APEC 3).

Finley, C., 1992

C. Finley from the University of Toronto reviewed the Avati report and the 1992 PWGSC literature review in a publication summary of the state of solid waste disposal in Iqaluit. No new information pertaining to the site was brought to light with this report.

Avati, 1993

Avati Ltd. completed an environmental assessment on Sylvia Grinnell Dump site in 1993 (volume 1993a). During this investigation, four surface water samples and 14 soil samples were collected. Inorganic elements were tested in 11 of the soil samples, none of which exceeded the CCME Residential/Parkland (R/P) criteria at that time. Three of the water samples contained concentrations of inorganic elements that exceeded the CCME FAL criteria at that time. Avati Ltd. also completed a remedial options analysis (volume 1993b). This volume of their report did not address the above mentioned exceedances.

PCBs were detected and exceeded the CCME R/P Remediation Criteria at that time in three soil samples collected during the 1993 investigation.

Remedial options presented included:

- Excavating all debris, sorting, and shipping south all materials or
- Excavating all debris, sorting, and shipping only hazardous materials south and burying remaining debris in local landfill facility.

ESG, 1995

Royal Military College, Environmental Services Group (ESG) conducted an environmental site assessment of the site in 1995. Eight soil samples, one surface water sample, three vegetation samples, and three sediment samples were collected as part of this investigation.

<u>Inorganics</u>

Four of the seven soil samples analyzed contained elevated concentrations of inorganic elements (specifically lead and zinc) which exceeded the DEW Line Cleanup Criteria

(DCC). One vegetation sample analyzed for inorganics contained concentrations of zinc elevated when compared to the soil samples taken in the same location. One of the three sediment samples analyzed contained concentrations of chromium exceeding the Environment Canada Interim Freshwater Sediment Quality Guidelines (ISQG); however, elevated levels of chromium were also detected in background sediment samples.

PCBs

Eight soil samples were analyzed for PCBs and all contained concentrations below the DCC criteria at that time. It should be noted that soil samples were elevated considerably in comparison to background sample locations. One vegetation sample was analyzed for PCBs and contained concentrations 41 times background. The three sediment samples contained detectable levels of PCBs, but remained below the Environment Canada ISQG.

Pesticides were tested in one soil sample and contained concentrations below the applicable criteria at that time. Two soil samples were also analyzed for PAHs, most PAH analytes were present, but below the CCME R/P criteria.

Recommendations & Conclusions

Inorganics

It was found that lead (409, 414, and 1140 ug/g) and zinc (720 and 12820 ug/g) were elevated in soils; however, plants remained unaffected by the elevated inorganic elements. Sediments from Sylvia Grinnell River contained trace inorganic elements only slightly elevated when compared to background. It was suggested that sediment loading was not occurring in Sylvia Grinnell River as a result of land filling activities at the site.

PCBs

Soils at the toe of the main landfill (APEC 3) were elevated (mean level of 0.13 ug/g, high of 0.71 ug/g) and approached the DCC criteria, while concentrations elsewhere remained low. PCBs remained un-detected in surface water collected below the vehicle dump (APEC 2). Vegetation appeared to be impacted due to the presence of elevated

PCB concentrations in soil at the toe of the main landfill. No evidence was established to suggest migration of PCBs to the Sylvia Grinnell River.

Cleanup Recommendations

It was recommended that soil remediation take place at the toe of the landfill site to address the elevated levels of inorganic elements identified through this and previous environmental investigations. Soils should be removed from contact with the arctic ecosystem between the toe of the landfill and the first set of parallel bedrock outcrops.

It was recommended that all metallic debris be removed from the site and be recycled and/or shipped south. The stability of the main landfill (APEC 3) should also be addressed, as it presents an immediate physical hazard and risk to those using the area for recreational purposes. It was proposed that sufficient amounts of granular material be added to the landfill face to achieve a safe and suitable slope angle and ensure that all debris remains buried at an adequate depth. The newly obtained slope should be seeded to prevent erosion and help maintain slope stability.

Peramaki, A., Decker, J.F., 1998

A study was conducted with regard to lead contamination at the Landfill Site. The study was conducted to determine the spatial distribution of soil and sediment-associated lead.

Sylvia Grinnell Park exhibited the highest concentrations of lead found in any of the sites considered during this investigation. These lead concentrations were found to be in the same order of magnitude as previously reported by ESG, 1995.

3.7 Identification of APEC's

Based on the previous environmental assessment activities completed to date and the historical records review, the following APECs and PCOCs formed the basis for the Phase II ESA sampling plan. Based on the timelines of the project initiation some of the archive materials and other historical information were only available following the field investigation.

The Vehicle Dump and Community Landfill site has three main areas that contain a zone(s) of contamination and has been divided into four APECs as follows (See **Figure 2**):

APEC 1 – Upgradient Buried Debris

The area of the landfill directly upgradient from the vehicle dump contained evidence of potential buried metal debris during the site visit. The area also appears to be disturbed on the 1964 aerial photographs.

APEC 2 – Vehicle Dump

The second area of concern is the vehicle dump located in the drainage feature to the east of the main Landfill area. This area is composed of vehicles, such as trucks, cars, trailers, boilers, tankers, and others. A drainage channel runs directly through the center of this debris pile discharging to the ponds, then the river.

APEC 3 – Main Landfill

The third area is the main landfill area consisting of a mixture of debris spread across a steep graded bedrock slope. The top of the landfill area has been capped with granular material and the toe is left exposed with debris scattered throughout the area.

APEC 4 – Downgradient, Off-site

The fourth APEC is comprised of any area of the site that is off-site and in Sylvia Grinnell Park. All downgradient and off-site sampling locations were given a separate sampling nomenclature in order to clearly differentiate their results from those of the on-site sampling locations.

The APECs and PCOCs are further broken down for each area in the following table:

APEC	PCOCs
APEC 1- Up Gradient Buried Debris	PHCs, Metals, PCBs, and Pesticides
APEC 2 – Vehicle Dump	PHCs, PAHs, Volatile Organic Compounds (VOCs), Metals, PCBs, and Pesticides
APEC 3 – Main Landfill	PHCs, PAHs, VOCs, Metals, PCBs, and Pesticides
APEC 4 – Down Gradient, Off Site	PHCs, PAHs, VOCs, Metals, PCBs, and Pesticides

3.8 Present Conditions

The Vehicle Dump and Community Landfill is not in active use. **Figure 2** presents an aerial view of the site and representative photos are shown in **Appendix C**.

The site was abandoned as a landfill in the mid 1970's. Since then it has remained relatively unchanged. The extent of the vehicle dump area has increased and approximately 100 pieces of electrical equipment were removed between 1987 and 1989. No buildings or infrastructure are present on the site. Site use is understood to be strictly recreational with no known development strategies for the future.

The site consists of a main landfill area, a vehicle dump, and a series of streams and ponds meandering ther way to the Sylvia Grinnell River via linear surficial features.

4.0 SUPPLEMENTAL FIELD INVESTIGATION

4.1 Field Reconnaissance

A preliminary site visit was conducted by FRANZ personnel on August 13, 2008 and accompanied by Mr. Leo Twerdin, Assistant Airport Manager – Transport Canada. The following observations were compiled during this initial site visit:

Vehicle Dump – APEC 2

- To the south and parallel with the main landfill is a significant vehicle dump;
- The landfill consists of approximately 86 large vehicles/trucks, boilers, tankers, flat beds, vehicle parts, drums/tanks, construction debris, some domestic debris. The debris is not covered and is randomly placed within a bedrock low lying area; and
- A surface water pathway draining via a series of ponds into the Sylvia Grinnell River is located at the toe of the vehicle dump.

Main Debris/Community Landfill – APEC 3

- A significant amount of exposed waste was classified as metal debris consisting of old auto parts, boilers, cans, tires, metal gas containers, 45 gallon drums, rods and metal braces;
- A portion of the waste including 45 gallon drum dumps are located at the toe of the bedrock escarpment;
- A portion of the waste appears to be unstable and would represent a potential for slope failure;
- The upper portion of the waste pile at the top of the bedrock outcrop appears to be capped with a thin veneer of sand/silt material. This cap appears to be weathering, exposing the waste materials. There was evidence of burning of wastes;
- Potential hazardous waste materials including batteries, potential asbestos (liner of boilers); gas drums and storage tanks; electrical equipment were noted; and
- Down gradient from the landfill is the Sylvia Grinnell River, which supports arctic char fishing. From the toe of the landfill, minor surface water pathways were noted that may be seasonally active. Some of the waste materials at the toe of the landfill were wet and saturated.

A detailed site visit was completed by FRANZ personnel on September 1, 2008. This site visit expanded on the above mentioned items and included:

- A detailed inventory of waste debris located in each section of the landfill area;
- A breakdown of the site into four distinct Areas of Potential Concern (APECs);
- Identification of historical sample locations;
- Identification of potential and observed contaminant source areas;
- Mapping of drainage pathways, waste debris areas, seepage and leachate, and pooling surface water bodies;
- Mapping of bedrock outcrops and geologically dependant surface water pathways;
- Mapping of stained areas and any areas used for open burning; and
- Evidence of vegetation stress.

The information collected above, in combination with the complete historical records review was used in the design of the detailed sampling plan.

4.2 Detailed Sampling Plan

Based on the results of the Phase I ESA site visit and interview program conducted on September 1 and 2, 2008, as well as the review of available historical reports and documents pertaining to the site, a detailed sampling plan was designed to conduct a Phase II ESA of the site. The purpose of the Phase II ESA with respect to soils, sediments, surface water, and waste materials was to characterize known environmental impacts, investigate newly discovered potential sources of environmental impact, confirm and/or refute the presence of suspected contaminants of concern (COCs), summarize and classify on-site wastes, and to generate a qualitative geotechnical stability assessment of the landfill. The sampling plan was established within the agreed-upon scope, timeline, and budget of the program. The detailed sampling plan submitted to PWGSC via e-mail September 2, 2008 described the following aspects of the program:

- proposed sampling locations and numbers;
- proposed sampling or measurement methods;
- parameters being sampled;

- details on methodologies including sample collection, measurement, transportation, and analysis;
- description of objectives with rational;
- proposed QA/QC methods;
- proposed background sampling protocols;
- updated health and safety plan (See **Appendix D**); and
- updated budget.

During the field activities, areas of environmental concern were prioritized and assessed in accordance with the proposed scope of work. In addition, based on visual observations at the time of the field program, testing locations were refined from the initial sampling plan to target most likely impacted areas and/or to attempt coarse grid delineation of impacts.

4.3 Health and Safety Procedures

FRANZ field programs are always subject to a site-specific Health and Safety Plan (HSP). We use a Corporate Health and Safety as a general guide in developing the site-specific plan to which all team members and subcontractors must adhere. Protection of the public and personnel from exposure to any contaminated materials at the site was priority during the field program.

Prior to conducting any of the onsite work, a site-specific health and safety plan was developed, distributed, and discussed with all field personnel (see **Appendix D**). As a minimum, full personal protective equipment (e.g., hard hats, safety glasses, safety boots, reflective vests, and Nitrile gloves) was worn at all times during field activities. Tyvek overalls and respirators were made available to all field personnel, should the site health and safety officer (SHSO) find their use necessary.

4.4 Subsurface Sampling Methodology

4.4.1 Test Pit Excavations

Test-pitting was considered the appropriate method for conducting observations of soil condition and collecting near surface soil samples in areas of potential environmental concern (APECs).

Between September 5, 2008 and September 9, 2008, 25 hand excavated test pits were advanced by FRANZ personnel to a maximum depth of 1.6 m below ground surface. One soil sample from each test pit was collected and analyzed for various contaminants of concern (please refer to **Tables 1** and **2**). All test pits were completed with a spade shovel to the maximum achievable depth, the majority of test pits encountered refusal at bedrock.

At each test pit location, composite soil samples were collected using a decontaminated trowel. Depending on the depth of the test pit, the nature of the stratigraphy, and any evidence of contamination, composite samples generally were collected over a range of 50-60 cm.

Prior to sampling, soil descriptions including approximate grain size, colour, moisture content, stratigraphy, and any evidence of contamination were recorded (**Table 1**).

Following the completion of the test pit field log and prior to backfilling the pit to grade, soil samples were collected and stored in sealable polyethylene bags (for soil vapour headspace analysis) and dedicated glass sample containers (for laboratory analysis). Following sample collection, jarred soils were refrigerated and/or stored on ice in laboratory supplied coolers from the day of collection until delivery to the project laboratory in Vancouver, British Columbia.

The 2008 test pitting program was limited by the fact that no mechanical equipment was available for advancing the test pits on or below the escarpment. Therefore, most test pitting was completed by hand using a spade tipped shovel (with the exception of the test pits excavated in APEC 1). A test pit depth of 1.5 m was the maximum accessible depth from the ground surface. This method also limited the ability of field personnel to perform visual vertical profiling below 1 m, which would have been possible using traditional test pitting equipment (i.e., backhoe or excavator).

Test pit locations are indicated on the site instrumentation map (**Figure 2)**. Test pit logs were prepared for all of the locations tested and are located in **Table 1**. The number of logs prepared was sufficient to provide adequate coverage of the stratigraphy which appears to be fairly constant across the site and over the depth tested.

4.4.2 Soil Sampling Field Vapour Screening

Vapour screening is a frequently used method for detecting and measuring the quantity of volatile organic compounds present in soil. When taken continuously from the ground surface to the end of a test pit, vapour readings can provide an indication of the relative level of contamination and whether it derived from a localized source or migrated from a more distant one. As a result, field screening is a useful tool to facilitate selection of samples to be submitted for laboratory analysis.

During the investigation, field vapour screening was completed in-situ by partially filling and sealing standard volumes of soil into dedicated polyethylene bags. When stored at room temperature, headspace vapours were allowed to develop and equilibrate in the sealed bag. Gas samples retrieved by piercing the bag with a needle were then analyzed with an RKI Eagle organic vapour meter (OVM), and the concentration of combustible gases present (other than methane) by volume (ppm) of the calibrating gas (hexane) was measured. Only those soil samples suspected of hydrocarbon contamination were tested for head space vapours. The results of the soil vapour headspace analyses are included in the test pit logs (**Table 1**).

4.4.3 Selection Criteria for Soil Chemical Analyses

Soils were analyzed based upon three distinct rationales:

1) to delineate confirm/refute potential soil impacts related to land filling procedures;
2) to provide a better understanding of metal concentrations in the soil and other native materials across the site; and
3) generate a thorough understanding of environmental receptors, as well as fate and transport of contaminants of concern (COCs).

Soil sample selection for metals analyses was based on a detailed review of previous soil analyses completed on the various soil types found on the site and near impacted source areas, as well as visual site inspection of potential source areas and natural environmental pathways and receptors.

Samples for potential hydrocarbon analysis were screened for soil vapour concentrations and reviewed for staining and visual impacts. In general, soil samples submitted for VOC or hydrocarbon analysis were based on elevated soil vapour concentrations, odours and/or staining.

Samples for potential PCBs were selected based on historical site usage and visual impacts.

Background samples for metals were based on areas that appeared to be free of influence by human activities or land filling. Selected laboratory analyses for each sample are presented in **Table 2**.

4.4.4 Site Survey

A complete site survey was carried out during the 2008 field program. The site survey consisted of georeferencing site features and sample locations with the use of a Differential Global Positioning System (DGPS) unit horizontally accurate to < 30 cm.

The survey data was placed on a 2008 Google Earth image (2008, Google) and orthorectified to correspond with data points collected during the field survey.

In addition to the DGPS mapping, measurements of key site features (i.e., streams, pounding areas, some debris piles, etc.) were also conducted using a 30 m tape and compass. These site features were also incorporated into the final site base mapping.

4.4.5 Surface Water Characterization

A total of 19 surface water samples were collected from four areas across the site in 2008. One sample was collected in the upgradient debris area (APEC 1), four along the drainage channels passing through the vehicle dump (APEC 2), four at the toe of the main landfill area (APEC 3), eight downgradient of the main landfill and vehicle dump areas (APEC 4), and two background samples.

The surface samples were collected from the shores of the pond areas and Sylvia Grinnell River or by wading into the ponds with hip waders. The surface water locations collected during the field program corresponded with sediment sampling locations (with the exception of A1-SW08-1, A3-SW08-1, and A4-SW08-7). Specific sample locations for each site are indicated on **Figure 2**.

The samples were collected from a depth of 5-15 cm below the water surface, into laboratory supplied sample containers. Field parameters including pH, temperature and conductivity were measured at each surface water station at the time of sample collection. Each sample was labelled and refrigerated and/or kept on ice until they were relinquished to the project laboratory. Results of the field parameters are presented in **Table 3**.

4.5 Stream Flow Measurements

Measurements of stream flow were taken at three separate locations during the 2008 field investigation. One at the discharge from Pond 1 to the Sylvia Grinnell River, one at the discharge of Pond 4 to the Sylvia Grinnell River, and one directly below the vehicle dump (APEC 2) before entering Pond 6.

Simple stream flow estimates were conducted using the Q=VkA method, where Q = total rate of discharge, V = velocity, A = area, and k = correction factor. The site of the field measurements was selected based on the following available criteria:

- Slope of the stream not to great;
- Roughness of channel bottom; and
- Not in proximity to backwater effects, eddy currents, or other influencing factors.

The selected site was prepared by first removing any debris or large cobbles from the stream bed and clearing any obstructions from the stream walls.

Velocity measurements were conducted using float methodology, where a float was timed on a given (measured) portion of the stream seven times and averaged to gain distance/time. A correction factor of 0.85 (k) was applied to the velocity calculations to account for faster moving water at the surface of the stream in comparison that that moving in the middle or bottom.

The area of the stream cross-section was obtained by collecting depth measurements at nine locations across the stream transect and averaging out the depth and multiplying that by the stream width.

4.6 Sediment Characterization

A total of 16 pond and river sediment samples were collected across the site. Four samples were collected in the drainage through the vehicle dump (APEC 2), three at the toe of the main landfill (APEC 3), eight downgradient of the main landfill and vehicle dump areas, and two background samples. Sediment sample stations were located based on the most likely contaminant entrance point to the individual water body being tested.

The sediment sampling was completed using an Eckman sediment dredge. Sediment samples at each location were collected from the top 0 - 10 cm of pond and river sediments in the dredge and placed in a stainless steel bowl for observation, photographing, and logging. For each sample collected, a depth measurement, GPS coordinates, and description of the sediment (including colour, odour, sheens, staining, water depth, grain size, sample recovery, and % natural organic material), the presence of debris, and any unusual characteristics were recorded. The sediments were then placed in laboratory supplied sample containers with the aid of a stainless steel spoon or nitrile gloves and refrigerated and/or kept on ice until they could be relinquished to the project laboratory. The sampling equipment was washed with Alconox and rinsed with lake water between sampling locations. Specific 2008 sample locations are indicated on **Figure 2** and sediment field observations are summarized in **Table 4**.

4.7 Vegetation Sampling

The 2008 field investigation included the collection of 11 vegetation samples throughout the site. One was collected in the upgradient debris area (APEC 1), one was collected down gradient of the vehicle dump next to the main drainage channel (APEC 2), four were collected at the toe of the main landfill (APEC 3), three downgradient of the main landfill and vehicle dumps (APEC 4), and two background samples.

Vegetation samples were collected from the same species (wherever possible) and only foliage from each sample location was submitted for analysis. Samples were collected using nitrile gloves and placed in Ziploc bags. Each sample location was photographed and mapped. The samples were refrigerated and/or kept on ice until they could be relinquished to the project laboratory. Specific sample locations are indicated on **Figure 2**.

4.8 Waste Debris Inventory

For the purpose of future landfill decommissioning and potential removal of debris, an inventory of site waste in the form of debris, abandoned machinery, old transformers, miscellaneous chemicals and other debris scattered across the site (e.g., trucks, domestic waste, etc.) was completed. The waste materials were identified as hazardous or non-hazardous to assist in characterizing materials for potential disposal considerations.

Waste materials associated with the main landfill area and the vehicle dump were quantified by measuring their in-situ dimensions (length and width) using the DGPS system.

The other site waste was itemized as individual scattered pieces (e.g., drums, scrap metal, scrap wood and abandoned vehicles etc.).

A complete summary of waste material characterization and associated inventories categorized by APEC and location is provided in **Section 10.1.2, Table 26**.

4.9 Background Sampling Program

A background quality program was implemented to determine the natural physical and chemical characteristics of soil, sediment, surface water and vegetation in the vicinity of the Vehicle Dump and Community Landfill, but outside of any APECs. The purpose of the program was to obtain data regarding natural conditions that could be used for analytical comparison to conditions within the APECs. Soil, sediment, surface water and vegetation samples were collected and analyzed for metals.

Two background soil sample stations were selected up the river from the site. At each station, surface water, sediment, and vegetation samples were submitted for metals analysis.

Each soil sample was a composite of three sub-samples collected from the overburden unit, excluding the top organic layer.

Background sediment and surface water samples were collected as per the methodologies described in preceding sections under the appropriate media above.

4.10 Chemical and Physical Analysis

4.10.1 Chemical and Physical Analysis Program

ALS Laboratories (ALS) was selected to complete the analytical testing for this project. ALS is certified by the Canadian Association of Environmental Analytical Laboratories (CAEAL), and follows strict internal quality assurance/quality control (QA/QC) protocols. The ALS quality control program includes replicate analysis, blank spikes, matrix spikes, instrument calibration, internal standards, method blanks, and internal QC checks. The standard ALS analytical quality control protocols meet or exceed the requirements of all United States and Canadian regulators. A copy of the chain-of-custody forms used for sample submission is provided with the laboratory reports (**Appendix E**).

4.10.2 Selection Process for Chemical Analyses

Samples were analysed for three reasons: to document pesticide, PCB, metal, VOC, PAH and petroleum hydrocarbon concentrations across the site; to delineate the spatial distribution of impacts for the identified contaminants of concern; and to determine the current environmental and physical conditions which represent the most important potential risks to human and environmental health. Sample locations and analytical parameters were selected on the basis of a review of previous results and site history.

4.10.3 Chemical Analytical Program

The quantity of soil, sediment, surface water and vegetation samples by parameter, and the associated testing protocols are listed in the following table:

Analysis	Medium				
	Soil	Surface water	Sediment	Vegetation	Totals
PHCs	20 (2)	9 (1)	8 (1)		**37**
Metals	27 (2)	19 (1)	20 (1)	11 (1)	**77**
PCBs	13 (1)	15 (1)	11 (1)	9 (1)	**48**
VOCs	5 (1)	2	2		**9**
PAHs	7 (1)	2	2		**11**
Pesticides	5 (1)	3	3		**11**
Grain Size	5		2		**7**
Total number of analyses:	**82**	**50**	**48**	**20**	**200**

(XX) Denotes number of QA/QC samples.

4.10.4 Physical Testing Program

Grain size analyses (± 0.075 mm) were completed on five composite soil samples representative of the area surrounding the landfill and two sediment samples. Grain size analysis (fine/coarse) was conducted to aid in the selection of a site specific environmental criteria and for use in consideration of future landfill capping solutions. Grain size analyses results in both soil and sediment are presented in **Table 5**.

4.11 Quality Assurance/Quality Control

The purpose of the quality assurance/quality control (QA/QC) program was to confirm that field sampling methods and laboratory analyses were reliable. In implementing the QA/QC program, FRANZ verified that the quality of the reported results was suitable to support the environmental impact and human health risk conclusions drawn from the data.

The 2008 field program included the following QA/QC protocol elements:

- Decontamination (Alconox wash and distilled water rinse) of sampling equipment / instrumentation between all sample locations;
- Fresh, chemical-resistant nitrile gloves at each sampling location;
- Proper documentation of all aspects of the sampling program, with particular detail to the introduction of potential bias;
- Elimination of headspace for all volatile parameters (soils and water);
- Collection of one blind analytical duplicate for approximately every 10 samples of environmental media;
- Calculation of the relative percent difference between a sample and its duplicate; and
- Calibration of field instruments.

4.12 Data Reduction and Validation

Data reduction of the investigation results primarily involved, summary tabulation of analytical results and transcription of field observations. Following data reduction, data validation was performed to ensure that the raw data were not altered and that an audit trail was developed for managing the data. Data validation was also performed to verify the quantitative and qualitative reliability of the information. A comparative review of sample collection records, chain-of-custody, holding times, dilution factors, estimated quantitation limits (EQLs), and laboratory and field QC sample records were evaluated against original laboratory reports.

4.13 Quality Assurance/Quality Control Samples

Laboratory reports detailing the handling and secure storage of samples, and the significant dates with respect to sample delivery, extraction, and analysis were reviewed by FRANZ and found to be within control limits.

External QA/QC samples in the form of blind field duplicates were submitted by FRANZ for laboratory analysis. Approximately one duplicate was collected per 10 samples for a given medium. The nomenclature Dup-XX ensured that the sample number corresponding to the blind duplicate was not evident to the lab, allowing the external verification of laboratory accuracy and precision.

4.14 Data Validation of QA/QC Samples

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

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

where x_1 and x_2 are the duplicate concentrations and x_{avg} is the mean of these two values.

The duplicate results were evaluated using criteria developed by Zeiner (1994), which draw from several data validation guidelines developed by the United States Environmental Protection Agency (USEPA). According to these criteria, the RPD for duplicate samples should be less than 20% for aqueous samples and less than 40% for solid samples. RPDs can only be calculated when the compound is detected in both the original and the duplicate sample at a concentration five times above the reportable detection limit (or method detection limit - MDL).

The results of the data validation are presented in the Tables section of this report along with the analytical results. The precision is considered acceptable when evaluation criteria are met, or when both results are below the MDL. When the evaluation criteria are not satisfied, the following apply:

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

4.15 Data Evaluation – Results

Duplicate Analysis

Blind field duplicates (labelled as Dup-xx) were collected and submitted for PHC (2), PAHs (1), VOCs (1), metals (3), PCBs (1) and pesticides (1) analyses in soils. Blind field duplicates were collected and submitted for PHC (1), metals (1), and PCB (1) analyses in sediment. For surface waters, blind field duplicates were collected for PHCs (1), PCBs (1) and metals (1).

In general, the results show satisfactory precision. The following discussion presents the results of the RPD calculations.

In the comparison of soil test samples and their duplicates, PHC Fraction 3 and PCB concentrations were above 40% in one duplicate pair (A3-TP08-13/A3-TP08-DUP2). Variations are likely due to the low concentrations being measured, the relatively small amounts of sample required for the analysis method used and possibly due to heterogeneity in the samples, despite efforts to homogenize them.

In the sediment samples, one sample duplicate pair (A3-SD08-2 / SD-DUP1) displayed unsatisfactory results for one parameter (Copper) at 55%. The two Copper concentrations did not exceed the criteria. The other parameters remained within the acceptable precision and therefore the concentrations do not change the outcome of the assessment and have been kept as part of the assessment. All other parameters had acceptable RPD precision.

Surface water duplicate analysis was completed for PHCs, metals, and PCBs. The concentrations were all within the acceptable precision. Therefore, the sample results are considered valid and were kept as part of the assessment.

Duplicate analysis was completed on the vegetation samples for metals and PCBs. All concentrations for PCBs remained below detection limits; therefore RPD calculations were not required. The concentrations for duplicate metals analysis remained below acceptable precision, with the highest percent difference at 27% for Phosphorus (P).

5.0 PHYSICAL SITE CHARACTERISTICS

5.1 Regional and Local Topography

The study area is characterized by rolling terrain that slopes towards the Sylvia Grinnell River. The bedrock over which the metal debris was dumped is approximately 30 m above the River valley. Local terrain consists mainly of bare rocky outcrops with a thin layer of glacial and marine sediments in low lying areas between outcrops.

The elevation of the landfill site is approximately 20 to 30 metres above sea level (m asl) and the Sylvia Grinnell River is at approximately 0 to 5 m asl (http://atlas.nrcan.gc.ca).

5.2 Regional and Local Drainage

The Sylvia Grinnell River is the principal drainage system in the region which discharges into Frobisher Bay. The river is influenced by the tidal action of the ocean which has some of the largest tides in Canada. The river is a major migratory route for Arctic Char.

The natural drainage around the study area is influenced by the bedrock structure and numerous small, elongated ponds that have formed along fault lines and joints. The ponds are shallow (approximately less than 0.5 m deep), and are poorly drained. The high ratio of sediment surface to pond volume allows maximal exchange between the sediment and the water. In the summer, mixing throughout the water column is provided by the strong prevailing winds. In the winter, the ponds are frozen to the bottom. There are four large ponds and two smaller ponds. There are small intermittent drainages that join these water bodies (See **Figure 2**).

Pond 1 is located adjacent to the river and is fed from the southeast and north. From the southeast side feed, a metallic sheen in the water and orange staining along the shoreline and water bed was observed. The flow rate is low but sourced directly below the west end of the landfill. The north side feed is of medium flow rate, also with a metallic sheen and orange staining. This north side feed discharges from Pond 2. Surface sediments in Pond 1 consisted of mainly orangey, decomposed organic matter mixed with fine black sand. This pond has a discharge into the river with a measured flow rate of 1.35 L/s.

Pond 2 appears to be fed from the southeast and northeast by slow groundwater discharge seeps possibly through fractured bedrock. Minor orange staining was observed around the shoreline and debris was present in the pond (tires). The pond is approximately 1 to 1.5 m deep. The pond discharges to the south towards Pond 1. Sediments in Pond 2 consist of fine brown sand mixed with a thin top layer of decomposed organic matter.

Pond 3 is directly down-gradient from the main landfill site. Two gullies are present on the northeast side that would direct rain water and overland flow into the pond. A feed on the northeast side was observed in a flat, low lying area. The discharge is from the southwest corner and is only visibly active during high water events. Surface sediments in Pond 3 consisted of brown to black decomposed organic matter mixed with brown fine sand.

Pond 4 is at a slightly lower elevation than Pond 3 and not connected hydraulically. It is located downstream of the landfill with a quite high recharge from the vehicle dump area. Discharge is from the southwest corner of the pond at a measured flow rate of 9.13 L/s to several small intermittent ponds before discharging to the river. Surface sediments in Pond 4 consisted of black to dark grey fine sand with trace decomposed organic matter.

Pond 5 was also observed to have orange staining along the shoreline. It is located upgradient of Pond 4, approximately 85 m southwest of the vehicle dump.

Pond 6 is located below the escarpment, directly below the vehicle dump. Seeps are present primarily from the north (from vehicle dump), with small seeps from the east and west. The seep from the north is through a grassy area between bedrock outcrops at a measured flow rate of 5.41 L/s. Sediments in both Ponds 5 and 6 consisted of 50% decomposed black organic matter and 50% black fine sand.

5.3 Geological Characterization

5.3.1 Regional Bedrock Geology

The southern portion of Baffin Island consists of primarily Precambrian Canadian Shield crystalline rocks. The regional bedrock geology in the study area is part of the Churchill

Structural province. The bedrock in the study area is from the Aphebian Era and consists of a variety of metamorphic rocks. Quartz-feldspar-gneissic rocks are the predominant facies in the area around Iqaluit (Härtling, 1988).

The structural geology follows the general northwest – southeast trend of the area. The northwest – southeast aligned fault system in southern Baffin Island were the result of the Upper Cretaceous and early Tertiary rifting associated with the spreading in the Baffin Bay and Davis Strait. The study area lies at the boundary between the Frobisher Bay graben and the Hall Peninsula horst, and the cliff line and the bedrock outcrops follow the overall trend. This structural feature greatly impacts the migration of contaminants from the waste disposal site (Härtling, 1988).

5.3.2 Regional Surficial Soils

The major landforms developed along lines of weakness related to the Upper Cretaceous to Tertiary faulting and along pre-existing draining systems. During the Cenozoic, the area was affected by several glacial advances and retreats. Glacial ice streams flowed southeastward along the Sylvia Grinnell valley and surrounding areas. The landscape was developed during deglaciation when glacial, glaciofluvial and glaciomarine processes dominated (Mode and Jacobs, 1987). Following glacial retreat of the Frobisher Bay outlet glacier past the study area, the Sylvia Grinnell valley was covered by marine waters until approximately 2 – 3,000 years ago. This would limit the time for modern soil development in the area downslope of the lower cliff line. The area above the cliff line became free of marine influence approximately 5,000 years ago and thus had a longer time for soil development. This time would be too short for substantial bedrock weathering, thus reducing the influence of the bedrock geochemistry on the overlying soils. Both areas would be subject to fluvial and colluvial processes. The predominant weathering process would be mechanical disintegration by differential thermal expansion, frost action and salt weathering in the Sylvia Grinnell estuary (Härtling, 1988).

The shallow soils observed on the site were primarily black sands with some gravel and silts. The soil would have been deposited during glaciation (till) and by marine deposition (silts).

5.3.3 Local Scale Geology

The surficial geology in the region has been described as a thin layer of silty sand with trace to some gravel. The soil is dark brown to black with a high organic content and the presence of rootlets. Bedrock was encountered between 0.8 to 1.6 m bgs (Area 1); 0.1 m bgs (Area 2); between 0.1 and 0.4 m bgs (Area 3); and between 0.3 to 0.8 m bgs (Area 4). Logs for the test pits completed by FRANZ are provided in **Table 1**.

5.4 Hydrogeological Characterization

5.4.1 Regional Hydrogeology

Overland flow is the primary mode of water transport in the area. Groundwater associated with fractures in the bedrock and through the thin overburden would be likely be minor. Groundwater is not used as a drinking water source in the area. The site lies within the continuous permafrost zone. Permafrost occurs when the ground remains at or below a temperature of 0^oC for a minimum of two years. Almost all the moisture in permafrost occurs in the form of ground ice. Within the continuous permafrost zone, permafrost underlies most types of terrain except rivers, lakes and newly consolidated soils, and is at depth under well–drained, coarse-grained landforms such as eskers and kames.

Based on the regional geology, and the presence of permafrost, the groundwater flow directions and velocities are likely complex and controlled by topography, surface water bodies and large faults and fracture zones. It is expected that the surface water bodies are expressions of the water table and are discharge zones for fractured bedrock.

5.4.2 Site Hydrogeology

The shallow soil and presence of bedrock did not allow for the installation of any monitoring wells.

6.0 REGULATORY REVIEW AND ENVIRONMENTAL QUALITY CRITERIA

6.1 Soil, Sediment, Groundwater and Surface Water Guidelines

6.1.1 Regulatory Framework

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

In Nunavut, environmental site assessments and site remediation projects are typically based on the use of federally developed generic guidelines. Risk assessment principles have been used extensively in developing federal generic clean-up criteria for contaminated sites. However, as the term “generic” implies, they are intended for broad applications and are usually over-protective to avoid underestimating potential risks associated with a wide range of site conditions and potential land uses.

The chemical data obtained during this Phase I/II ESA were preferentially compared to established guidelines from the federal CCME. The federal guidelines are relevant since the site is currently federally managed and Nunavut has adopted the CCME approach.

The federal CCME guidelines were derived based on potential impacts to humans and ecological receptors. However, the CCME guidelines also take into account potential risks to humans associated with the consumption of groundwater on the site. The CCME have not established an equivalent set of non-potable thresholds for federal lands. For these reasons, a chemical-specific selection process was used to identify the appropriate guideline for use in the chemical evaluation (as discussed below).

6.1.2 Federal Guidance

The CCME "Canadian Environmental Quality Guidelines" (1999) publication compiled all previously released soil and groundwater criteria and guidelines into one publication. Updates have been issued for selected chemicals over the past several years. These guidelines for soil, sediment and water are numerical limits intended to maintain, improve or protect environmental quality and human health at contaminated sites. The guidelines are derived using toxicological data. There are four separate sets of guidelines for soil quality and five sets of guidelines for water quality. The guidelines are separated into groups for different types of land and water use.

Soil

The soil analytical results were compared to the Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines, specifically the Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (CSQG), and with the Canada-Wide Standards (CWS) for Petroleum Hydrocarbons (PHC) in soil. These are applied to most federal contaminated sites. The criteria are numerical limits intended to maintain, improve or protect environmental quality and human health at contaminated sites. The guidelines are derived using toxicological data and aesthetic considerations.

The standards or guidelines adopted for this evaluation are as follows:

- *Canadian Environmental Quality Guidelines* (CEQGs; CCME, 2007) for commercial land use (parkland/residential land use standards were also shown for comparison purposes); and
- *Canada-Wide Standards for Petroleum Hydrocarbons* (CWS - PHC) in Soil (CCME, 2008a) - Tier 1 Levels also for commercial land use (parkland/residential land use were also shown for comparison purposes).

The Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (CCME, 2008a) presents criteria for petroleum hydrocarbons in soil. These numerical standards are based on the assessment and consistent management of risks posed to humans, plants, animals and environmental processes under four common land uses (agricultural, residential/parkland, commercial and industrial). Under Tier 1 of the CWS, specific numerical levels are presented for the four land uses, two soil textures (coarse and fine) and the four defined petroleum hydrocarbon fractions (F1 (nC6-nC10); F2 (nC10-nC16); F3 (nC16-nC34); F4 (nC34+)). There are several additional levels for fractions F1 and F2 to protect surface water where groundwater discharges to surface water, where groundwater is used for potable purposes and where residential buildings have slab-on-grade construction. These levels are deemed to be protective of all receptors based on the defined conditions in all settings.

The CWS also includes the option to generate Tier 2 levels where site-specific information indicates that site conditions exist that modify human or ecological exposure to PHC contamination. Such conditions may alter risks significantly relative to the generic conditions used to derive Tier 1 levels. Furthermore, Tier 3 under the CWS involves developing site-specific cleanup levels and management options using general and site-specific information in conducting a risk assessment.

Given the nature of the work, only the Tier 1 levels are used as comparison criteria. The appropriate levels are presented with the laboratory analytical data in tables.

Sediment

Established sediment assessment guidelines depend on the probability of an effect to occur in organisms inhabiting the sediment. Sediment quality guidelines are scientific tools that synthesize information regarding the relationships between sediment concentrations of chemicals and any adverse biological effects resulting from exposure to these chemicals. Federally, the CCME has established Interim Sediment Quality Guidelines (ISQG) and the Probable Effect Level (PEL). Sediment chemical concentrations below ISQG values are not expected to be associated with any adverse biological effects, while concentrations above PEL values are expected to be frequently associated with biological effects. Chemical concentrations between the ISQG and PELs represent the range in which effects are occasionally observed.

Water

Canadian water quality guidelines are intended to provide protection of freshwater and marine life from anthropogenic stressors such as chemical inputs or changes to physical conditions. In 1999, CCME also updated the surface water quality guidelines for the protection of aquatic life. The Freshwater Aquatic Life (FWAL) water quality guidelines were applied to the surface waters at the Site.

Summary

The guidelines adopted for this evaluation are summarized as follows:

- CCME 1999 “Canadian Environmental Quality Guidelines” and recent updates (2004 and 2007) for commercial (CL) land use and for comparison purposes to the residential/parkland (RD/PL) land use for coarse grained soil were employed.
- CCME 2000 “Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil”. For this assessment, the Tier 1 Commercial guidelines for coarse-grained soils were used in addition to the residential/parkland guidelines for comparison purposes.
- Surface water quality was compared to the CCME guidelines for the protection of freshwater aquatic life (FWAL; 2007 Update).
- Sediment quality was compared to the CCME guidelines for the protection of ecosystems (ISQG and PEL, 2002 Update).

6.1.3 Chemical Evaluation - Process for Selection of Environmental Criteria

The chemical evaluation was conducted by comparing the detected concentrations for each substance to the CCME guideline for CL (and RD/PL) land use standards. The following selection process was used to identify which EQG to use for the chemical evaluation.

- If only one guideline was available from the federal CCME for a chemical, then it was adopted for use.
- If normal average background concentrations for a chemical in the study area were higher than CCME criteria, then the background concentration was selected as the most appropriate point of comparison. It should be noted that the average background concentrations were below the CCME guidelines.

6.2 Designated Substances

6.2.1 Selection of Environmental Quality Guidelines

Criteria, rationale, and regulatory jurisdictions for each component of the designated substances property survey are presented below.

Material Type	Classifications	Evaluation Criteria
PCBs in Soils	PCBs in soils are regulated under the Canadian Environmental Protection Act (CEPA) and transported according to TDGA and CEPA.	PCB content >50 ug/g is considered a hazardous waste. Material with PCBs above the CCME soil criteria (e.g., 1.3 ug/g) but below 50 ug/g is not hazardous waste.
Liquids/Chemicals	Waste solvents and liquids are a contaminant under the EPA of Nunavut and must be managed as a hazardous waste.	Absence/presence of liquids/chemicals in containers.
Batteries	Waste batteries are a contaminant under the EPA of Nunavut and must be managed as a hazardous waste.	Absence/presence of waste batteries.

6.3 Vegetation Evaluation Guidelines

The Ontario Ministry of the Environment (MOE) “Upper Limit of Normal” contaminant guidelines (ULN) represent the expected maximum concentrations of contaminants in surface soil (non-agricultural), foliage (deciduous and current year coniferous trees and shrubs) grass, moss bags and/or snow from areas of Ontario not subject to the influence of point sources of emissions. Rural guidelines are based upon samples collected from undeveloped areas.

These guidelines do not represent maximum desirable or allowable levels of contaminants. Rather, they serve as levels which, if exceeded, would prompt further investigation on a case-by-case basis to determine the significance, if any, of above-normal concentrations. Concentrations which exceed the guidelines are not necessary toxic to plants, animals or humans. Concentrations below the guidelines would not normally be considered toxic (MOEE HCB Phytotoxicology Field Investigation Manual (014-3511-93).

7.0 INVESTIGATION RESULTS

Samples from soil, sediment, surface water, and vegetation were collected at the four identified APECs and analysed for selected parameters including metals, benzene, toluene, ethylbenzene, and xylenes (BTEX), PHC fractions F1 to F4, PAHs, VOC, PCBs, and pesticides (**Table 2**). The analytical data is summarized in **Tables 6** to **25** and on **Figures 3** to **13**.

7.1 APEC 1 - Upgradient Buried Debris

The sampling program at APEC 1 included three soil samples (A1-TP08-1, -2 and -3), one surface water sample (A1-SW08-1) and one vegetation sample (VEG-6). Based on site activities, the potential contaminants of concern were identified as being PHCs, metals, PCBs and pesticides. At the three test pits locations, the soil profile from 0.0 to 1.6 m bgs was described as a brown fine to coarse sand and gravel mixed with buried debris. The buried debris included tires, drums, wood, iron bracing, vehicle parts, rubber hose, cable wire, and rods.

__Surface Water__

Metals and PCBs were analysed from the surface water sample A1-SW08-1 collected at APEC 1. Metal analytical results indicated that the aluminum concentration (0.0144 mg/L) was greater than the CCME freshwater guideline of 0.005 mg/L. PCB concentrations were below the laboratory detection limit. Sample locations and analytical results for surface water at APEC 1 are presented on **Figure 3**.

__Vegetation__

One representative sample (VEG-6) of vegetation from APEC 1 was submitted for metals and PCBs analysis. Metal results are below the Ontario Vegetation Criteria and PCB results are lower than the laboratory detection limit. Sample locations and analysed parameters are presented on **Figure 3**.

Soil

Soil analytical results from A1-TP08-1 indicated that the copper concentration of 103 mg/kg exceeds both the CCME residential/parkland and commercial land use guidelines. The same sample contains a lead concentration (190 mg/kg) greater than the CCME guideline for residential/parkland land use (140 mg/kg) but lower than the guideline for commercial land use (260 mg/kg). Concentrations of PHC, pesticides and PCB at A1-TP08-1 were all below the applicable guidelines. The exceedances in soil at APEC 1 are provided on **Figure 4**.

Metal analytical results from test pits A1-TP08-2 and 3 were lower than the CCME residential/parkland and commercial land use guidelines.

7.2 APEC 2 – Vehicle Dump

APEC 2 is located to the east of the main Landfill and has been used as a disposal area for trucks, cars, trailers, boilers, and tankers. The potential contaminants of concerns are PHC, PAH, metals, PCB, pesticides and VOC.

Four sediment samples (A2-SD08-1 to 4) and four surface water samples (A2-SW08-1 to 4) were collected along the main drainage channel that runs directly through the center of the debris pile and discharges into Sylvia Grinnell River. Sediment in the channel varies from a dark, grey, fine to coarse sand to brown sand and gravel. Orange staining was observed at the four sediment sample locations.

A total of two shallow test pits (A2-TP08-1 and 2) were excavated to bedrock at APEC 2. Soil from 0.0 to 0.10 mbg was described as a dark brown fine to medium sand, with trace gravel and some organic matter. One representative vegetation sample (VEG-4) was collected at APEC 2 and submitted for metals and PCB analyses.

Surface Water

With respect to the CCME freshwater guidelines, there are four surface water samples that exceeded metal concentrations of aluminum, cadmium, copper and lead. The highest metal concentrations were measured at A2-SW08-3 and at A2-SW08-4. At these two locations concentrations of PHC, PCB and pesticides were below the laboratory detection limit.

Vegetation

Analytical results from VEG-4 indicate that a sodium concentration of 55 mg/kg (wwt) slightly exceeds the Ontario vegetation criteria of 50 mg/kg (**Figure 5**). PCB concentrations are lower than the laboratory detection limit.

Soil

At A2-TP08-1 a cadmium concentration of 22.4 mg/kg is greater than the CCME guidelines for residential/parkland and commercial land use. At this location, a total PCB concentration of 4.76 mg/kg also exceeds the CCME guideline of 1.3 mg/kg for residential/parkland and a barium concentration of 134 mg/kg is four times higher than the background concentrations. A summary of soil exceedances at APEC 2 is presented on **Figure 6**. PHC, pesticides, VOC and PAH concentrations were below the applicable guidelines.

With respect to the samples collected from test pit A2-TP08-2 the results for metals, PHC, pesticides, VOC, and PAH were below the applicable guidelines.

Sediment

Concentrations of arsenic, cadmium, chromium, copper and 4,4-DDD concentrations exceed the applicable guidelines for sediments in sample A2-SD08-4 with respect to CCME Interim Freshwater Sediment Quality guidelines (ISQG) but the results are less than the CCME Probable Effect Levels (PELs). Lead, zinc, total PCB, 4,4-DDE and 4,4-DDT concentrations exceed both ISQG and PEL CCME guidelines.

In sample A2-SD08-3, concentrations of cadmium, chromium, copper and zinc are greater than the ISQG but lower than the PEL values. Lead and total PCB concentrations exceed both ISQG and PEL CCME guidelines.

The highest zinc and copper concentrations were measured, respectively, in samples A2-SD08-1 (499 mg/kg) and A2-SD08-2 (292 mg/kg) at levels greater than both the ISQG and PEL CCME guidelines.

A summary of the exceedances encountered in sediment from APEC 2 is presented on **Figure 7.**

7.3 APEC 3 – Main Landfill

The main landfill area consists of a mixture of debris spread across a steep graded bedrock slope. The top of the landfill has been capped with granular material and the toe is left exposed with debris scattered throughout the area. PHC, metals, PCB, pesticides, VOC, and PAH were identified as the contaminants of concern based on site use.

The majority of the landfill material is within the boundaries of APEC 3. This area was investigated via 18 test pits (A3-TP08-1 to A3-TP08-18). Soil at APEC 3 consists of a black/brown fine to medium sand, occasionally with some silt or gravel and organic matter. Buried metal debris was encountered at test pits A3-TP08-1 and 18 and staining was observed at test pits A3-TP08-1, 5 and 13. In addition, representative vegetation samples were collected at four discrete locations (VEG-1, 2, 3, and 5).

There are four main ponds at APEC 3 in which surface water (A3-SW08-1 to 4) and sediment (A3-SD08-2 to 4) samples were collected. Sediment at these ponds was described as dark grey/black fine sand. Samples A3-SW08-3 and 4 were collected in the secondary ponds that receive upgradient waters from the main drainage channel that runs across APEC 2.

Surface Water

Metal analytical results from sample A3-SW08-1 indicate a variety of exceedances including aluminum, cadmium, copper, lead and zinc. Cadmium concentrations also exceed the CCME freshwater guideline in samples A3-SW08-3 and 4. A summary of the exceedances in surface water at APEC 3 is presented on **Figure 8**. PHC and PCB results were below laboratory detection limits or below the applicable guidelines.

Vegetation

Of the four vegetation samples collected at the site only VEG-1 (62 mg/kg wwt) and 2 (53 mg/kg wwt) had sodium concentrations greater than the Ontario vegetation criteria of

50 mg/kg wwt (**Figure 8**). PCB concentrations were below the laboratory detection limit for all four samples.

Soil

Hydrocarbon exceedances were observed at test pits A3-TP08-2 and 3 located just downgradient of the exposed debris area. The highest F2 to F4 hydrocarbon concentrations were measured in sample A3-TP08-2, these concentrations are considerably higher than the CCME guidelines for both commercial and residential/parkland land use. In the same sample, total PCB (17.1 mg/kg) also exceeds the CCME residential/parkland guideline of 1.3 mg/kg and sample A3-TP08-2 contained a concentration of barium of 425 mg/kg which is more than 10 times the background levels.

Analytical results from sample A3-TP08-12 indicate that copper (82 mg/kg) and lead (256 mg/kg) concentrations are greater than the CCME residential/parkland guideline but lower than the CCME commercial land use guidelines. The corresponding zinc concentration (488 mg/kg) exceeds both CCME commercial and residential/parkland guidelines.

PAH and zinc concentrations in the duplicate sample (A3-TP08-DUP2) from A3-TP0813 exceeded the applicable guidelines.

In a number of locations, sample results for pH were below 6. Despite the exceedance of the CCME interim remediation criteria, these results are likely reflect a natural condition of the soil. **Figure 9** presents the sample locations and exceedances in soil at APEC 3. The remaining analytical results were below laboratory detection limit and/or below with the applicable guidelines.

Sediment

Cadmium, lead and zinc concentrations in samples A3-SD08-3 and 4 are higher than the CCME Interim Freshwater Sediment Quality guidelines (ISQG) but lower than the CCME Probable Effect levels (PELs). The total PCB concentration from A3-SD08-4 exceeds both CCME guidelines for freshwater sediments (ISQG and PEL).

Sediment collected at the largest pond at APEC 3 contains a lead concentration greater than the CCME Interim Freshwater Sediment Quality guidelines (ISQG). Sediment sample locations and exceedances are presented on **Figure 10**.

7.4 APEC 4 – Downgradient, Off-Site

APEC 4 encompasses the area of the Sylvia Grinnell Park, directly downgradient of the site. A total of two test pits (A4-TP08-1 and 2) were excavated at the downgradient northwest border of the main landfill. A dark grey/brown fine to medium sand with some organic matter was encountered at both test pits to a maximum depth of 0.8 m bgs. Representative vegetation samples (A4-VEG-1 to 3) from APEC 4 were collected and submitted for metals and PCB analyses.

There are three main ponds at APEC 4 in which surface water and sediment samples were collected. Two of them (Ponds 1 and 2) receive upgradient water from the main landfill area (APEC 3) and one (Pond 4) is a receptor of upgradient waters from the drainage channel that runs across APEC 2 and 3. These ponds are connected directly or indirectly to the Sylvia Grinnell River. Surface water and sediment samples were collected along the margins of Sylvia Grinnell River. According to field observations, sediment texture varies from fine to coarse sand, with occasional gravel. Debris was encountered at Ponds 1 and 2.

Surface Water

Cadmium concentrations exceed the CCME freshwater guideline at Pond 4 (A4-SW08-3) and at two locations along the Sylvia Grinnell River (A4-SW08-4 and A4-SW08-7). The corresponding copper concentration also exceeds the applicable guideline at Pond 4. At Pond 1, the analytical results indicate that a trichloroethylene concentration of 0.0226 mg/L is slightly greater than the CCME freshwater guideline of 0.021 mg/L. Exceedances in surface water from APEC 4 are presented on **Figure 11**.

Vegetation

Three locations were sampled at APEC 4, sodium and iron concentrations respectively exceed, the Ontario vegetation criteria of 50 mg/kg wwt and 500 mg/kg wwt. A summary of the analytical results from APEC 4 is presented on **Figure 11**.

Soil

Analytical results for PHC, PCB and metals from test pits A4-TP08-1 and 2 were below the CCME guidelines for both residential/parkland and commercial land use (**Figure 12**).

Sediment

Metals and PCB analytical results from all sediment samples collected at APEC 4 are below both CCME guidelines (ISQG and PEL) or are below the laboratory detection limit. Sample locations and analysed parameters for APEC 4 are presented on **Figure 13**.

8.0 CHEMICAL SPATIAL ANALYSES

A variety of spatial analyses were conducted in order to infer the connectivity and distribution of previously identified contaminants of concern in soil and surface water. Based on the concentration and mobility, representative parameters were selected to demonstrate the transport and fate of contaminants from various soil sources present in APECs 1, 2 and 3. The following steps were taken to develop a site conceptual model.

8.1 Parameters and Identified Potential Source Areas

The major concern associate with landfills is the production and subsequent loss of contaminants in landfill leachate which can result in environmental impairment. Leachate is produced when moisture enters the landfill waste and dissolves contaminants found in the refuse into the liquid phase (i.e., groundwater). The types, amounts and production rates of contaminants in landfill leachates are influences by several factors including: physical and chemical composition of the wastes, refuse, density, placement sequence and depth, moisture loading, temperature, and time.

It is generally accepted that there is a finite mass of contaminants in landfills which can be leached from the solid wastes. Leachate contaminants generally reach a peak concentration then decline over time due to dilution, biodegradation and leachate from the landfill. The more soluble the contaminants, including the inorganic components, appear first in the leachate, reach a peak concentration, then slowly reduce over time. In turn, readily biodegradable organics appear, reach peak concentration then diminish with time. The poorly biodegradable/soluble contaminants are the last to reach peak concentrations resulting in persistence in the leachate over a number of years. In northern climates, low temperatures and precipitation events, prolong the production of leachate which slows the release of contaminants to the environment.

Based on the age of the landfills and dump areas within the study area, it is expected that contaminant concentrations in the surface waters are likely close to peak concentrations and perhaps declining. The impacts to sediments are likely a result of mass loading events over the contaminating lifespan of the landfills/dumps. The poorly biodegradable/soluble contaminants such as PHCs (F3-F4), PCBs, PAHs, and

Pesticides would be trapped in the high organic sediments and would contribute only minor concentrations to surface water. These chemicals would thus be considered immobile. The more soluble contaminants such as some metals would be present in both sediments and surface water. As such, these chemicals would be more mobile and would contribute to impacts along the flow path. It would also be expected that the metals would attenuate along the flow path as a result of absorption or chemical precipitation.

PCB, PHC and metals are the three classes of contaminants of concern (COCs) identified in soil at APECs 1, 2 and 3. PCB sources were encountered in APEC 2 (A2-TP08-1) and APEC 3 (A3-TP08-2). Hydrocarbon sources were identified only at APEC 3 at two locations downgradient of the exposed debris (A3-TP08-2 and 3) and at depths ranging from 0.0 to 0.2 mbg. Hydrocarbon exceedances included CWS F2 to F4. Pesticides were also detected above the PEL in APEC 2 (SD-TP08-4).

Metals were the COC parameter group encountered most frequently across the site and represented the highest number of source areas. A variety of metals were identified within APECs 1, 2 and 3 and included copper, lead, cadmium, and zinc. The main metal sources were present in samples collected from test pits A1-TP08-1 (copper), A2-TP08-1 (cadmium) and A3-TP08-12 (lead and zinc).

8.2 Stationary Sources

As discussed previously, shallow depth hydrocarbon sources are present at A3-TP08-2 and 3, located within APEC 3. Samples collected from nearby delineation test pits and at the main surface water receptors, contained hydrocarbon concentrations below laboratory detection limits. Therefore, the two shallow hydrocarbon sources identified at APEC 3 are considered stationary and transport pathways were not included in the site conceptual model and spatial analyses.

The PCB sources were encountered at APEC 2 (A2-TP08-1) and APEC 3 (A3-TP08-2) and remain restricted to these source locations and presently are not reaching the main surface water receptors. This parameter group was also not included in the analyses.

8.3 Mobile Sources

Based on soil analytical results, the main metal sources within APECs 1, 2 and 3 were detected at test pits A1-TP08-1 for copper, A2-TP08-1 for cadmium and at A3-TP08-13 for lead and zinc. Samples collected from the main surface water receptors contained concentrations of copper, lead, cadmium, and zinc that are high and non-compliant when compared to CCME freshwater guidelines. In comparing the metal results from soil sources and from surface water receptors, it is possible to infer a connection between the exceedances in both media. This indicates that metal sources are likely contributing to the metal concentrations present in some of the surface water drainage channels and ponds. Therefore, the soil and surface water metal concentrations were combined on the same figure with metal surface water results in order to develop a visual site conceptual model.

8.4 Site Conceptual Model

A site conceptual model was developed linking the soil and surface water concentrations for copper, lead, cadmium, and zinc. These metal concentration gradients were plotted and presented on **Figures 14** to **17.** In general, the metals impacts appear to be attenuating along the flow path, prior to discharge in Sylvia Grinnell River.

Cadmium Spatial Analysis

The cadmium soil source is likely impacting surface water quality of the main drainage channel present in APECs 2 and 3 (**Figure 14**). The soil source of cadmium can likely be attributed to debris piled up-gradient. An example of high cadmium soil results were seen at A2-TP08-1 (22.4 mg/kg). Several surface water samples collected along this drainage channel and at the discharge point to Sylvia Grinnell River contained concentrations of cadmium above the CCME freshwater guideline of 0.000017 mg/L.

A second cadmium source was identified at APEC 3 at test pit A3-TP08-12 (1.34 mg/kg). Even though this soil concentration is compliant with the applicable guidelines it might be high enough to contribute to the non-compliant surface water cadmium concentration measured in the nearby downgradient pond (A3-SW08-1).

Copper Spatial Analysis

Most of the copper exceedances in surface water were detected within the main drainage channel that runs from APEC 1 to the Sylvia Grinnell River. These exceedances might be attributed to the upgradient source at A1-TP08-1, where the copper concentration of 103 mg/kg in soil was the highest in comparison to the other sampling locations (**Figure 15**).

A secondary copper source at APEC 3 (A3-TP08-12 – 82 mg/kg) might be affecting the surface water quality in location of sample A3-SW08-1. This sample contains a copper concentration greater than the CCME freshwater guideline. Although both the impacted pond and drainage channel are connected directly or indirectly to the Sylvia Grinnell River, samples collected from the river were compliant with the applicable copper guideline.

Lead Spatial Analysis

The primary lead soil source was encountered at sample location A3-TP08-12 in APEC 3. The lead concentration of 256 mg/kg is greater than the CCME guideline for park land. Immediately downgradient of this source, there is a pond in which the lead concentration detected at A3-SW08-1 impacted surface water quality, **Figure 16**. A section of the main drainage channel that runs across APEC 2, contained a lead concentration (A2-SW08-3) that similarly exceeds the applicable guideline. This Lead impact may be a result of leaching from the A2-TP08-2 source area.

The samples collected along the Sylvia Grinnell River contained compliant lead concentrations. Therefore, upgradient lead impacts were not reaching the main surface water receptor.

Zinc Spatial Analysis

The primary zinc source was identified within APEC 3 at sample location A3-TP08-12. The sample zinc concentration of 488 mg/kg exceeded both the CCME guidelines for park and commercial lands. Leachate originating from this source may be affecting the quality of the surface water in the downgradient pond located near sample A3-SW08-1,

Figure 17. The upgradient zinc impact in the pond has not migrated to Sylvia Grinnell River, even though the surface water flows are connected to the River.

There are two locations in which zinc concentrations are compliant but three times higher than the background concentrations: A1-TP08-1 (122 mg/kg) and A3-TP08-2 (126 mg/kg). Some samples from the downgradient drainage channel and nearby these sample locations contained also measurable but compliant zinc concentrations.

9.0 GEOTECHNICAL AND STABILITY EVALUATION

Scope of Stability Assessment

The scope of the stability assessment was limited to a qualitative evaluation of the site and setting to identify potential physical hazards and stability issues to human health and safety. The regional and site conditions were reviewed and general assumptions were developed regarding the type and distribution of debris, the presence and depth of the soil active layer and presence and depth to bedrock. Further general assumptions were made regarding the operation of the landfill such as dumping and capping practises.

The intent of the qualitative assessment is to identify issues related to human health and safety so that these issues can be incorporated into the proposed landfill decommissioning plans. Additional work may be required to quantify the likelihood of occurrence and the risk associated with the identified stability or hazard issues.

Landfill Areas

The landfill was divided into four areas based on the type of physical hazard or stability concerns, **Figure 18**. These four areas are as follows:

- **Upper Bench and Vehicle Dump** - this area of the landfill encompasses the upper level bench and the upper level portions of APEC 1, Main Landfill areas as well as APEC 2, Vehicle Dump Area.
- **Main Slope** - the second area consists of the debris covered slope connecting the lower bench area with the upper bench area.
- **Gully** - the third area consists of the gully connecting the upper bench area to the lower bench area. This area located within the southwest portion of APEC 2.
- **Lower Bench** – the fourth area is located within the lower portions of APECs 1, 2 and 4.

Upper Bench and Vehicle Dump

The following conditions were assumed based on non-intrusive field observations and reviews of the previous environmental reports. The upper bench area consists of debris placed over the top of existing soil and bedrock conditions. The debris may consist of domestic and industrial refuse, with the industrial refuse consisting primarily of relic equipment, drums, steel cables, and other metallic debris. The area has been partially or completely capped using available soil.

Based on the previously noted assumptions the physical hazard and stability concerns primarily were assumed to be secondary settlement of the landfill debris due to decomposition and consolidation of the debris. This may create voids within the landfill and these voids may collapse when subjected to foot traffic. Hazard mitigation can be accomplished by posting warning signs and/or using fences to limit public access.

Main Slope

Based on observations of the surficial debris deposited on the slope this material is assumed to consist of a mixture of soil and refuse with significant variability in the ratios of soil to refuse. The slope may potentially represent a significant hazard and would normally warrant a quantitative analysis however the material is not homogenous and conventional quantitative stability analysis may not be possible. Instead the field and report data was reviewed to determine the probable method of material placement on the slope. It appears that the material was either dumped over the slope or pushed over the slope with heavy equipment. There were likely many episodes of material deposition on the slope.

The method of depositing the material from the top of the slope and allowing the material to accumulate causes the material to be deposited at or near its natural angle of repose. If this is indeed the case the factor of safety can be inferred to be 1.0. This is significantly less than the preferred conservative factor of safety for slope stability of 1.5.

Since the factor of safety is likely low any changes to the material properties as a result of stability (factor of safety) may be reduced if the moisture content in the debris approaches saturation, or the loads on the slope increase or when debris decomposition occurs. If the factor of safety is reduced the slope may fail. Slope stability can be improved by:

- Removal of all debris on the slope,
- Counter weighting or reinforcing the toe of the slope. The counter weighting should be appropriately designed to achieve the required factor of safety; and,
- Re-constructing the slope from the base and continuing up the slope using an appropriate material such as blast rock and placing the material at less than its natural angle of repose to achieve the required factor safety.

If these options are not possible another option may be to limit personnel access to both the area of the slope and a suitable run-out distance at the base of the slope. The run-out distance should be calculated by a suitably qualified professional. It was assumed that in all cases, overland drainage would be properly managed to direct all surface water away from the debris located on the face of the slope.

Gully

Large metallic debris consisting of relic cars and drums were placed in the gully. The debris represents a physical hazard for anyone trying to traverse the gully. The gully may have a debris flow or torrent potential. A debris flow potential could exist if there is sufficient peak water flow directed through the gully. A more detailed study would be required to determine if the range of peak water flow would be sufficient to create a debris torrent.

Lower Bench

The lower bench area consists of debris that has been randomly distributed via the dumping activities occurring at the top of the slope. The debris may consist of domestic and industrial refuse, with the industrial refuse consisting primarily of relic equipment, drums, steel cables, and other metallic debris. This area has not been capped.

Based on our conceptual understanding of the lower bench area, the physical hazard and stability concerns primarily relate to the random and uneven distribution of debris. There is also a potential that either a slope failure or debris flow event could suddenly deposit debris in this area. Hazard mitigation for these issues was discussed previously.

10.0 CONCEPTUAL REMEDIAL OR RISK MANAGEMENT ACTION PLANS

10.1 Areas of Environmental Concern (AEC)

The results of the chemical distribution and impacts evaluation (Section 7), the spatial analysis and contaminant transport model (Section 8), and the geotechnical evaluation (Section 9) indicate that at selected areas, risk management or remediation may be required to reduce the physical safety hazards and mitigate exposure to chemicals of concern present at concentrations greater than the Environmental Quality Guidelines (EQG).

For this discussion, APECs have transitioned to Areas of Environmental Concern (AECs) (i.e., no longer “potential”) based on the confirmation of chemical or physical impacts. The numbering system remains the same between the APECs and associated AECs; however, some changes to the area boundaries have occurred based on the locations of environmental pathways and receptors. **Figure 19** shows the AEC divisions. Recommendations for supplemental work have been outlined in Section 10.6.

Based on chemical analyses and evaluation of physical risk factors, a number of AECs were identified. The AECs with their identified contaminants and estimated volumes are summarized in **Section 10.2.1 – Table 26**. Detailed remedial option cost breakdowns are provided in **Appendix F (Tables F1 to F3)**.

This Conceptual Remedial Action Plan outlines the strategies that can be used to mitigate potential physical risks and exposure of human and ecological receptors to contaminants. A Preliminary Quantitative Risk Assessment (PQRA) and Ecological Risk Evaluation (ERE) is being completed as part of this contract (provided as a separate report). The PQRA and ERE will identifiy the potential risks to human health and environmental receptors based on the appropriate pathways, concentrations and chemicals of concern. The extent of impacts, volumes of impacted media and final risk management approaches may be guided by the outcomes of the PQRA/ERE or a higher level Site Specific Risk Assessment (if required). As such, the PQRA/ERE coupled with this conceptual Remediation/Risk Management Plan (Rem/RM Plan) could be used as the basis for a more detailed Remedial/Risk Management Plan.

10.1.1 Contaminant Impacts

Within the study area, there are known and discrete metal impacted soils associated with up-gradient waste burial, vehicle dump, and main land filling activities. Elevated metals (particularly cadmium, zinc, copper, and lead) exist on site and are somewhat heterogeneous in terms of spatial distribution and concentrations. Upon completion of the spatial analysis model, it was determined that the source area for each of the COC's remains consistent with each parameter tested. As such, it is our opinion that the soil, surface water and sediment chemistry reflects environmental impacts related to the historical land filling activities on site. Our evaluation indicates that the buried and exposed metallic debris imparts a slow release of metals into the environment.

Isolated PHC, PAH, PCB, Pesticide and to a much lesser degree VOC (e.g. TCE) impacts were detected in several locations on site. These impacts are likely associated with chemical waste materials historically discharged at the site. PCBs were likely released by the historical disposal of transformers and electrical equipment on site. In 1987, site remediation activities removed electronic equipment suspected as a point source for PCBs on site.

A summary of the contaminant impacts is provided in the table below:

Area Identification	AEC	Identified Contaminant	Impacted Media
Up-Gradient Debris Area	AEC 1	lower priority – metal impacts	Soil and surface water
Vehicle Dump	AEC 2	Higher priority – metal impacts	Soil, surface water, and stream sediments
		Lower priority – PCB, PAH, PHC, Pesticide impacts	Discrete near source impacts - soil and stream sediments
Main Landfill	AEC 3	Higher priority metal impacts	Soil, surface water, and pond sediments
		Lower priority – PHCs, PAHs, and PCB impacts	Soil, and pond sediments
	AEC 3a	Higher priority- Geotechnical slope stability hazard	
Down-Gradient and Off Site	AEC 4	Higher priority – metal impacts	Surface water
		Lower priority – VOC impacts	Surface water

10.1.2 Non-Hazardous and Hazardous Waste Debris

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

The site was historically used as for land filling activities, therefore miscellaneous debris was found scattered throughout the site. However, the majority of the debris was found in AEC 2 (Vehicle Dump) and AEC 3 (Main Landfill Area).

It is anticipated that the majority of the waste will be considered non-hazardous. However, hazardous debris (e.g., asbestos, unknown liquids, batteries) may be present but currently buried or inaccessible. Provisions should be made within any remedial work to anticipate the presence of hazardous waste.

Table 26 describes the debris located at the site.

10.1.3 Main Landfill Slope Stability (AEC 3a)

Based on the geotechnical assessment of the Main Landfill southern slope (AEC 3a), it appears that the slope is at its maximum angle of repose and that the landfill poses a significant current and potential physical hazard. Remedial work is proposed for this area.

10.2 Approach and Evaluation Criteria

It is our opinion that the remediation/risk management priorities should be based on the removal of physical hazards (i.e., slope stabilization and debris removal and/or capping) and the containment and control of metals in the surface water pathways (i.e., Vehicle Dump main drainage) discharging to Sylvia Grinnell River.

The buried and exposed debris is the main source of the metal impacts to the environment. Considering the spatial distribution and volume of this material, a two tierred remedial approach could be adopted for this site. Remedial plans could include partial or complete removal of source debris in conjunction with proper capping, as well as a strategy focusing on controlling/removing the contaminants in the surface water pathways (i.e., Vehicle Dump main drainage) prior to discharge into the receiving water body (e.g., Sylvia Grinnell River). The specific approach to the area wide metals in soil, sediment, and surface water will depend on the outcomes of the PQRA/ERE. Essentially immobile contaminants found at discrete locations and close to the source areas (i.e., PCBs, PAHs, Pesticides, PHCs) would need to be addressed but are considered a lower priority.

The long-term strategy for the study area should be based on the following goals, in order of priority:

- Removal of Physical Hazards/contaminant source debris
    a. Vehicle Dump Scrap Metal (Full Removal)
    b. Main Landfill Debris (Full or Partial Removal)
    c. Re-capping of Main Landfill
- Containment and control, including risk management, passive treatment systems and monitoring of surface water drainage systems (Discharge to Silvia Grinnell River);
- Risk management/remediation of impacted soils/sediments; and
- Site monitoring and inspections.

For all the options, Class D (+/- 50%) cost estimates have been included in **Appendix F**. It is our understanding that more detailed cost estimates would be completed as part of a future Remediation/Risk Management Plan, as the relevant strategies and options are carried forward.

Evaluation Criteria

For the analysis of remedial and risk management strategies, a set of criteria for the evaluation of the options includes:

- Overall protection of human health and the environment;
- Removal of hazards;
- Long term effectiveness;
- Ease of implementation;
- Maximal level of confidence in remediation results;
- Minimal remediation time;
- Minimal site disruption;

- Regulatory acceptance; and
- Cost effectiveness.

It should be noted that our responses to the criteria have been established based on our professional opinion and available information. A more detailed analysis would be required in a specific Remedial/Risk Management Plan.

Assumptions

For all the options, the following assumptions have been made:

- Individual options have been provided with cost estimates. Some options require heavy equipment. As such, there will be common costs (e.g., permitting, and mobilization, health and safety) associated with a remedial approach. It is assumed that these common costs would be added to the individual work options.

- Depending on the final option or strategy selected, several excavators, cranes, dump trucks and bulldozers, would be required. At this point, it is difficult to determine the exact equipment list as it would vary depending on the final plan. However, order-of-magnitude costs have been provided in this analysis.

- General costs for the preparation of tenders, laboratory analysis and reporting have been incorporated into the individual cost estimate spreadsheets.

- A recycling contractor is currently active in the City of Iqaluit. The estimated costs for recycling have been based on unit prices from the current operation and may change if the operations cease in the future.

- Based on the site topography and access, options to recover the waste, via heavy equipment and trucks at the toe of the bedrock escarpment are limited. For this analysis, we have not costed the construction of a temporary road or the ability to construct a winter road (which would likely require access through the Territorial Park).

The estimated common costs for the remedial approach are summarized in the following table:

Summary of Common Costs Remedial Approach

Activity/Item	**Unit**	**Quantity**	**Unit Price**	**Total**
Environmental Impact Assessment	Estimate	1	$80,000	$80,000
Permit Applications	Estimate	1	$50,000	$50,000
Health and Safety	Estimate	1	$20,000	$20,000
Total Common Costs for Remedial Approach				**$150,000**
+/- Approximate				**$150,000**

10.3 Mitigation of Physical Hazards

The Main Landfill area and Vehicle dump were identified as physical hazards to humans using the site for recreational purposes and to wildlife. The exposed debris and the geotechnical slope stability of the main landfill area (AEC 3) was identified as a physical hazard. Two options to mitigate these physical hazards have been proposed and are summarized as follows:

Option 1: Removal of Physical Hazards

- Option 1A- Consolidate, Recycle, Waste Materials disposal into Engineered On-Site Landfill
- Option 1B – Consolidate, Recycle, and Waste Materials disposal Off-Site

Option 2: Capping of Physical Hazards

10.3.1 Removal of Physical Hazards (Option 1)

Metal debris, scrap machinery, vehicles, drums, tanks and other building materials are found throughout the landfill area. The approximate total volume of metallic debris is estimated to be on the order of ~16,000 m^3 and other miscellaneous (non-metallic) debris is on the order of 6800 m^3. Two options could be used to physically remove and dispose of the physical hazards:

Option 1A – Consolidate, Recycle, Waste Materials disposal into Engineered On-Site Landfill; and
Option 1B – Consolidate, Recycle, and Waste Materials disposal Off-Site

An options analysis based on the evaluation criteria is presented as follows. Detailed Class "D" cost estimates supporting the options are provided in **Table F1**, Waste Dumps and Metal Debris- Removal of Physical Hazards.

Both debris removal options would include removal and re-location of debris to a temporary staging ground located in AEC 1 where sorting of the materials could take place. Metallic objects would be sent for recycling and other debris would be disposed of via one of the options provided below.

Due to the difficult site access, materials could be recovered by using a truck mounted or stationary anchored crane with a magnetic attachment for metallic debris and a clam attachment for non-metallic debris. The crane would be mounted on the upper bench of the Main Landfill (AEC 3) and debris would be transported from the slope and toe of the landfill to the upper bench, where loaders would then move the debris to a temporary staging ground located in AEC 1 for sorting. Based on our research, a suitable crane is available in Iqaluit. The magnetic and clam attachments are specialized pieces of equipment which would be shipped from the south.

Both option 1A and option 1B require complete removal of waste debris. Both options would also include separation of recyclable materials and disposal of non-metallic items.

Option 1A – Consolidate into Engineered Landfill

In this option, all the waste debris and materials would be consolidated and placed in an engineered landfill constructed in AEC 1 close to the current location of buried metallic debris. Some of the metal pieces would require cutting into smaller, more manageable pieces and transporting to recycling area. This option would remove this material as a physical hazard. The material would be placed in an engineered landfill and covered with a geotextile (or equivalent), covered with soil and re-vegetated. This burial option will require some monitoring over time to ensure the cover materials remain stable and any potential leachate remains contained within landfill area.

Option 1B – Consolidate and move off-site

This option would involve consolidating the waste materials and transporting to the City of Iqaluit municipal landfill. It is our understanding that the City is currently limiting the acceptance of wastes due to over capacity issues. A significant quantity of waste material exists at the site, as shown in **Table 26**, including relic metallic debris, appliances, municipal waste, construction debris etc. Debris would be first transported to the staging ground in AEC 1 and sorted for recyclable metallic materials and materials suitable for land filling.

These options provide long-term solutions to remediating non-hazardous wastes and would be consistent with other aesthetic clean-ups in the region. A summary of the options is provided as follows:

OPTIONS	**Option 1A** **Consolidate Waste and On-site Engineered Landfill**	**Option 1B** **Consolidate Waste and move off-site**
Project Goals	Remove physical hazard by providing a permanent solution	
Operating Principle	All material would be consolidated and placed within an engineered waste landfill. The wastes would be placed in excavated; lined; covered with borrow pit soils and re-vegetated.	All material would be consolidated and removed from the site. Waste materials would be consolidated and transported to municipal landfill.
Protection of Human Health and the Environment	Yes	Yes
Degree of Site Disruption	High	Moderate to High
Confidence Level	Moderate to High	High
Estimated Time for Implementation	Four weeks to prepare disposal area; 1.5 months to consolidate and move into disposal area.	1.5 months to consolidate and transport to municipal landfill
Long-term Effectiveness	Yes- additional monitoring required	Yes
Ease of Implementation	Low- Moderate	Moderate
Regulatory and Community Acceptance	Low	Moderate
Estimated Capital Cost	**$2,351,154**	**$1,628,225**
Estimated Operating Cost (5 years)	**$150,000**	**$0**
Total Estimated Remediation Cost +/-	**$2.5M**	**$1.6M**

10.3.2 Capping of Physical Hazards (Option 2)

The placement of an engineered cap or backfill would be another option to eliminate the physical hazards created by the Main Landfill Area. The general approach would be to completely cap the Main Landfill Area with quarried sand and gravel fill material.

Quarried blast rock and/or sand and gravel material would need to be trucked on site and placed on the Main Landfill. The calculations were based on a 1.5 metre cap on the upper bench and side portions of the site and an average depth of 10 m for the lower section of the site. The rationale for the thicker cover in the bottom portion of the site is to achieve the appropriate grade to provide slope stability and allow for adequate re-vegetation.

It should be noted that metallic debris from the vehicle dump should be removed and recycled prior to applying the capping material. Costs for removal of only recyclable materials prior to capping are expected to be on the order of $830,000..

The approximate total volume of fill materials required to provide adequate capping and obtain slope stability is estimated to be on the order of 70,000 m^3 (See **Table F2 -** Waste Dumps and Metal Debris- Capping).

This option would also provide a long-term solution to remediating non-hazardous wastes. A summary of the capping option is provided as follows:

OPTIONS	**Option 2** **Capping Waste Debris**
Project Goals	Remove physical hazard by providing a permanent solution
Operating Principle	Metallic debris from the Vehicle Dump (AEC 2) is to be removed and recycled. The remainder of the debris and impacted area are to be capped with fill material. Slope stability is to be achieved by applying the appropriate amount of capping materials to the toe of the landfill.
Protection of Human Health and the Environment	Yes
Degree of Site Disruption	High
Confidence Level	Low-Moderate
Estimated Time for Implementation	4 months transport the appropriate quantities of fill material.
Long-term Effectiveness	Yes
Ease of Implementation	Low-Moderate

OPTIONS	**Option 2** **Capping Waste Debris**
Regulatory and Community Acceptance	Low
Estimated Capital Cost	**$5,896,078**
Estimated Operating Cost (5 years)	**$150,000**
Total Estimated Remediation Cost +/-	**$6M**

10.3.3 Removal of Hazardous Waste Materials.

A small quantity of hazardous waste debris types may be located in the different areas/AECs. The approximate total volume of potentially hazardous debris is currently unknown. All hazardous debris should be consolidated, packaged appropriately and shipped south for adequate disposal practices.

Potential hazardous material on site could include asbestos, batteries, and unknown liquids. Due to the nature of the landfill, buried debris could also expose other hazardous materials not visible during the site inspection.

A conservative estimated cost for the packaging and removal of the hazardous materials is approximately $50,000.

10.4 Surface Water Drainage Systems

The historical metal loading and current slow release of metals associated with the metallic and non-metallic debris deposited on site have resulted in impacted surface waters and sediments down-gradient of the Main Landfill (AEC 3) and more significantly down-gradient of the Vehicle Dump (AEC 2). A preliminary quantitative risk assessment (PQRA) and ecological risk evaluation (ERE) are currently being completed to determine the potential for risks to human health and ecological receptors from the metal impacted areas. The outcomes of the PQRA or a higher level SSRA, can be used to guide the long-term strategies for the site. Two general approaches are possible:

Option 1 – Long-term monitoring;
Option 2 – Passive in-situ treatment.

As the surface water metal contributions will continue with time (due to the presence of the waste debris), dredging of sediments and on-site treatment was not considered a viable option. In fact, pond and creek bathymetry would be affected by dredging, leading to a loss of natural habitat for fish, wildlife and benthic organisms which are a food source for fish and wildlife and possibly releasing metals (including Arsenic) to the water column.

An options analysis based on the evaluation criteria is presented as follows. Detailed Class "D" cost estimates supporting the options are provided in **Table F3**, Surface Water Drainage Systems.

10.4.1 Option 1 – Long-term Monitoring

Surface Water Drainage

The goal of the long-term monitoring program would be to ensure that present and future risks are negligible and that monitoring could be terminated with confidence, based on findings of no risk and no depreciation of site environmental status. The program would be developed specifically to:

- Inspect and monitor surface water integrity, flow rates, channelling and physical conditions;
- Monitor, evaluate and analyze for metals in surface waters over time; and
- Ensure the protection of human health and environment from exposure to chemicals of concern.

Both passive and active monitoring would be undertaken at the property. A site inspection program (<u>passive monitoring</u>) would be conducted to observe the physical condition of the surface water bodies. An <u>active</u> surface water monitoring program would be developed upon which future risk management decisions could be based. This plan would effectively provide an early warning system that could be implemented in association with a Contingency Plan and could provide the decision criteria for termination. As an outcome of Option 1, a passive in-Situ treatment evaluation may be warranted.

Sediments

Based on our preliminary evaluation, it would appear that the chemicals of concern are not currently having an impact on aquatic life. Site monitoring may be required as an outcome of the PQRA.

10.4.2 Option 2 – Passive In-Situ Treatment

In recent years, a variety of passive treatment systems have been developed that do not require continuous chemical inputs and that take advantage of naturally occurring chemical and biological processes to treat metal impacted waters. The primary passive technologies include constructed wetlands, anoxic limestone drains (ALD), successive alkalinity producing systems (SAPS), limestone ponds, and open limestone channels (OLC).

For the Vehicle Dump site, the existing drainage systems could be modified to reduce the surface water/sediment metal loading to the environment and Sylvia Grinnell River by:

- providing a predictable and steady flow path to the discharge points by enhancing the physical drainage systems with weirs, banks or channels to avoid overflow, flooding or hydraulically cross-connecting with other low-lying areas during heavy run-off periods ; and
- enhancing the natural treatment system to trap or remove metals along the flow path.

Enhanced wetlands are characterized by water-saturated soils or sediments with supporting vegetation adapted to reducing conditions in their rhizosphere. Often they consist of shallow excavations filled with flooded gravel, soil, and organic matter to support wetland plants such as *Typha*, *Juncus*, and *Scirpus* sp. Treatment depends on dynamic biogeochemical interactions as contaminated water travels through the constructed wetland.

At their present stage of development, passive systems can be reliably implemented as a single permanent solution for many types of metal impacted waters, which is similar in nature to that of the Vehicle Dump (AEC 2) and at a much lower cost than active treatment.

Selection of an appropriate passive system is based on water chemistry, flow rate, local topography and site characteristics. Mechanisms of metal retention within wetlands, listed in their order of importance, include: 1) formation and precipitation of metal hydroxides, 2) formation of metal sulfides, 3) organic complexation reactions, 4) exchange with other cations on negatively-charged sites, and 5) direct uptake by living plants. Other mechanisms include neutralization by carbonates, attachment to substrate materials, adsorption and exchange of metals onto algal mats, and microbial dissimilatory reduction of Fe hydroxides and sulfate.

The way in which a wetland is constructed ultimately affects how water treatment occurs. Two construction styles currently predominate: 1) "aerobic" wetlands consisting of *Typha* and other wetland vegetation planted in shallow (<30 cm), relatively impermeable sediments comprised of soil, clay or mine spoil, and 2) "anaerobic" wetlands consisting of *Typha* and other wetland vegetation planted into deep (>30 cm), permeable sediments comprised of soil, peat moss, spent mushroom compost, sawdust, straw/manure, hay bales, or a variety of other organic mixtures, which are often underlain or admixed with limestone. In aerobic wetlands, treatment is dominated by processes in the shallow surface layer. In anaerobic wetlands, treatment involves major interactions within the substrate.

Implementation: Prior to implementation, this approach requires that the site be well characterized and that the processes which affect surface water and sediment chemistry be well understood. For this option to be successful, an in-depth evaluation of the chemical, biological and physical characteristics of the site should be conducted through seasonal monitoring, detailed hydrology studies and bench-scale treatment tests.

A summary of the options is provided as follows:

OPTIONS	**Option 1** **Long-term Monitoring**	**Option 2** **Passive Treatment**
Project Goals	Ensure the protection of human health and environment from exposure to chemicals of concern.	
Operating Principle	Complete detailed monitoring of surface water and sediments, as required. Evaluated data based on trigger criteria and contingency plans	Enhance the natural removal of metals along the surface water flow systems prior to discharge to receiving bodies. Enhancements could include surface water drainage routing and construction of wetlands and filters to reduce chemical concentrations.
Protection of Human Health and the Environment	Yes	Yes
Degree of Site Disruption	Low	Moderate
Confidence Level	Low	Moderate
Estimated Time for Implementation	Long-term (>10 years)	2-3 years
Long-term Effectiveness	Low	High
Ease of Implementation	High	Moderate, studies required
Regulatory and Community Acceptance	Low	High
Estimated Capital Cost	**$100,000**	**$630,000**
Estimated Operating Cost (10 years)	**$300,000**	**$300,000**
Total Estimated Remediation Cost	**$400,000**	**$930,000**

10.5 Site Specific Risk Assessment- Area Wide Impacts

Following the completion of the PQRA/ERE, a site specific risk assessment (SSRA) could be completed to determine the absence/presence of risks to human health and the environment and develop site specific remedial guidelines for clean-up.

As such, the SSRA could be useful as the primary option with the outcomes of the assessment used to guide other remedial requirements. The SSRA would specifically target the mobile and immobile CoCs in soil and sediments which are considered low priority issues, but not addressed in the active remedial options.

The main elements of the risk assessment would include:

- Chemical hazard assessment;
- Receptor identification;
- Exposure pathways and assessment; and
- Qualitative risk characterization and estimates.

The cost for a risk assessment is expected to be approximately $100,000

10.6 Summary of Remedial Cost

Based on the discussion provided above, a summary of the options and costs is provided on the following table:

AEC	Option	Costs	
		Total	+ Common
Removal of Physical Hazard	Option 1A: On-Site Engineered Landfill	$2,500,000 (high)	Yes
	Option 1B: Off-Site Disposal	$1,600,000 (low)	Yes
	Option 2: Capping	$6,000,000 (high)	Yes
Surface Water Drainage	Monitoring	$400,000 (low)	No
	Passive Treatment	$930,000 (high)	Yes
Hazardous Waste Materials	Asbestos Containing Materials and Other Hazardous Materials (estimate)	$50,000 (l/h)	No
Area Wide impacted soils and sediments	Site Specific Risk Assessment	$100,000 (l/h)	No
Lowest estimate + common costs	**$3,980,000 + 150,000 (common costs)**	**$3,980,000 ($3.98M)**	
Highest estimate + common costs	**$7,480,000 + $150,000 (common costs)**	**$7,630,000 ($7.63M)**	

Lowest estimate= selecting the lowest cost option per AEC

Highest estimate = selecting the highest cost option per AEC

The common costs are included only once = $150,000

10.7 Supplemental Investigations

The impacts to the site are well defined and additional assessment work would enhance the quantity estimates, confidence and the overall distributions of the impacts. Preliminary activities may include the following:

- Detailed delineation of impacts to soils surrounding the Vehicle Dump (AEC 2) in terms of horizontal distribution;
- Further delineation of up-gradient debris area (AEC 1) to classify debris and obtain horizontal delineation of impacts;
- Seasonal (i.e., spring, summer, and fall) surface water flow rate monitoring to help better understand surface hydrology and contaminant pathway characteristics;
- Seasonal (i.e., spring, summer, and fall) surface water and sediment sampling to fully characterize contaminant distribution in peak and low flow situations; and
- Hazardous waste materials sampling and characterization.

10.8 2008 NCSCS Site Score

The CCME National Classification System for Contaminated Sites (NCSCS) was revised in 2008 to supersede the 1992 NCS system and also the Federal Contaminated Sites Action Plan (FCSAP) scoring system (2005 version, developed by Franz Environmental Inc.). The NCSCS is a tool to aid in the evaluation of contaminated sites. The revised system retains the general classification structure of Class 1, 2, 3, “I” or “N” based on the site’s current or potential adverse impact on human health and/or the environment.

The site score was 84.1 which classifies the Vehicle Dump and Community Landfill as a Class 1 site (Action Required) (See Appendix G).

11.0 SUMMARY AND CONCLUSIONS

11.1 Introduction and Purpose

Franz Environmental Inc. (FRANZ) was retained by Public Works and Government Services Canada (PWGSC) Pacific Region and Transport Canada (TC), Prairie and Northern Region and Environmental Affairs Division to complete a Phase I/II Environmental Site Assessment (ESA) of the Vehicle Dump/Community Landfill, Iqaluit, Nunavut. This project was completed based on the FRANZ proposal, P-2704, dated August, 2008 which followed the tasks outlined in PWGSC/Transport Canada's Terms of Reference (ToR), dated May 20, 2008.

11.2 Study Area

The landfill site is situated 1.7 km southwest of the town of Iqaluit, on the slope of an escarpment leading to the Sylvia Grinnell River and contains several shallow ravines and coulees partially filled with metal debris. The site covers an area of approximately 7.25 ha (72,500 m^2) and has central UTM coordinates of E521904.94, N7067812.69. The waste streams consist of vehicles, equipment, barrels, domestic waste, and scrap metal. The study area is divided into two distinct areas:

- The main debris/community landfill area which includes exposed metal debris. A portion of the waste including 45 gallon drum dumps are located at the toe of the bedrock escarpment; and
- The vehicle dump to the south and parallel with the main landfill.

11.3 Site Investigation

FRANZ conducted a Phase I/II ESA targeting Areas of Potential Environmental Concern (APECs) and potential Contaminants of Concern (COCs) based on the historical review. The field investigation included test pit excavation and soil sampling, surface water sampling, sediment sampling, vegetation sampling and chemical analysis of soil, sediment, surface water, and vegetation. The field program was completed from September 5 to 9, 2008.

11.4 Site Characterization

The study area is characterized by rolling terrain that slopes towards the Sylvia Grinnell River. The bedrock over which the metal debris was dumped is approximately 30 m above the River valley. Local terrain consists mainly of bare rocky outcrops with a thin layer of glacial and marine sediments in low lying areas between outcrops.

The elevation of the landfill site is approximately 20 to 30 masl and the Sylvia Grinnell River is at approximately 0 to 5 masl (http://atlas.nrcan.gc.ca).

The Sylvia Grinnell River is the principal drainage system in the region which discharges to Frobisher Bay. The river is influenced by the tidal action of the ocean which has some of the largest tides in Canada. The river is a major migratory route for Arctic Char.

The natural surficial drainage around the study area is influenced by the bedrock structure and numerous small, elongated ponds that have formed along fault lines and joints. The ponds are shallow (~ less than 0.5 m deep), and are poorly drained.

11.5 Environmental Quality Guideline (EQG)

The chemical data obtained through the Phase II ESA were compared to established commercial and residential/parkland guidelines from the federal CCME. The federal guidelines are relevant since the site is currently federally managed and Nunavut has adopted the CCME approach.

11.6 Summary of Impacts

The area covered by the Vehicle Dump and Community Landfill site is extensive and its history is long, but environmental impacts present in 2008 were associated with disposal of metallic debris, disposal of items containing hydrocarbons (i.e, drums), disposal of PCB containing electronic equipment, disposal of pesticide containing containers. Whereas hydrocarbon, PCB, and pesticide impacts were localized to small areas near their original sources, apparent contamination from metals was more widespread and largely associated with metalloid dissolution and distribution along surface water flow pathways.

11.6.1 PHC, PCB, and pesticides

PHC, PCBs, and pesticides were identified in soil and sediments in AECs 2 and 3. These impacts appeared to be localized to discrete areas of impacts. The PHC fractions were primarily associated with the F2/F3 fractions. Delineation of the PHC soil impacts was not completed in all instances during this study.

PCBs and pesticides in sediment were identified in AEC 2 down-gradient of the Vehicle Dump. Testing was completed further down-stream and no evidence of contaminant migration was present. Impacts appear to be localized and temporarily contained within the sediments.

11.6.2 Metal Impacts and Evaluation

Leaching of metals from buried and exposed metallic debris has impacted soil, sediment, and surface water on site, as well as to a lesser extent vegetation.

Since the creation of the site (i.e., early 1960’s), concentrations of metals and metalloids in environmental media (e.g., soil, sediments) have likely been accumulating slowly over time. Based on analysis conducted on background samples collected in the vicinity and up-gradient of the site, it is unlikely that these elevated metals concentrations can be attributed to naturally occurring geological elements.

Site conceptual models were created and showed that metal concentrations consistently decrease across the site as the preferential pathways (i.e., drainages and ponds) advance further down-gradient from the source areas. A degree of natural attenuation and/or entrapment is currently being demonstrated on site.

11.6.3 Physical Hazards

The major physical hazards observed during the FRANZ (2008) field program were related to the slope stability of the Main Landfill (AEC 3) and debris piles in the Vehicle Dump (AEC 2). It was found that the Main Landfill slope, in its current state, remains at its maximum angle of repose and presents a physical hazard to humans frequenting the site for recreational purposes and wildlife.

The potential for the slope to fail is considered high. The Vehicle Dump (AEC 2) was also found to contain physical hazards of unstable debris piles with potential to slide with added weight or heavy water run-off.

11.6.4 Conceptual Remedial or Risk Management Action Plans

A Conceptual Remedial and Risk Management Action Plan is presented which outlines the strategies that can be used to mitigate exposure of contaminants to potential human and ecological receptors. A Preliminary Quantitative Risk Assessment (PQRA) and Ecological Risk Evaluation (ERE) are being completed as part of this contract (provided under a separate cover). The PQRA/ERE will determine the potential risks to human health and environmental receptors based on the appropriate pathways, concentrations and chemicals of concern. The extent of impacts, volumes of impacted media and final approaches will rely on the outcomes of the PQRA/ERE. As such, the PQRA coupled with this conceptual Remedial Action Plan (RAP) could be used as the basis for a more detailed Remediation/Risk Management Plan (Rem/Rm Plan).

It is our opinion that the remediation/risk management priorities should be based on the removal of physical hazards and the containment and control of metals in the surface water pathways (i.e., Main drainage from Vehicle Dump) discharging to Sylvia Grinnell River.

The buried waste debris is likely the main source of the metal impacts to the environment. The strategy to deal with these metals impacts should focus on, first removing the source of the impacts (i.e., buried debris) and/or controlling/removing the contaminants in the surface water pathways (i.e. Main Drainage in AEC 2) prior to discharge to the receiving body (Sylvia Grinnell River). The specific approach to the area wide metals in soil and sediments will depend on the outcomes of the PQRA. Due to the apparent immobility, Petroleum hydrocarbon, PCB, and pesticide impacts to soil/sediments would be considered a lower priority.

The long-term strategy for the Vehicle Dump and Community Landfill should be based on the following goals, in order of priority:

- Removal of Physical Hazards and contaminant source areas;

   a. Vehicles in Vehicle Dump
   b. Waste Debris- Main Landfill
- Containment and control, including risk management, passive treatment systems and monitoring of surface water drainage systems (AEC 2 and 3);
- Risk management/remediation of PHC, PCB, and pesticide impacted soils/sediments; and
- Site monitoring and inspections.

11.6.5 Summary of Options and Costs

For all the options, Class D (+/- 50%) cost estimates were calculated. Based on our evaluation, the cost estimates range from approximately $3.98 M to $7.63 M.

AEC	**Option**	**Costs**	
		Total	**+ Common**
Removal of Physical Hazard	Option 1A: On-Site Engineered Landfill	$2,500,000 (high)	Yes
	Option 1B: Off-Site Disposal	$1,600,000 (low)	Yes
	Option 2: Capping	$6,000,000 (high)	Yes
Surface Water Drainage	Monitoring	$400,000 (low)	No
	Passive Treatment	$930,000 (high)	Yes
Hazardous Waste Materials	Asbestos Containing Materials and Other Hazardous Materials (estimate)	$50,000 (l/h)	No
Area Wide impacted soils and sediments	Site Specific Risk Assessment	$100,000 (l/h)	No
Lowest estimate + common costs	**$3,980,000 + 150,000 (common costs)**	**$3,980,000 ($3.98M)**	
Highest estimate + common costs	**$7,480,000 + $150,000 (common costs)**	**$7,630,000 ($7.63M)**	

Lowest estimate= selecting the lowest cost option per AEC

Highest estimate = selecting the highest cost option per AEC

The common costs are included only once = $150,000

11.6.6 CCME NCS Score

The CCME National Classification System for Contaminated Sites (NCSCS) was revised in 2008 to supersede the 1992 NCS system and also the Federal Contaminated Sites Action Plan (FCSAP) scoring system version (2005) developed by Franz Environmental.

The site score was 84.1 which classifies the Vehicle Dump and Community Landfill as a Class 1 site (Action Required).

11.7 Supplemental Investigations

The impacts to the site are well defined and additional assessment work would enhance the quantity estimates, confidence and the overall distributions of the impacts. Preliminary activities may include the following:

- Detailed delineation of impacts to soils surrounding the Vehicle Dump (AEC 2) in terms of horizontal distribution;
- Further delineation of up-gradient debris area (AEC 1) to classify debris and obtain horizontal delineation of impacts;
- Seasonal (i.e., spring, summer, and fall) surface water flow rate monitoring to help better understand surface hydrology and contaminant pathway characteristics;
- Seasonal (i.e., spring, summer, and fall) surface water and sediment sampling to fully characterize contaminant distribution in peak and low flow situations; and
- Hazardous waste materials sampling and characterization.

12.0 LIMITATIONS

The conclusions in this report are based on information collected from the investigation locations chosen for this study. The locations were selected based on the best information available to us at the time of this study. This does not preclude the possibility that different conditions may be present elsewhere on the property. No investigative method can completely eliminate the possibility of obtaining partially imprecise or incomplete information; it can only reduce this possibility to an acceptable level.

Professional judgement was exercised in gathering and analysing the information obtained. Like all professional persons rendering advice, we cannot act as absolute insurers of the conclusions we reach; we commit ourselves to care and competence in reaching those conclusions. Our undertaking therefore, is to perform our work, within the limits prescribed by our client, with the usual thoroughness and competence of the profession. No other warranty or representation, expressed or implied, is included or intended in this report.

Sincerely,

Franz Environmental Inc.

Ryan Fletcher C.Tech, CEPIT
Field Supervisor

Marta Rosa, B.Sc.
Environmental Geoscientist

Tamra Reynolds, P.Geo.
Environmental Geologist

Steve Livingstone, M.Sc., P.Geo(l).
Vice-President

Richard Wells, P.Eng.
Senior Environmental Engineer

FIGURES

References:

(above) Google Earth satellite image, 2008.

(upper right) "*Canada Road Map*", MapArt Publishing, 2003.

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

Title:
SITE LOCATION

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Project:
IQALUIT DUMP SITE
IQALUIT, NU

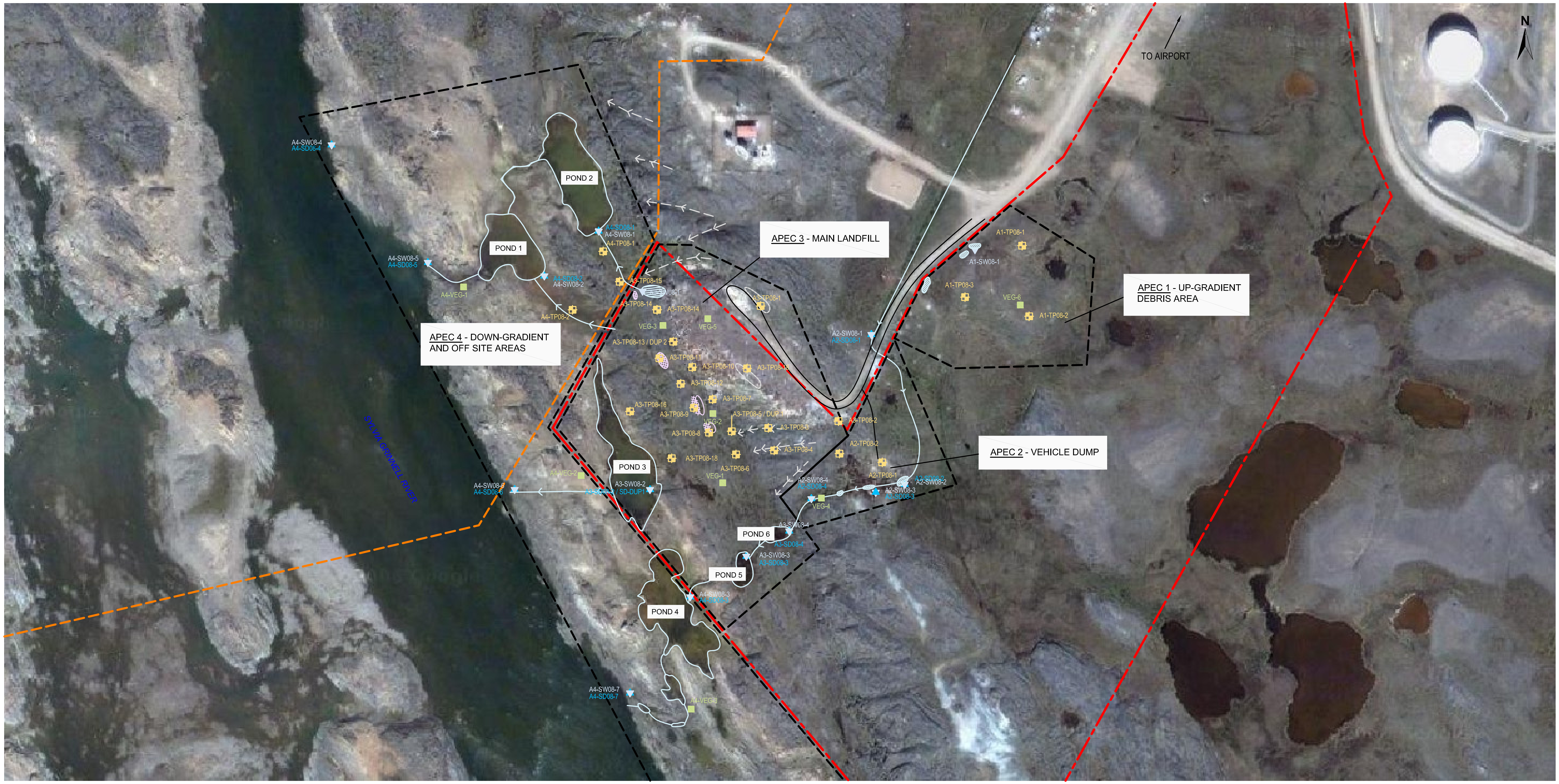
Date:
FEBRUARY 2009

Client:
TRANSPORT CANADA

SCALES AS SHOWN

FIGURE 1

Z:\Projects\2008\1584-0801 TC Iqaluit dump\Figures



LEGEND:

Pooling Water
Property Boundary
Park Boundary
Stream / Drainage
Burn Area
Drums
Seepage / Gully

SOIL Soil Sample Location
SW Surface Water Sample Location
SD Sediment Sample Location
VEG Vegetation Sample Location
Area of Potential Environmental Concern (APEC)

REFERENCE: BACKGROUND IMAGE OBTAINED FROM GOOGLE EARTH, 2008

SCALE 1: 3000

75 60 45 30 15 0 metres 75 150

Title:
APECs AND SAMPLING LOCATIONS

Project:
DUMP SITE
IQALUIT, NU

Client:
TRANSPORT CANADA

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Date:
FEBRUARY 2009

FIGURE 2

*Original in colour

Projects\1584-0801\CAD\SG\FINAL_1584-0801_mr_rf_v5-ACAD2004.dwg

A1-SW08-1	
Prepared by:	FRANZ
Date:	08-SEP-08
Lab ID:	L682329-1
Parameter	
Aluminum (Al) *a pH<6.5	🟥 0.0144

LEGEND:

▨	Pooling Water
— —	Property Boundary
🟨 SOIL	Soil Sample Location
▽ SW	Surface Water Sample Location
🟩 VEG	Vegetation Sample Location

▽ ☐	Analytical Parameters are less than the CCME Freshwater Guideline and/or the Applicable Ontario Vegetation Criteria
( )	Indicates Parameters Analyzed which were below the CCME Freshwater guideline and/or the Applicable Ontario Vegetation Criteria
▽ ☐	One or More Analytical Parameters are greater than the CCME Freshwater Guideline and/or the Applicable Ontario Vegetation Criteria
( )	Indicates Parameters Analyzed which exceeded the CCME Freshwater guideline and/or the Applicable Ontario Vegetation Criteria

APPLICABLE GUIDELINE

Parameter		CCME Freshwater
Aluminum (Al)	pH<6.5	0.005

🟥 10	Value is greater than the CCME freswater Guideline

NOTES

*a Standard is pH dependent

CCME Canadian Water Quality Guidelines for the Protection of Freshwater Aquaitc Life, Updated in 2007
Surface Water Concentrations in mg/L

Horizontal Scale 1:600
12 9 6 0 6 12
metres

Title:
APEC 1 - ANALYTICAL RESULTS FOR SURFACE WATER & VEGETATION

Project:
DUMP SITE
IQALUIT, NU

Client:
TRANSPORT CANADA

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING♦ ENGINEERING♦ TECHNOLOGIES♦

Date:
FEBRUARY 2009

FIGURE 3

*Original in colour

Projects\1584-0801\CAD\SG\FINAL_1584-0801_mr_rf_v5-ACAD2004.dwg

A1-TP08-1	
Prepared by:	FRANZ
Date:	08-SEP-08
Lab ID:	L682335-1
Sample Depth (m):	0.0 - 0.8
Parameter	
Copper (Cu)	103
Lead (Pb)	190

LEGEND:

▨	Pooling Water
— — —	Property Boundary
▣ SOIL	Soil Sample Location
▽ SW	Surface Water Sample Location
■ VEG	Vegetation Sample Location
▽ □	Analytical Parameters are Lower than the Applicable CCME Soil Guideline
( )	Indicates Parameters Analyzed which were Below the Applicable CCME Soil Guideline
▽ □	One or More Analytical Parameters are Greater than the Applicable CCME Soil Guideline
( )	Indicates Parameters Analyzed which Exceeded the Applicable CCME S oil Guideline

APPLICABLE GUIDELINES

Parameter	CCME SOIL CL		CCME SOIL PL	
Copper (Cu)	91	1	63	1
Lead (Pb)	260	1	140	1

10	Value is greater than the CCME Cl Guideline
10	Value is greater than the CCME PL Guideline

NOTES

Soil Concentrations in mg/kg
Canadian Soil Quality Guidelines for the Protection of of Environmental and Human Health CCME, 1999, updated 2001, updated 2002, updated 2004, updated 2007.

1 Soil Quality Guideline, Parkland (PL) and Commercial (CL), Coarse Grained Soils

Horizontal Scale 1:600
12 9 6 0 6 12
metres

Title:
APEC 1 - ANALYTICAL RESULTS FOR SOIL

Project:
DUMP SITE
IQALUIT, NU

Client:
TRANSPORT CANADA

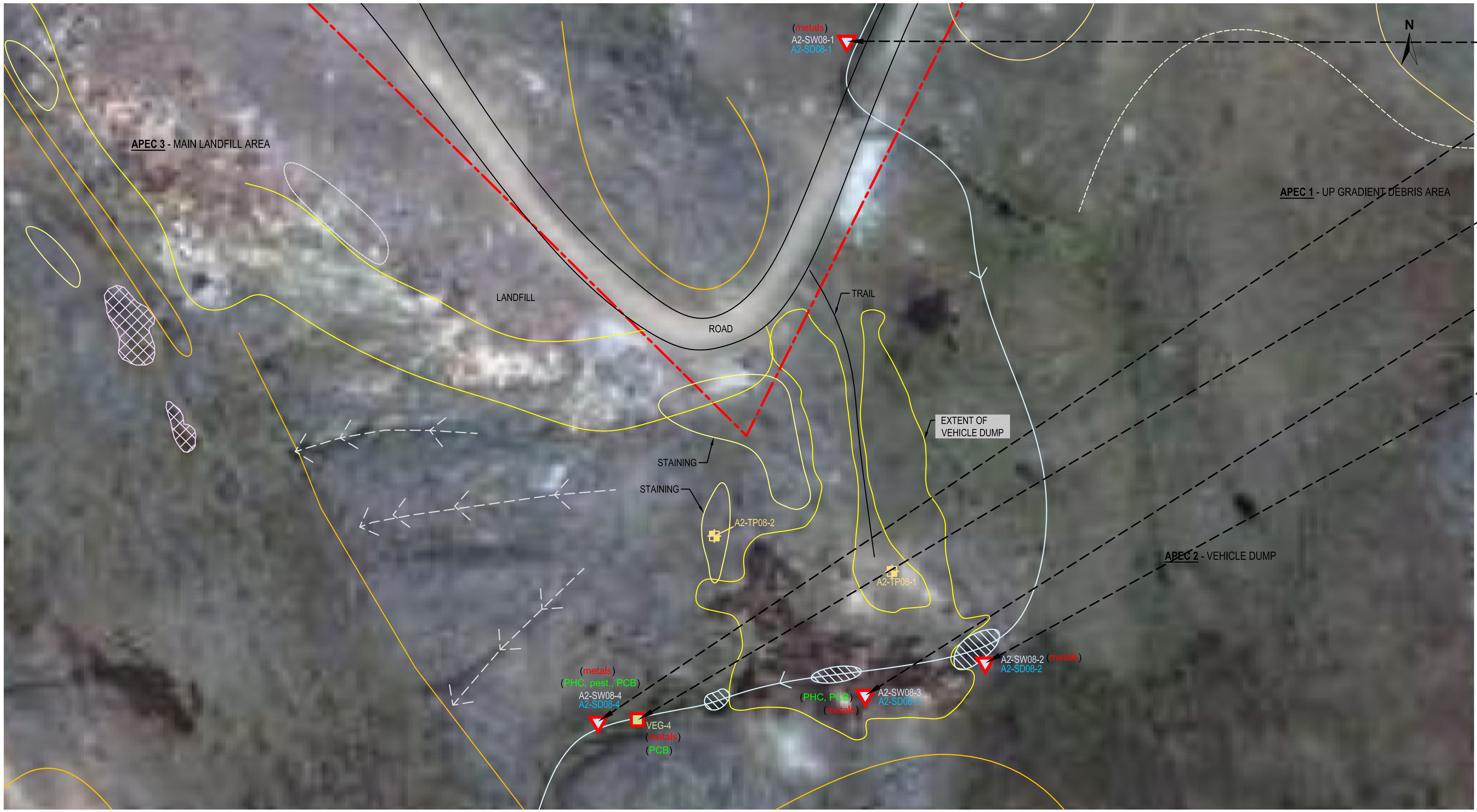
FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Date: **FEBRUARY 2009**

FIGURE 4

*Original in colour

Projects\1584-0801\CAD\SG\FINAL_1584-0801_mr_rf_v5-ACAD2004.dwg



A2-SW08-1	
Prepared by:	FRANZ
Date:	06-SEP-08
Lab ID:	L681303-1
Parameter	
Aluminum (Al) *a pH<6.5	0.0288
Cadmium (Cd)	0.000047
Copper (Cu) *b H: 0 - 120mg/L	0.0037

A2-SW08-4	
Prepared by:	FRANZ
Date:	06-SEP-08
Lab ID:	L681303-4
Parameter	
Aluminum (Al) *a pH<6.5	0.0247
Cadmium (Cd)	0.000037
Copper (Cu) *b H: 0 - 120mg/L	0.0023

VEG 4	
Prepared by:	FRANZ
Date:	09-SEP-08
Lab ID:	L682370-4
Parameter	
Sodium (Na)	55

A2-SW08-3	
Prepared by:	FRANZ
Date:	06-SEP-08
Lab ID:	L681303-3
Parameter	
Aluminum (Al) *a pH<6.5	0.119
Cadmium (Cd)	0.000087
Copper (Cu) *b H: 0 - 120mg/L	0.0071
Lead (Pb) *b H: 0 - 60mg/L	0.002

A2-SW08-2	
Prepared by:	FRANZ
Date:	06-SEP-08
Lab ID:	L681303-2
Parameter	
Aluminum (Al) *a pH<6.5	0.0112
Copper (Cu) *b H: 0 - 120mg/L	0.0037

LEGEND:

Pooling Water
Property Boundary
Rock
Stream / Drainage
Burn Area
Drums
Seepage / Gully

SOIL Soil Sample Location
SW Surface Water Sample Location
SD Sediment Sample Location
VEG Vegetation Sample Location

▽ □ Analytical Parameters are less than the CCME Freshwater Guideline and/or the Applicable Ontario Vegetation Criteria
( ) Indicates Parameters Analyzed which were below the CCME Freshwater guideline and/or the Applicable Ontario Vegetation Criteria
▽ □ One or More Analytical Parameters are greater than the CCME Freshwater Guideline and/or the Applicable Ontario Vegetation Criteria
( ) Indicates Parameters Analyzed which exceeded the CCME Freshwater guideline and/or the Applicable Ontario Vegetation Criteria

APPLICABLE GUIDELINE

Parameter		CCME Freshwater
Aluminum (Al)	pH<6.5	0.005
Cadmium (Cd)		0.000017
Copper (Cu)	H: 0 - 120mg/L	0.002
Lead (Pb) *b	H: 0 - 60mg/L	0.001

Ontario Vegetation Criteria for Sodium: 50 mg/kg wwt

10	Value is greater than the CCME freshwater Guideline
10	Value is greater than the Ontario Vegetation

NOTES

*a	Standard is pH dependent
*b	Standards is hardness dependent
CCME	Canadian Water Quality Guidelines for the Protection of Freshwater Aquaitc Life, Updated in 2007
	Surface Water Concentrations in mg/L

Horizontal Scale 1:750
15 11.25 7.5 0 7.5 15
metres

Title:
APEC 2 - ANALYTICAL RESULTS FOR SURFACE WATER & VEGETATION

Project:
DUMP SITE
IQALUIT, NU

Client:
TRANSPORT CANADA

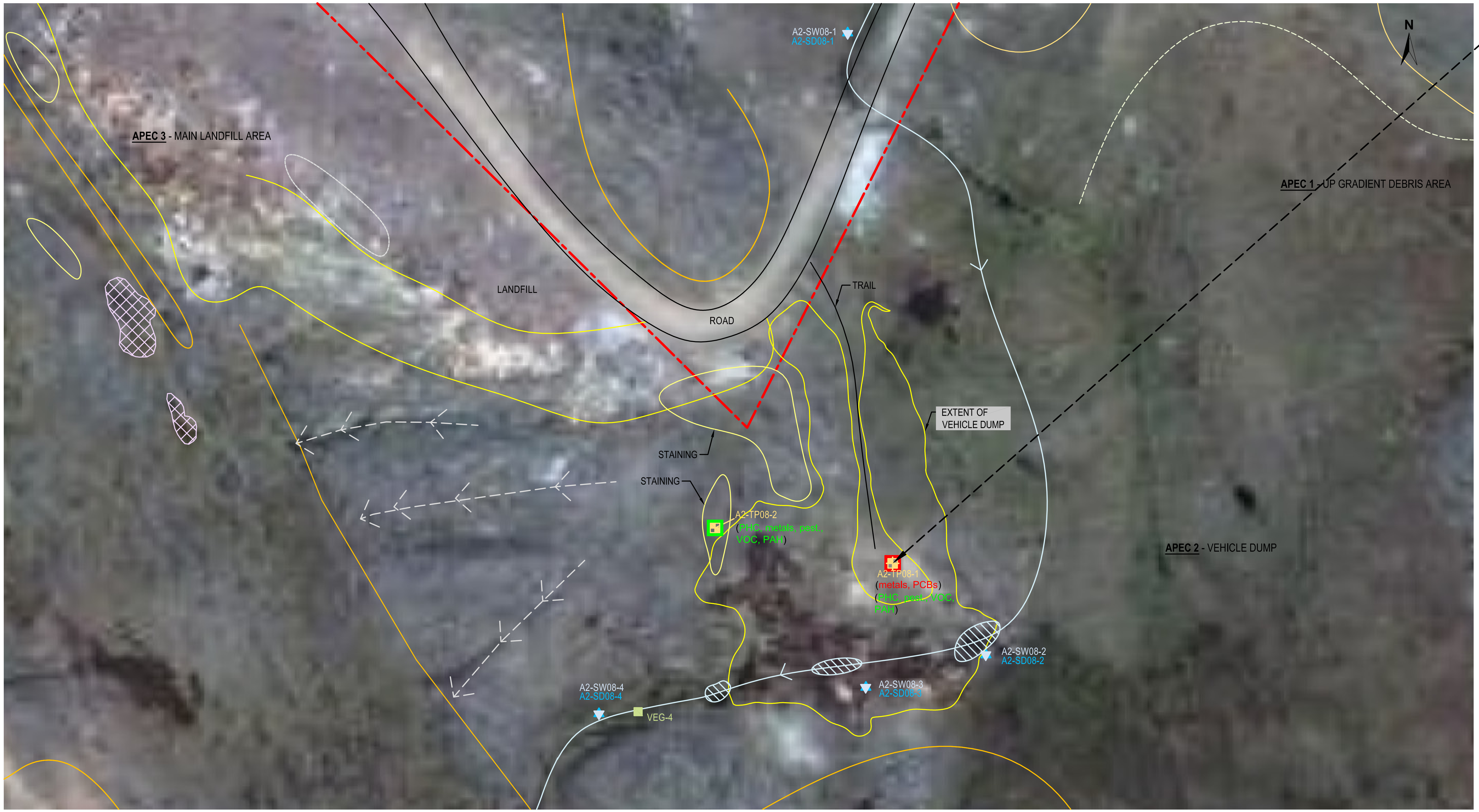
FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Date:
FEBRUARY 2009

FIGURE 5

*Original in colour

Projects\1584-0801\CAD\SG\FINAL_1584-0801_mr_rf_v5-ACAD2004.dwg



A2-TP08-1	
Prepared by:	FRANZ
Date:	06-SEP-08
Lab ID:	L681311-1
Sample Depth (m):	0.0 - 0.1
Parameter	
Cadmium (Cd)	22.4
Total PCBs	4.76

LEGEND:

	Pooling Water	SOIL	Soil Sample Location
	Property Boundary	SW	Surface Water Sample Location
	Rock	SD	Sediment Sample Location
	Stream / Drainage	VEG	Vegetation Sample Location
	Burn Area		
	Drums		
← — ←	Seepage / Gully		

▽ □	Analytical Parameters are Lower than the Applicable CCME Soil Guideline
( )	Indicates Parameters Analyzed which were Below the Applicable CCME Soil Guideline
▽ □	One or More Analytical Parameters are Greater than the Applicable CCME Soil Guideline
( )	Indicates Parameters Analyzed which Exceeded the Applicable CCME Soil Guideline

APPLICABLE GUIDELINES

Parameter	CCME SOIL CL		CCME SOIL PL	
Cadmium (Cd)	22	1	10	1
Total PCBs	33	1	1.3	1

10	Value is greater than the CCME CI Guideline
10	Value is greater than the CCME PL Guideline

NOTES

Soil Concentrations in mg/kg
Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health CCME, 1999, updated 2001, updated 2002, updated 2004, updated 2007.

1 Soil Quality Guideline, Parkland (PL) and Commercial (CL), Coarse Grained Soils

Horizontal Scale 1:750
15 11.25 7.5 0 7.5 15
metres

Title:
APEC 2 - ANALYTICAL RESULTS FOR SOIL

Project:
DUMP SITE
IQALUIT, NU

Client:
TRANSPORT CANADA

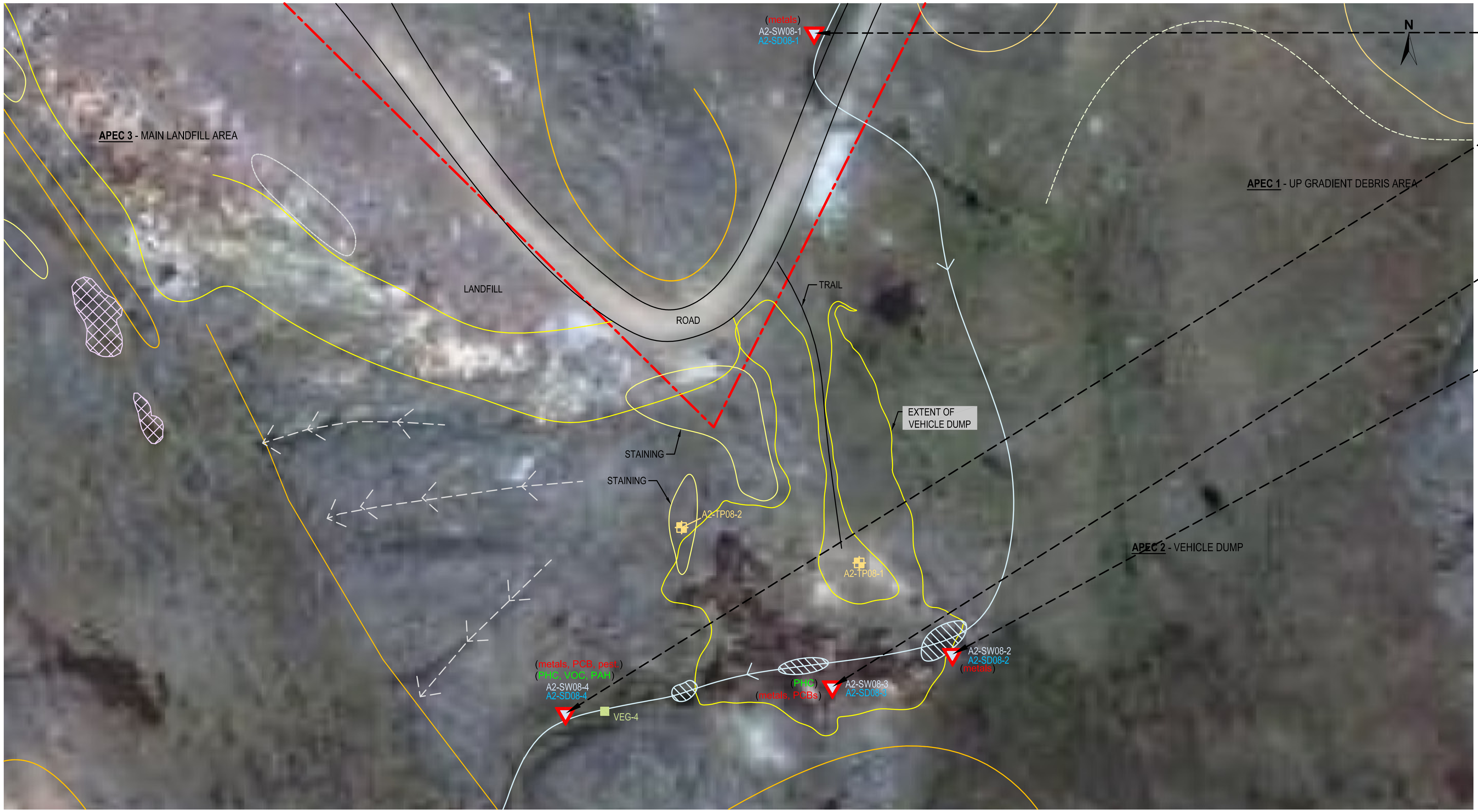
FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Date: FEBRUARY 2009

FIGURE 6

*Original in colour

Projects\1584-0801\CAD\SG\FINAL_1584-0801_mr_rf_v5-ACAD2004.dwg



A2-S008-1	
Prepared by:	FRANZ
Date:	06-SEP-08
Lab ID:	L681311-3
Parameter	
Zinc (Zn)	499

A2-S008-4	
Prepared by:	FRANZ
Date:	06-SEP-08
Lab ID:	L681311-6
Parameter	
Arsenic (As)	6.3
Cadmium (Cd)	2.83
Chromium (Cr)	50.2
Copper (Cu)	48.9
Lead (Pb)	201
Zinc (Zn)	333
Total PCBs	0.56
4,4'-DDD (*b)	0.0149
4,4'-DDE (*c)	0.029
4,4'-DDT (*d)	0.0175

A2-S008-3	
Prepared by:	FRANZ
Date:	06-SEP-08
Lab ID:	L681311-5
Parameter	
Cadmium (Cd)	2.73
Chromium (Cr)	55.4
Copper (Cu)	70.3
Lead (Pb)	96
Zinc (Zn)	145
Total PCBs	0.976

A2-S008-2	
Prepared by:	FRANZ
Date:	06-SEP-08
Lab ID:	L681311-4
Parameter	
Copper (Cu)	292

LEGEND:

Pooling Water
Property Boundary
Rock
Stream / Drainage
Burn Area
Drums
Seepage / Gully

SOIL Soil Sample Location
SW Surface Water Sample Location
SD Sediment Sample Location
VEG Vegetation Sample Location

▽ □ Analytical Parameters are Lower than the Applicable CCME Freshwater Sediment Guideline
( ) Indicates Parameters Analyzed which were Below the Applicable CCME Freshwater Sediment Guideline
▽ □ One or More Analytical Parameters are Greater than the Applicable CCME Freswater Sediment Guideline
( ) Indicates Parameters Analyzed which Exceeded the Applicable CCME Freshwater Sediment Guideline

APPLICABLE GUIDELINES

Parameter	CCME Freshwater Sediment (ISQG)	CCME Freshwater Sediment (PEL)
Arsenic (As)	5.9	17
Cadmium (Cd)	0.6	3.5
Chromium (Cr)	37.3	90
Copper (Cu)	35.7	197
Lead (Pb)	35	91.3
Zinc (Zn)	123	315
Total PCBs	0.0341	0.277
4,4'-DDD (*b)	0.00354	0.0851
4,4'-DDE (*c)	0.00142	0.00675
4,4'-DDT (*d)	0.00119	0.00477

🟥 10	Value is greater than the PEL Guideline
10	Value is greater than the ISQG Guideline

NOTES

*b Standard for DDD (2,2-Bis(p-chlorophenyl)-1,1-dichloroethane; Dichloro diphenyl dichlorethane)

*c Standard for DDE (1,1-Dichloro-2,2bis(p-chlorophenyl)-ethane; Diphenyl Dichloro ethylene)

*d Standard for DDT (2,2-Bis(p-chlorophenyl)-1,1,1-trichloroethane; Dichloro diphenyl trichloroethane

Canadian Sediment Quality Guidelines for the Protection of Aquatic Life, Updated 2002

Interim Freshwater Sediment Quality Guidelines (ISQG; dry weight), and Probable Effect levels (PELs; dry weight)

Sediment Concentrations in mg/kg

Horizontal Scale 1:750
15 11.25 7.5 0 7.5 15
metres

Title:
APEC 2 - ANALYTICAL RESULTS FOR SEDIMENT

Project:
DUMP SITE
IQALUIT, NU

Client:
TRANSPORT CANADA

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Date:
FEBRUARY 2009

FIGURE 7

*Original in colour

Projects\1584-0801\CAD\SG\FINAL_1584-0801_mr_rf_v5-ACAD2004.dwg

A3-SW08-1	
Prepared by:	FRANZ
Date:	07-SEP-08
Lab ID:	L681064-5
Parameter	
Aluminum (Al) *a pH<6.5	0.0434
Cadmium (Cd)	0.000129
Copper (Cu) *b H: 0 - 120mg/L	0.0047
Lead (Pb) *b H: 0 - 60mg/L	0.00277
Zinc (Zn)	0.163

VEG-2	
Prepared by:	FRANZ
Date:	09-SEP-08
Lab ID:	L682370-2
Parameter	
Sodium (Na)	53

VEG-1	
Prepared by:	FRANZ
Date:	09-SEP-08
Lab ID:	L682370-1
Parameter	
Sodium (Na)	62

A3-SW08-3	
Prepared by:	FRANZ
Date:	07-SEP-08
Lab ID:	L681064-2
Parameter	
Cadmium (Cd)	0.000024

A3-SW08-4	
Prepared by:	FRANZ
Date:	07-SEP-08
Lab ID:	L681064-3
Parameter	
Cadmium (Cd)	0.000018

LEGEND:

Pooling Water
Property Boundary
Silvia Grinnell Park Boundary
Rock
Stream (Drainage)
Burn Area
Drums
Seepage / Gully

SOIL Soil Sample Location
▽ SW Surface Water Sample Location
▲ SD Sediment Sample Location
🟩 VEG Vegetation Sample Location
● GR3 Grain Size Sample Location

▽ ☐ Analytical Parameters are less than the CCME Freshwater Guideline and/or the Applicable Ontario Vegetation Criteria
( ) Indicates Parameters Analyzed which were below the CCME Freshwater guideline and/or the Applicable Ontario Vegetation Criteria
▽ ☐ Analytical Parameters are greater than the CCME Freshwater Guideline and/or the Applicable Ontario Vegetation Criteria
( ) Indicates Parameters Analyzed which exceeded the CCME Freshwater guideline and/or the Applicable Ontario Vegetation Criteria

APPLICABLE GUIDELINE

Parameter		CCME Freshwater
Aluminum (Al)	pH<6.5	0.005
Cadmium (Cd)		0.000017
Copper (Cu)	H: 0 - 120mg/L	0.002
Lead (Pb) *b	H: 0 - 60mg/L	0.001
Zinc (Zn)		0.03

Ontario Vegetation Criteria for Sodium: 50 mg/kg wwt

10	Value is greater than the CCME freshwater Guideline
10	Value is greater than the Ontario Vegetation Criteria

NOTES

*a Standard is pH dependent
*b Standards is hardness dependent
CCME Canadian Water Quality Guidelines for the Protection of Freshwater Aquaitc Life, Updated in 2007
Surface Water Concentrations in mg/L

Horizontal Scale 1:1200
24 18 12 0 12 24
metres

Title:
APEC 3 - ANALYTICAL RESULTS FOR SURFACE WATER & VEGETATION

Project:
DUMP SITE
IQALUIT, NU

Client:
TRANSPORT CANADA

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Date:
FEBRUARY 2009

FIGURE 8

*Original in colour

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A3-TP08-13		A3-TP08-DUP2
Prepared by:	FRANZ	FRANZ
Date:	07-Sep-08	07-Sep-08
Lab ID:	L681268-4	L681268-5
Sample Depth (m):	0.0 -0.2	0.0 -0.2
Parameter		
Zinc (Zn)	205	277
Benz(a)anthracene	<0.05	1.14
Benzo(a)pyrene	<0.05	🟥 1.31
Benzo(b)fluoranthene	<0.05	1.78

A3-TP08-12	
Prepared by:	FRANZ
Date:	07-Sep-08
Lab ID:	L681268-2
Sample Depth (m):	0.0 - 0.1
Parameter	
Copper (Cu)	82
Lead (Pb)	256
Zinc (Zn)	🟥 488

A3-TP08-2	
Prepared by:	FRANZ
Date:	67-Sep-08
Lab ID:	L681400-2
Sample Depth (m):	0.0 - 0.1
Parameter	
Total PCBs	17.1
CWS F2 (c10-C16)	🟥 450
CWS F3 (C16-C34)	🟥 44400
CWS F4 (C34-C50)	🟥 6960

A3-TP08-3	
Prepared by:	FRANZ
Date:	06-SEP-08
Lab ID:	L681400-3
Sample Depth (m):	0.0 - 0.25
Parameter	
CWS F3 (C16-C34)	343

LEGEND:

- Pooling Water
- Property Boundary
- Silvia Grinnell Park Boundary
- Rock
- Stream (Drainage)
- Burn Area
- Drums
- Seepage / Gully
- SOIL Soil Sample Location
- SW Surface Water Sample Location
- SD Sediment Sample Location
- VEG Vegetation Sample Location
- GR3 Grain Size Sample Location
- ▽ 🟩 Analytical Parameters are Lower than the Applicable CCME Soil Guideline
- ( ) Indicates Parameters Analyzed which were Below the Applicable CCME Soil Guideline
- ▽ 🟥 One or More Analytical Parameters are Greater than the Applicable CCME Soil Guideline
- ( ) Indicates Parameters Analyzed which Exceeded the Applicable CCME Soil Guideline

APPLICABLE GUIDELINES

Parameter	CCME SOIL CL		CCME SOIL PL	
pH	6 to 8	2	6 to 8	2
Copper (Cu)	91	1	63	1
Lead (Pb)	260	1	140	1
Zinc (Zn)	360	1	200	1
Benz(a)anthracene	10	2	1	2
Benzo(a)pyrene	0.7	1	0.7	1
Benzo(b)fluoranthene	10	2	1	2
Total PCBs	33	1	1.3	1
CWS F2 (C10-C16)	33	3	1.3	3
CWS F3 (C16-C34)	1700	3	300	3
CWS F4 (C34-C50)	3300	3	2800	3

NOTES

* pH lower than 6 and not compliant with CCME Guideline

Soil Concentrations in mg/kg

Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health CCME, 1999, updated 2001, updated 2002, updated 2004, updated 2007.

1 Soil Quality Guideline, Parkland (PL) and Commercial (CL), Coarse Grained Soils

2 Interim remediation criteria for soil, Parkland and (PL) and Commercial (CL)

3 Canadian-Wide Standards (CWS) for Petroleum Hydrocarbons (PHC) in Soil

🟥 10	Value is greater than the CCME Cl Guideline
10	Value is greater than the CCME PL Guideline

Horizontal Scale 1:1200

24 18 12 0 12 24

metres

Title:

APEC 3 - ANALYTICAL RESULTS FOR SOIL

Project:

DUMP SITE
IQALUIT, NU

Client:

TRANSPORT CANADA

FRANZ ENVIRONMENTAL INC.
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Date:

FEBRUARY 2009

FIGURE 9

*Original in colour

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A3-S008-2-DUP1	
Prepared by:	FRANZ
Date:	07-SEP-08
Lab ID:	L681123-4
Parameter	
Lead (Pb)	39

A3-S008-3	
Prepared by:	FRANZ
Date:	07-SEP-08
Lab ID:	L681123-2
Parameter	
Cadmium (Cd)	1.38
Lead (Pb)	59
Zinc (Zn)	191

A3-S008-4	
Prepared by:	FRANZ
Date:	07-SEP-08
Lab ID:	L681311-3
Parameter	
Cadmium (Cd)	0.6
Lead (Pb)	57
Zinc (Zn)	139
Total PCBs	0.496

LEGEND:

◯	Pooling Water
— —	Property Boundary
— —	Silvia Grinnell Park Boundary
◯	Rock
—	Stream (Drainage)
◯	Burn Area
▨	Drums
← — ←	Seepage / Gully
▣ SOIL	Soil Sample Location
▽ SW	Surface Water Sample Location
▲ SD	Sediment Sample Location
■ VEG	Vegetation Sample Location
⌖ GR3	Grain Size Sample Location
△ □	Analytical Parameters are Lower than the Applicable CCME Freshwater Sediment Guideline
( )	Indicates Parameters Analyzed which were Below the Applicable CCME Freswater Sediment Guideline
△ □	One or More Analytical Parameters are Greater than the Applicable CCME Freshwater Sediment Guideline
( )	Indicates Parameters Analyzed which Exceeded the Applicable CCME Freshwater Sediment Guideline

APPLICABLE GUIDELINES

Parameter	CCME Freshwater Sediment (ISQG)	CCME Freshwater Sediment (PEL)
Cadmium (Cd)	0.6	3.5
Lead (Pb)	35	91.3
Zinc (Zn)	123	315
Total PCBs	0.0341	0.277

10	Value is greater than the PEL Guideline
10	Value is greater than the ISQG Guideline

NOTES

Canadian Sediment Quality Guidelines for the Protection of Aquatic Life, Updated 2002

Interim Freshwater Sediment Quality Guidelines (ISQG; dry weight), and Probable Effect levels (PELs; dry weight)

Sediment Concentrations in mg/kg

Horizontal Scale 1:1200

24 18 12 0 12 24
metres

Title:
APEC 3 - ANALYTICAL RESULTS FOR SEDIMENT

Project:
DUMP SITE
IQALUIT, NU

Client:
TRANSPORT CANADA

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Date: FEBRUARY 2009

FIGURE 10

*Original in colour

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A4- SW08-4	
Prepared by:	FRANZ
Date:	08-SEP-08
Lab ID:	L682349-3
Parameter	
Cadmium (Cd)	0.000044

A4-VEG-1	
Prepared by:	FRANZ
Date:	10-SEP-08
Lab ID:	L682370-7
Parameter	
Sodium (Na)	2660
Iron (Fe)	7880

A4-SW08-2	
Prepared by:	FRANZ
Date:	08-SEP-08
Lab ID:	L682349-2
Parameter	
Trichloroethylene	0.0226

A4-VEG-2	
Prepared by:	FRANZ
Date:	10-SEP-08
Lab ID:	L682370-8
Parameter	
Sodium (Na)	6790
Iron (Fe)	627

A4-SW08-3	
Prepared by:	FRANZ
Date:	08-SEP-08
Lab ID:	L682329-2
Parameter	
Cadmium (Cd)	0.000146
Copper (Cu)	0.0057

A4-SW08-7	
Prepared by:	FRANZ
Date:	08-SEP-08
Lab ID:	L682329-4
Parameter	
Cadmium (Cd)	0.000082

A4-VEG-3	
Prepared by:	FRANZ
Date:	10-SEP-08
Lab ID:	L682370-9
Parameter	
Sodium (Na)	6180
Iron (Fe)	853

LEGEND:

Pooling Water
Property Boundary
Silvia Grinnell Park Boundary
Rock
Stream (Drainage)
Burn Area
Drums
Seepage / Gully

SOIL Soil Sample Location
SW Surface Water Sample Location
SD Sediment Sample Location
VEG Vegetation Sample Location
GR3 Grain Size Sample Location
Area of Potential Environmental Concern (APEC)

▽ □ Analytical Parameters are less than the CCME Freshwater Guideline and/or the Applicable Ontario Vegetation Criteria
( ) Indicates Parameters Analyzed which were below the CCME Freshwater guideline and/or the Applicable Ontario Vegetation Criteria
▽ □ Analytical Parameters are greater than the CCME Freshwater Guideline and/or the Applicable Ontario Vegetation Criteria
( ) Indicates Parameters Analyzed which exceeded the CCME Freshwater guideline and/or the Applicable Ontario Vegetation Criteria

APPLICABLE GUIDELINE

Parameter	CCME Freshwater
Cadmium (Cd)	0.000017
Copper (Cu) H: 0 - 120mg/L	0.002
Trichloroethylene	0.021
Sodium (Na)	-
Iron (Fe)	-

Ontario Vegetation Criteria for Sodium: 50 mg/kg wwt and for Iron: 500 mg/kg wwt

10	Value is greater than the CCME freshwater Guideline
10	Value is greater than the Ontario Vegetation

NOTES

*a	Standard is pH dependent
*b	Standards is hardness dependent
CCME	Canadian Water Quality Guidelines for the Protection of Freshwater Aquaitc Life, Updated in 2007
	Surface Water Concentrations in mg/L

Horizontal Scale 1:3000
60 45 30 0 30 60
metres

Title:
APEC 4 - ANALYTICAL RESULTS FOR SURFACE WATER & VEGETATION

Project:
DUMP SITE
IQALUIT, NU

Client:
TRANSPORT CANADA

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Date:
FEBRUARY 2009

FIGURE 11

*Original in colour

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LEGEND:

- ▨ Pooling Water
- Property Boundary
- Silvia Grinnell Park Boundary
- Rock
- Stream (Drainage)
- Burn Area
- ▨ Drums
- Seepage / Gully
- SOIL Soil Sample Location
- SW Surface Water Sample Location
- SD Sediment Sample Location
- VEG Vegetation Sample Location
- GR3 Grain Size Sample Location
- ▽ □ Analytical Parameters are Lower than the Applicable CCME Soil Guideline
- ( ) Indicates Parameters Analyzed which were Below the Applicable CCME Soil Guideline
- ▽ □ One or More Analytical Parameters are Greater than the Applicable CCME Soil Guideline
- ( ) Indicates Parameters Analyzed which Exceeded the Applicable CCME Soil Guideline

NOTES

* pH lower than 6 and not compliant with CCME Guideline

Concentration is mg/kg

Canadian Soil Quality Guidelines for the Protection of of Environmental and Human Health CCME, 1999, updated 2001, updated 2002, updated 2004, updated 2007.

Horizontal Scale 1:700
14 10.5 7 0 7 14
metres

Title:
APEC 4 - ANALYTICAL RESULTS FOR SOIL

Project:
DUMP SITE
IQALUIT, NU

Client:
TRANSPORT CANADA

FRANZ ENVIRONMENTAL INC.
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Date:
FEBRUARY 2009

FIGURE 12

*Original in colour

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LEGEND:

Pooling Water
Property Boundary
Silvia Grinnell Park Boundary
Rock
Stream (Drainage)
Burn Area
Drums
Seepage / Gully

SOIL Soil Sample Location
SW Surface Water Sample Location
SD Sediment Sample Location
VEG Vegetation Sample Location
GR3 Grain Size Sample Location

▽ □ Analytical Parameters are Lower than the Applicable CCME Freshwater Sediment Guideline
( ) Indicates Parameters Analyzed which were Below the Applicable CCME Freshwater Sediment Guideline
▽ □ One or More Analytical Parameters are Greater than the Applicable CCME Freswater Sediment Guideline
( ) Indicates Parameters Analyzed which Exceeded the Applicable CCME Freshwater Sediment Guideline

NOTES

Canadian Sediment Quality Guidelines for the Protection of Aquatic Life, Updated 2002

Interim Freshwater Sediment Quality Guidelines (ISQG; dry weight), and Probable Effect levels (PELs; dry weight)

Sediment Concentrations in mg/kg

Horizontal Scale 1:700
14 10.5 7 0 7 14
metres

Title:
APEC 4 - ANALYTICAL RESULTS FOR SEDIMENT

Project:
DUMP SITE
IQALUIT, NU

Client:
TRANSPORT CANADA

FRANZ ENVIRONMENTAL INC.
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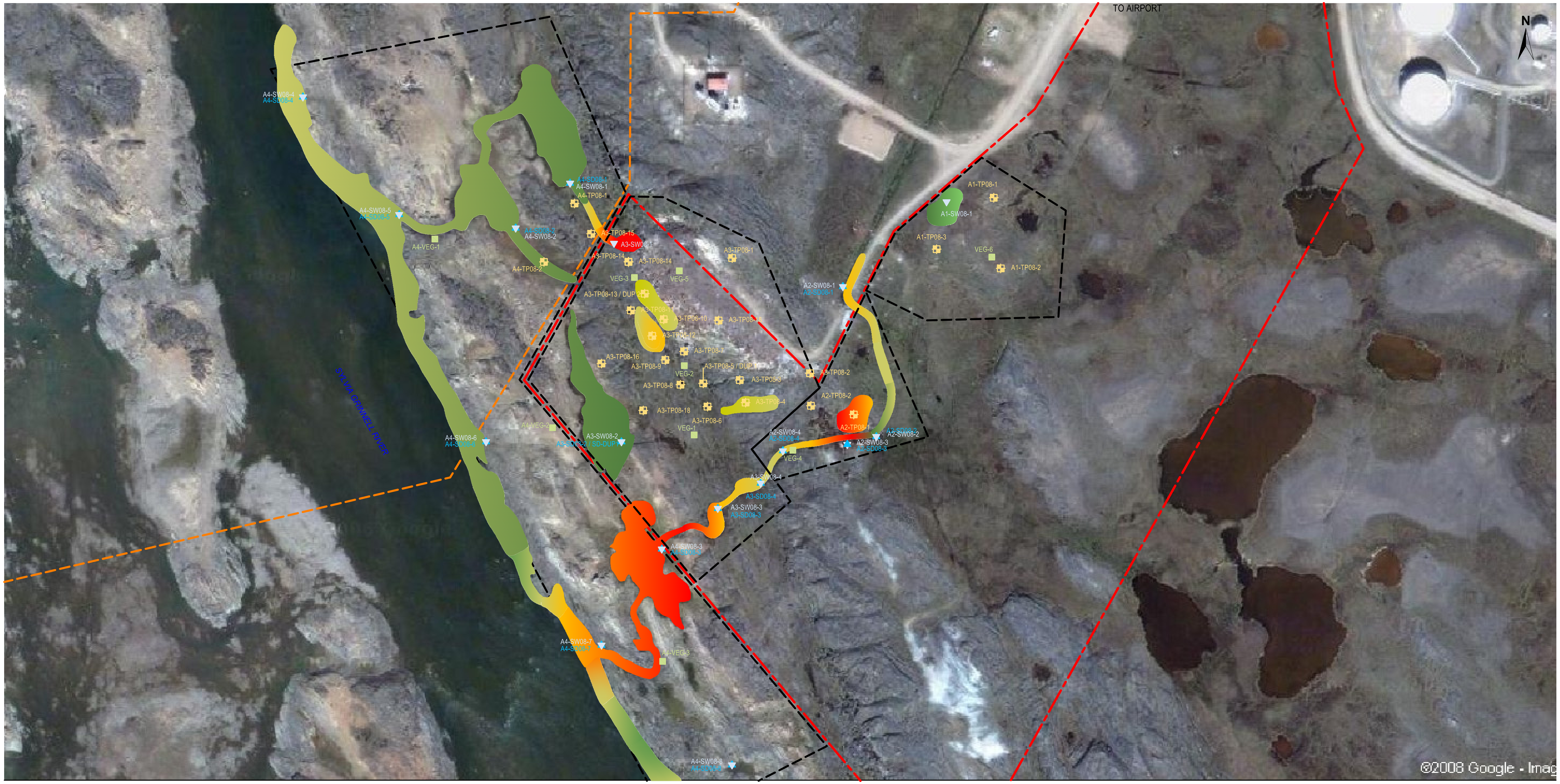
Date:
FEBRUARY 2009

FIGURE 13

*Original in colour

Projects\1584-0801\CAD\SG\FINAL_1584-0801_mr_rf_v5-ACAD2004.dwg



LEGEND:

Pooling Water

Property Boundary

Park Boundary

Rock

Stream / Drainage

Area of Potential Environmental Concern (APEC)

SOIL Soil Sample Location

SW Surface Water Sample Location

SD Sediment Sample Location

VEG Vegetation Sample Location

CONCENTRATIONS

	SOIL (mg/kg)	SURFACE WATER (mg/L)
🟥	>10	>0.00008
🟧	1 - 10	0.00002 - 0.00008
⬜	0.5 - 1.0	0.000017 - 0.00002
🟩	-	<0.000017

APPLICABLE GUIDELINES

SOIL CCME Parkland	SURFACE WATER CCME Freshwater
10 mg/kg	0.000017 mg/L

REFERENCE: BACKGROUND IMAGE OBTAINED FROM GOOGLE EARTH, 2008

SCALE 1: 3000

75 60 45 30 15 0 metres 75 150

Title:

CADMIUM SPATIAL ANALYSIS

Project:

DUMP SITE
IQALUIT, NU

Client:

TRANSPORT CANADA

FRANZ ENVIRONMENTAL INC.
CONSULTING ENGINEERING TECHNOLOGIES

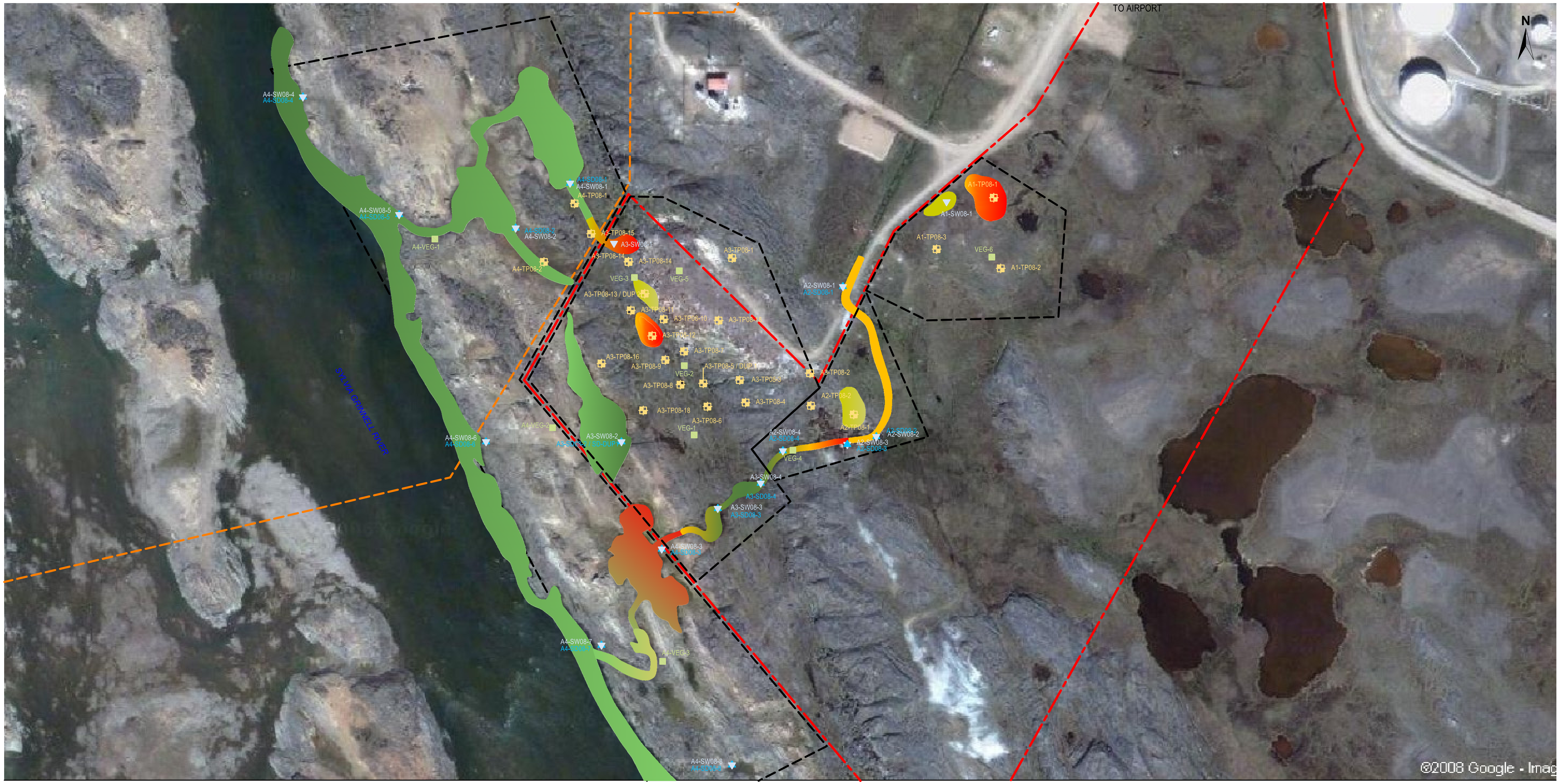
Date:

FEBRUARY 2009

FIGURE 14

*Original in colour

Projects\1584-0801\CAD\SG\FINAL_1584-0801_mr_rf_v5-ACAD2004.dwg



LEGEND:

Pooling Water
Property Boundary
Park Boundary
Rock
Stream / Drainage
Area of Potential Environmental Concern (APEC)

SOIL Soil Sample Location
SW Surface Water Sample Location
SD Sediment Sample Location
VEG Vegetation Sample Location

	CONCENTRATIONS	
	SOIL (mg/kg)	SURFACE WATER (mg/L)
🟥	>63	>0.004
🟧	40 - 63	0.002 - 0.004
🟨	20 - 40	0.001 - 0.002
🟩	-	<0.001

APPLICABLE GUIDELINES	
SOIL CCME Parkland	SURFACE WATER CCME Freshwater
63 mg/kg	0.002 mg/L

REFERENCE: BACKGROUND IMAGE OBTAINED FROM GOOGLE EARTH, 2008

SCALE 1:3000

75 60 45 30 15 0 metres 75 150

Title:
COPPER SPATIAL ANALYSIS

Project:
DUMP SITE
IQALUIT, NU

Client:
TRANSPORT CANADA

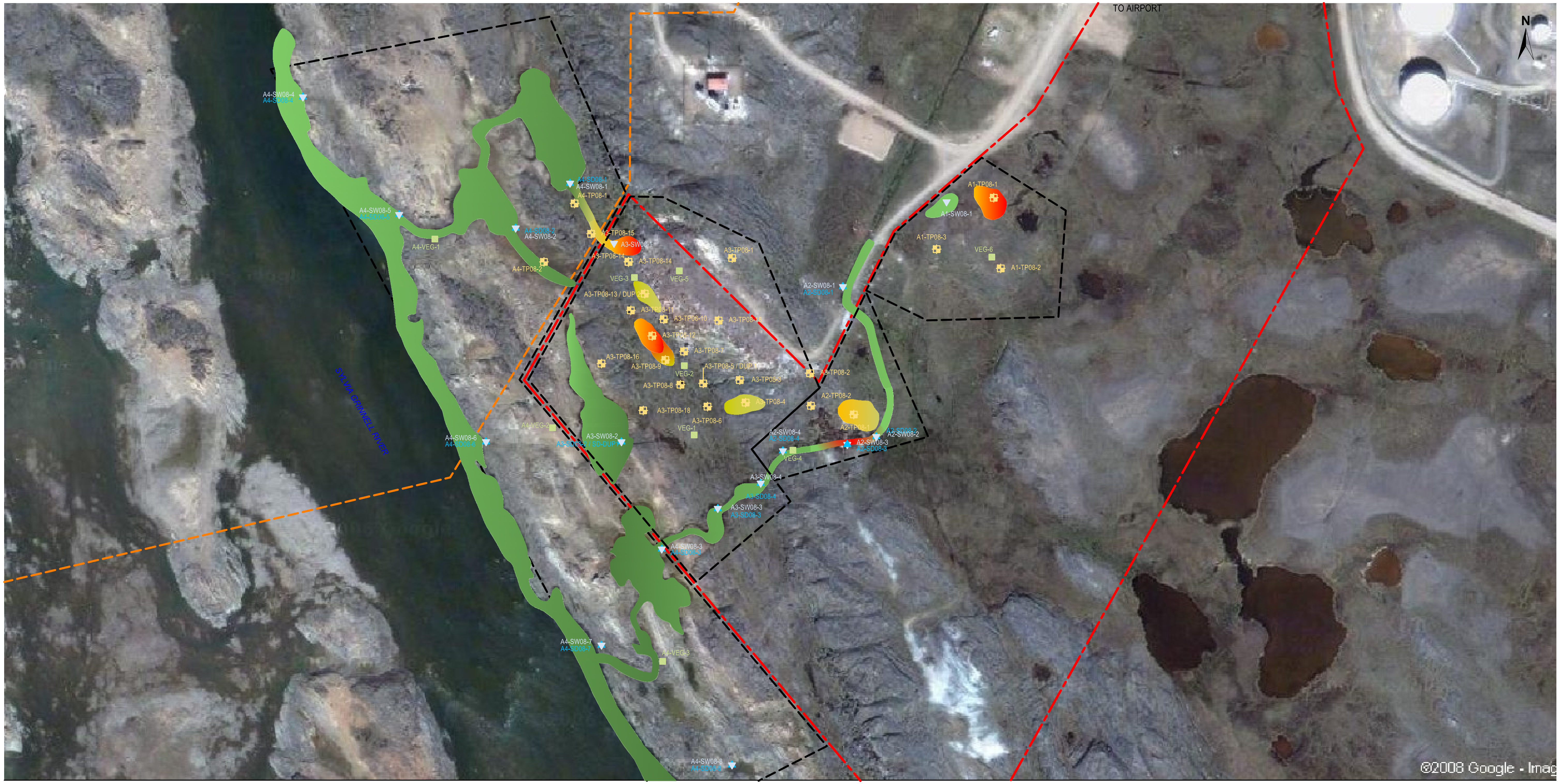
FRANZ ENVIRONMENTAL INC.
CONSULTING ENGINEERING TECHNOLOGIES

Date:
FEBRUARY 2009

FIGURE 15

*Original in colour

Projects\1584-0801\CAD\SG\FINAL_1584-0801_mr_rf_v5-ACAD2004.dwg



LEGEND:

Pooling Water
Property Boundary
Park Boundary
Rock
Stream / Drainage
Area of Potential Environmental Concern (APEC)

SOIL Soil Sample Location
SW Surface Water Sample Location
SD Sediment Sample Location
VEG Vegetation Sample Location

CONCENTRATIONS

	SOIL (mg/kg)	SURFACE WATER (mg/L)
🟥	>140	>0.001
🟧	70 - 140	0.0008 - 0.001
▨	30 - 70	0.0005 - 0.0008
🟩	-	<0.0005

APPLICABLE GUIDELINES

SOIL CCME Parkland	SURFACE WATER CCME Freshwater
140 mg/kg	0.001 mg/L

REFERENCE: BACKGROUND IMAGE OBTAINED FROM GOOGLE EARTH, 2008

SCALE 1: 3000

75 60 45 30 15 0 metres 75 150

Title:
LEAD SPATIAL ANALYSIS

Project:
DUMP SITE
IQALUIT, NU

Client:
TRANSPORT CANADA

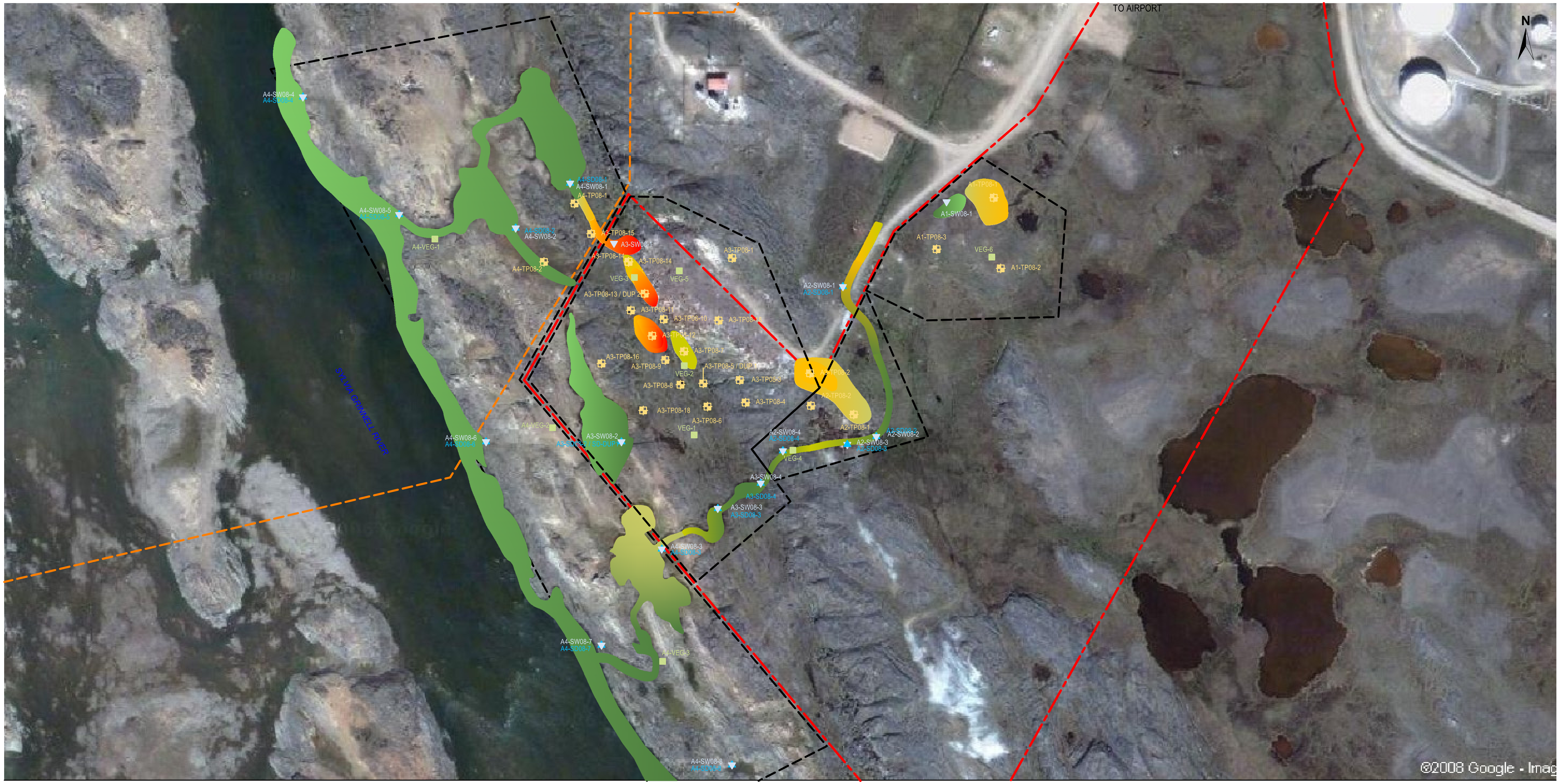
FRANZ ENVIRONMENTAL INC.
CONSULTING ENGINEERING TECHNOLOGIES

Date: **FEBRUARY 2009**

FIGURE 16

*Original in colour

Projects\1584-0801\CAD\SG\FINAL_1584-0801_mr_rf_v5-ACAD2004.dwg



LEGEND:

Pooling Water
Property Boundary
Park Boundary
Rock
Stream / Drainage
Area of Potential Environmental Concern (APEC)

SOIL Soil Sample Location
SW Surface Water Sample Location
SD Sediment Sample Location
VEG Vegetation Sample Location

CONCENTRATIONS

	SOIL (mg/kg)	SURFACE WATER (mg/L)
🟥	>200	>0.03
🟧	100 - 200	0.01 - 0.03
🟨	50 - 100	0.005 - 0.01
🟩	-	<0.005

APPLICABLE GUIDELINES

SOIL CCME Parkland	SURFACE WATER CCME Freshwater
200 mg/kg	0.03 mg/L

REFERENCE: BACKGROUND IMAGE OBTAINED FROM GOOGLE EARTH, 2008

SCALE 1: 3000

75 60 45 30 15 0 metres 75 150

Title:
ZINC SPATIAL ANALYSIS

Project:
DUMP SITE
IQALUIT, NU

Client:
TRANSPORT CANADA

FRANZ ENVIRONMENTAL INC.
CONSULTING ENGINEERING TECHNOLOGIES

Date:
FEBRUARY 2009

FIGURE 17

*Original in colour

Projects\1584-0801\CAD\SG\FINAL_1584-0801_mr_rf_v5-ACAD2004.dwg

LEGEND:

▨	Pooling Water
○	Geotechnical Assessment Areas

REFERENCE: BACKGROUND IMAGE OBTAINED FROM GOOGLE EARTH, 2008

SCALE 1:1000

Title:

GEOTECHNICAL HAZARD AREAS

Project:

DUMP SITE
IQALUIT, NU

Client:

TRANSPORT CANADA

FRANZ ENVIRONMENTAL INC.
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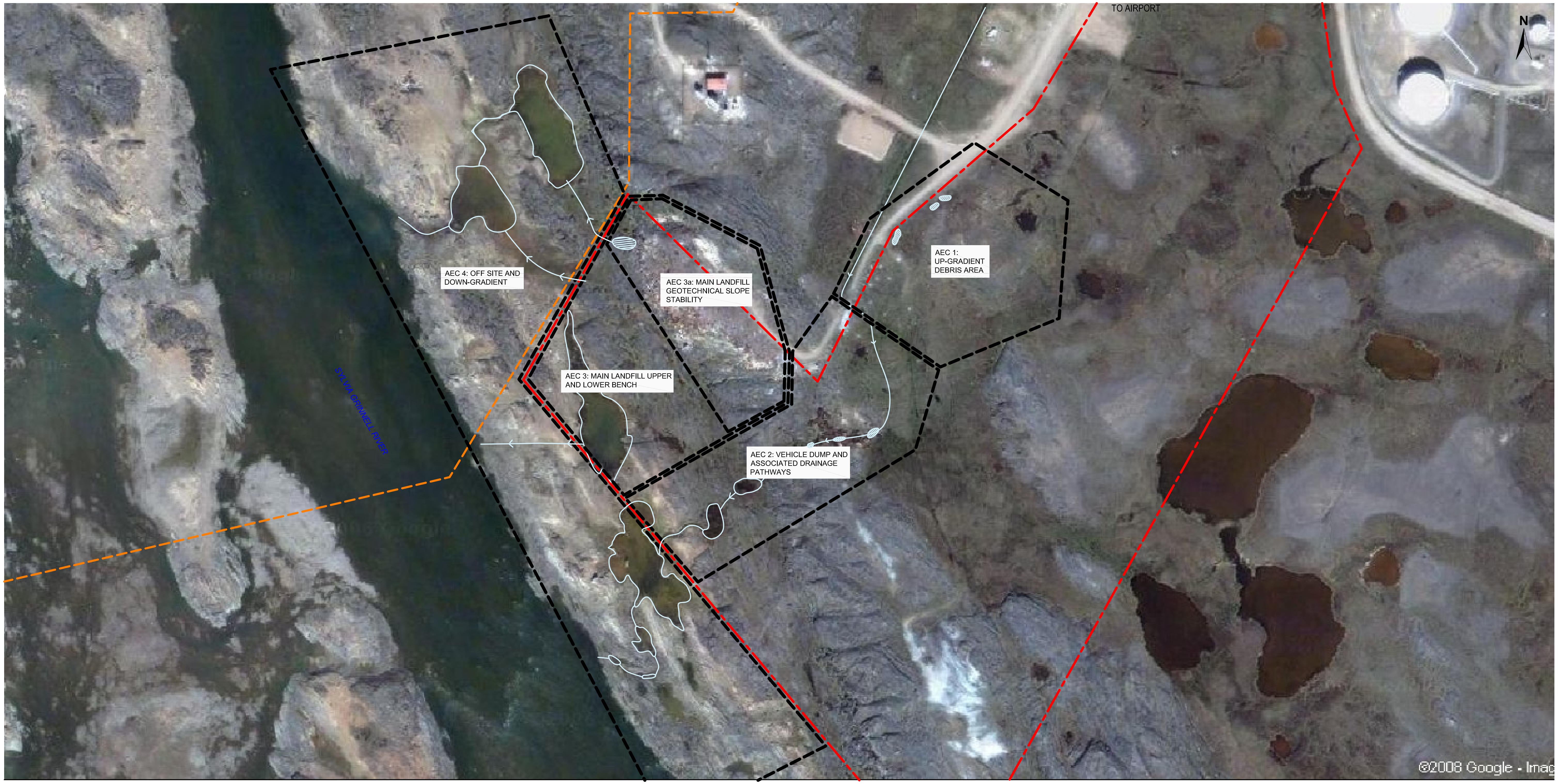
Date:

FEBRUARY 2009

FIGURE 18

*Original in colour

Projects\1584-0801\CAD\SG\FINAL_1584-0801_mr_rf_v5-ACAD2004.dwg



LEGEND:

▨	Pooling Water	SOIL	Soil Sample Location
🟥	Property Boundary	▼ SW	Surface Water Sample Location
🟧	Park Boundary	▲ SD	Sediment Sample Location
	Stream / Drainage	🟩 VEG	Vegetation Sample Location
⊏⊐	Area of Environmental Concern (AEC)		

REFERENCE: BACKGROUND IMAGE OBTAINED FROM GOOGLE EARTH, 2008

SCALE 1:3000

75 60 45 30 15 0 metres 75 150

Title:
AREAS OF ENVIRONMENTAL CONCERN (AECs)

Project:
DUMP SITE
IQALUIT, NU

Client:
TRANSPORT CANADA

FRANZ ENVIRONMENTAL INC.
CONSULTING ENGINEERING TECHNOLOGIES

Date:
FEBRUARY 2009

FIGURE 19

*Original in colour

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TABLES

TABLE 1 - Test Pit Observations and Sampling
Vehicle Dump/Community Landfill
Iqaluit, Nunavut

TEST PIT	DEPTH (m)	SAMPLE ID	VAPOUR READINGS (ppm)	SOIL DESCRIPTION	DEBRIS
APEC 1 - UP-GRADIENT DEBRIS					
A1-TP08-1	0.0 - 0.80	A1-TP08-1	110	Brown fine to coarse SAND and GRAVEL.	Drums, metal, piping, cable, vehicle parts, wheel rims, wood
A1-TP08-2	0.0 - 1.0	A1-TP08-2	-	Brown fine to coarse SAND and GRAVEL, no odour.	Drums, steel rods, metal, wood
A1-TP08-3	0.0 - 1.6	A1-TP08-3	-	Brown fine to coarse SAND and GRAVEL, no odour.	Tires, drums, wood, iron bracing, vehicle parts, rubber hose, cable wire, rods
APEC 2 - VEHICLE DUMP					
A2-TP08-1	0.0 - 0.1	A2-TP08-1	55	Dark brown fine to medium silty SAND, trace gravel, some organic matter, black staining, organic odour. Overlain bedrock	No
A2-TP08-2	0.0 - 0.1	A2-TP08-2	140	Dark brown SAND, trace gravel, some organic matter, organic odour.	No
APEC 3 - LANDFILL					
A3-TP08-1	0.0 - 0.2	A3-TP08-1	-	Dark brown fine to medium SAND, some organic matter, no odour, black staining.	Yes, metal debris
A3-TP08-2	0.0 - 0.12	A3-TP08-2	15	Black medium to coarse SAND, trace gravel, some organic matter, hydrocarbon odour. Overlain bedrock	No
A3-TP08-3	0.0 - 0.25	A3-TP08-3	20	Black SAND, organic matter, no odour. Overlain bedrock	No
A3-TP08-4	0.0 - 0.05	A3-TP08-4	-	Black SAND, organic matter, no odour. Overlain bedrock	No
A3-TP08-5	0.0 - 0.3	A3-TP08-5 / DUP - 1	70	Light brown fine to medium SAND, some organic matter, no odour, orange staining. Overlain bedrock. Slightly stressed vegetaion on surface.	No
A3-TP08-6	0.0 - 0.3	A3-TP08-6	80	Dark brown fine to medium silty SAND, no odour. Overlain bedrock	No
A3-TP08-7	0.0 - 0.25	A3-TP08-7	70	Dark brown/beige fine silty SAND, organic matter, paint odour. Overlain bedrock	No
A3-TP08-8	0.0 - 0.30	A3-TP08-8	60	Gry/brown silty SAND, some organic matter, no odour. Overlain bedrock	No
A3-TP08-9	0.0 - 0.20	A3-TP08-9	0	Gry/brown silty SAND, some organic matter, hydrocarbon odour. Overlain bedrock	No
A3-TP08-10	0.0 - 0.15	A3-TP08-10	-	Light brown fine to medium silty SAND, some organic matter, no odour. Overlain bedrock	No
A3-TP08-11	0.0 - 0.20	A3-TP08-11	50	Brown silty SAND, fine to medium, no odour. Overlain bedrock	No
A3-TP08-12	0.0 - 0.10	A3-TP08-12	20	Brown/grey SAND and GRAVEL, hydrocarbon odour. Overlain bedrock	No
A3-TP08-13	0.0 - 0.20	A3-TP08-13 / DUP-2	75	Bronw SAND and GRAVEL, heavy orange staining, unidentified odour.	No
A3-TP08-14	0.0 - 0.40	A3-TP08-14	75	Dark grey fine to medium silty SAND, trace gravel, trace organic matter, paint odour. Overlain bedrock	No
A3-TP08-15	0.0 - 0.30	A3-TP08-15	70	Brown fine to medium silty SAND, trace organic matter, no odour. Overlain bedrock	No
A3-TP08-16	0.0 - 0.30	A3-TP08-16	60	Light brown fine to medium SAND, some silt, trace organic matter, no odour. Overlain bedrock	No
A3-TP08-17	0.0 - 0.5	A3-TP08-17	-	Dark grey silty SAND, trace gravel, some organic matter. Overlain bedrock	No
A3-TP08-18	0.0 - 0.35	A3-TP08-18	45	Black fine to coarse SAND, trace gravel, some organic matter, no odour. Overlain bedrock	Metal debris
APEC 4 - DOWN-GRADIENT					
A4-TP08-1	0.0 - 0.80	A4-TP08-1	70	Dark brown fine to medium SAND, organic matter, no odour. Overlain bedrock	No
A4-TP08-2	0.0 - 0.33	A4-TP08-2	40	Dark grey/brown fine to medium SAND, organic matter, no odour. Overlain bedrock	No

TABLE 2 - Samples and Laboratory Analyses
Vehicle Dump/Community Landfill
Iqaluit, Nunavut

	SAMPLE ID	DEPTH (m)	SAMPLING DATE	LAB REPORT ID	LABORATORY ANALYSIS						
					BTXE	F1 - F4	Metals	PCB	Pesticides	VOC	PAH
	APEC 1 - UP-GRADIENT DEBRIS										
SOIL	A1-TP08-1	0.0 - 0.8	08-Sep-08	L682335			X				
	A1-TP08-2	0.0 - 1.0	08-Sep-08	L682335			X				
	A1-DUP-3						X				
	A1-TP08-3	0.0 - 0.5	08-Sep-08	L682335			X				
		0.5 - 1.6			X	X		X	X		
SURFACE WATER	A1-SW08-1	-	08-Sep-08	L682329			X				
		-	09-Sep-08	L682370				X			
VEG.	VEG-6	-	09-Sep-08	L682370			X	X			
	APEC 2 - VEHICLE DUMP										
SOIL	A2-TP08-1	0.0 - 0.1	06-Sep-08	L681311	X	X	X	X			
			09-Sep-08	L682370					X	X	X
	A2-TP08-2	0.0 - 0.1	06-Sep-08	L681311	X	X	X				
			09-Sep-08	L682370					X	X	X
SEDIMENT	A2-SD08-1	-	06-Sep-08	L681311			X				
	A2-SD08-2	-	06-Sep-08	L681311			X				
	A2-SD08-3	-	06-Sep-08	L681311	X	X	X	X			
	A2-SD08-4	-	06-Sep-08	L681311	X	X	X	X	X	X	X
SURFACE WATER	A2-SW08-1	-	06-Sep-08	L681303			X				
	A2-SW08-2	-	06-Sep-08	L681303			X				
	A2-SW08-3	-	06-Sep-08	L681303	X	X	X	X			
	A2-SW08-4	-	06-Sep-08	L681303	X	X	X	X	X		
VEG.	VEG-4	-	09-Sep-08	L682370			X	X			
	APEC 3 - LANDFILL										
SOIL	A3-TP08-1	0.0 - 0.2	06-Sep-08	L681400			X				
	A3-TP08-2	0.0 - 0.12	06-Sep-08	L681400	X	X	X	X			
	A3-TP08-3	0.0 - 0.25	06-Sep-08	L681400	X	X	X				
	A3-TP08-4	0.0 - 0.05	06-Sep-08	L681400			X				
	A3-TP08-5	0.0 - 0.3	06-Sep-08	L681400	X	X	X	X			X
	A3-DUP-1				X	X	X				
	A3-TP08-6	0.0 - 0.30	06-Sep-08	L681400	X	X	X	X			
	A3-TP08-7	0.0 - 0.25	06-Sep-08	L681400	X	X	X	X			X
	A3-TP08-8	0.0 - 0.3	06-Sep-08	L681400	X	X					
	A3-TP08-9	0.01 - 0.2	07-Sep-08	L681268	X	X	X	X			
	A3-TP08-10	0.0 - 0.15	06-Sep-08	L681400	X	X	X	X	X	X	X
	A3-TP08-11	0.0 - 0.2	07-Sep-08	L681268	X	X	X				
	A3-TP08-12	0.0 - 0.1	07-Sep-08	L681268	X	X	X				
	A3-TP08-13	0.0 -0.2	07-Sep-08	L681268	X	X	X	X	X	X	X
	A3-TP08-DUP2				X	X	X	X	X	X	X
	A3-TP08-14	0.0 - 0.4	07-Sep-08	L681268	X	X	X	X			X
	A3-TP08-15	0.0 -0.3	07-Sep-08	L681268	X	X	X			X	
	A3-TP08-16	0.0 - 0.3	07-Sep-08	L681268	X	X	X	X			
	A3-TP08-17	0.0-0.35	07-Sep-08	L681268			X				
	A3-TP08-18	0.0 - 0.35	07-Sep-08	L681268	X	X	X	X			
SEDIMENT	A3-SD08-2	-	07-Sep-08	L681123	X	X	X	X			
	SD-DUP 1				X	X	X	X			
	A3-SD08-3	-	07-Sep-08	L681123	X	X	X				
	A3-SD08-4	-	07-Sep-08	L681123	X	X	X	X			

TABLE 2 - Samples and Laboratory Analyses
Vehicle Dump/Community Landfill
Iqaluit, Nunavut

	SAMPLE ID	DEPTH (m)	SAMPLING DATE	LAB REPORT ID	LABORATORY ANALYSIS						
					BTXE	F1 - F4	Metals	PCB	Pesticides	VOC	PAH
	APEC 3 - LANDFILL										
SURFACE WATER	A3-SW08-1	-	07-Sep-08	L681064	X	X	X	X			
	A3-SW08-2	-	07-Sep-08	L681064	X	X	X	X			
	DUP-1				X	X	X	X			
	A3-SW08-3	-	07-Sep-08	L681064	X	X	X	X			
	A3-SW08-4	-	07-Sep-08	L681064	X	X	X	X			
VEG.	VEG-1	-	09-Sep-08	L682370			X	X			
	VEG-2	-	09-Sep-08	L682370			X	X			
	VEG-3	-	09-Sep-08	L682370			X	X			
	VEG-5	-	09-Sep-08	L682370			X	X			
	APEC 4 - DOWN-GRADIENT										
SOIL	A4-TP08-1	0.37 - 0.80	08-Sep-08	L682335	X	X	X	X			
	A4-TP08-2	0.0 - 0.3	08-Sep-08	L682335	X	X	X	X			
SEDIMENT	A4-SD08-1	-	08-Sep-08	L682317	X	X	X	X			
	A4-SD08-2	-	08-Sep-08	L682317	X	X	X	X	X	X	X
	A4-SD08-3	-	08-Sep-08	L682317	X	X	X	X	X	X	X
	A4-SD08-4	-	08-Sep-08	L682317			X	X			
	A4-SD08-5	-	08-Sep-08	L682317			X	X			
	A4-SD08-6	-	08-Sep-08	L682317			X	X			
	A4-SD08-8	-	08-Sep-08	L682317			X	X			
SURFACE WATER	A4-SW08-1	-	08-Sep-08	L682349	X	X	X	X			
	A4-SW08-2	-	08-Sep-08	L682349	X	X	X	X	X	X	X
	A4-SW08-3	-	08-Sep-08	L682329	X	X	X	X	X	X	X
	A4-SW08-4	-	08-Sep-08	L682349			X	X			
	A4-SW08-5	-	08-Sep-08	L682349			X	X			
	A4-SW08-6	-	08-Sep-08	L682329			X	X			
	A4-SW08-7	-	08-Sep-08	L682329			X	X			
	A4-SW08-8	-	08-Sep-08	L682329			X	X			
VEGETATION	A4-VEG-1 / VEG-DUP	-	10-Sep-08	L682370			X	X			
	A4-VEG-2	-	10-Sep-08	L682370			X	X			
	A4-VEG-3	-	10-Sep-08	L682370			X	X			
	FIELD BLANK SAMPLES										
SOIL	TP-BK-1	-	10-Sep-08	L682370			X				
	TP-BK-2	-	10-Sep-08	L682370			X				
SEDIMENT	SD-BK-1	-	10-Sep-08	L682370			X				
	SD-BK-2	-	10-Sep-08	L682370			X				
SURFACE WATER	SW-BK-1	-	10-Sep-08	L682370			X				
	SW-BK-2	-	10-Sep-08	L682370			X				
VEGETATION	VEG-BK-1	-	10-Sep-08	L682370			X				
	VEG-BK- 2	-	10-Sep-08	L682370			X				

TABLE 3 - Field Parameters - Surface Water Samples
Vehicle Dump/Community Landfill
Iqaluit, Nunavut

	FIELD CHEMISTRY PARAMETERS					
SURFACE WATER STATION	**pH (UpH)**	**TEMPERATURE (^{o}C)**	**CONDUCTIVITY (mS/cm)**	**DO**	**ORP**	**TURBINITY**
APEC 1 - UP-GRADIENT DEBRIS						
A1-SW08-1	-	-	-	-	-	-
APEC 2 - VEHICLE DUMP						
A2-SW08-1	6.2	6.25	0.139	10.52	1.27	16.8
	6.16	6.22	0.138	10.39	1.43	15.9
	6.14	6.21	0.138	10.3	1.56	15.3
	6.11	6.2	0.138	10.2	1.67	15.1
	6.11	6.2	0.138	10.15	1.43	15.1
	6.11	6.17	0.137	10.12	1.81	14.9
AVERAGE	**6.14**	**6.21**	**0.138**	**10.28**	**1.53**	**15.52**
A2-SW08-2	6.37	7.25	0.116	10.67	78	45.9
	6.37	7.23	0.116	10.65	73	46.5
	6.4	7.23	0.117	10.66	71	40.62
	6.43	7.23	0.116	10.64	69	46.7
AVERAGE	**6.39**	**7.24**	**0.12**	**10.66**	**72.75**	**44.93**
A2-SW08-3	6.56	6.7	0.116	11	85	47.8
	6.51	6.7	0.116	10.99	85	42.9
	6.48	6.77	0.115	10.94	83	35.8
	6.74	6.8	0.115	10.92	82	43
	6.43	6.77	0.115	10.96	82	32
	6.75	6.8	0.115	10.96	83	
AVERAGE	**6.58**	**6.76**	**0.115**	**10.96**	**83.33**	**40.30**
A2-SW08-4	6.37	6.54	0.115	11.57	59	24.9
	6.35	6.59	0.114	11.59	58	21.2
	6.35	6.61	0.114	11.57	58	19.4
	6.6	6.62	0.114	11.57	57	18.2
	6.35	6.62	0.114	11.57	52	18.9
	6.35	6.62		11.55	57	19.6
AVERAGE	**6.40**	**6.60**	**0.11**	**11.57**	**56.83**	**20.37**
APEC 3 - LANDFILL						
A3-SW08-1	6.92	7.23	0.46	11.41	292	46
	6.75	7.25	0.458	11.77	290	42.59
	6.6	7.27	0.455	11.94	288	31.2
	6.53	7.3	0.455	12.18	286	39.4
	6.38	7.31	0.45	12.2	285	38.2
AVERAGE	**6.64**	**7.27**	**0.46**	**11.90**	**288.20**	**39.48**
A3-SW08-2	6.48	6.77	14.9	11.6	3.43	11.2
	6.56	6.76	14.9	11.66	3.4	9.9
	6.62	6.75	14.9	11.66	3.38	10.1
	6.77	6.75	14.9	11.74	3.36	10.1
AVERAGE	**6.61**	**6.76**	**14.90**	**11.67**	**3.39**	**10.33**
A3-SW08-3	6.31	6.47	0.141	11.77	306	14.7
	6.49	6.52	0.14	11.78	303	14.2
	6.51	6.57	0.14	11.8	301	14.2
	6.55	6.6	0.141	12.07	298	14.2
AVERAGE	**6.47**	**6.54**	**0.14**	**11.86**	**302.00**	**14.33**
A3-SW08-4	6.92	5.83	0.9	11.51	60	98.8
	6.82	5.84	0.9	11.54	53	99
	6.9	5.83	0.99	11.45	48	98.8
	5.83	5.82	0.99	11.48	49	99.2
	6.9	5.83	0.99	11.5	49	99.4
	6.91	5.83	0.9	11.49	49	99.3
AVERAGE	**6.71**	**5.83**	**0.95**	**11.50**	**51.33**	**99.08**

TABLE 3 - Field Parameters - Surface Water Samples
Vehicle Dump/Community Landfill
Iqaluit, Nunavut

	FIELD CHEMISTRY PARAMETERS					
SURFACE WATER STATION	**pH (UpH)**	**TEMPERATURE (°C)**	**CONDUCTIVITY (mS/cm)**	**DO**	**ORP**	**TURBINITY**
APEC 4 - DOWN-GRADIENT						
A4-SW08-1	6.93	5.66	5.26	11.68	237	11.2
	6.94	5.68	5.26	11.52	237	10.8
	6.95	5.69	5.26	11.5	237	11.5
	6.97	5.69	5.26	11.45	236	11
	6.98	5.71	5.26	11.45	236	11
AVERAGE	**6.95**	**5.69**	**5.26**	**11.52**	**236.60**	**11.10**
A4-SW08-2	6.66	4.88	6.25	11.15	288	11.9
	6.7	4.53	6.25	12	262	11.2
	6.76	4.61	6.28	12.07	252	11.4
	6.78	4.66	6.29	11.98	248	11
	6.8	4.69	6.3	11.9	243	11.1
	6.82	4.7	6.31	11.86	239	11.3
AVERAGE	**6.75**	**4.68**	**6.28**	**11.83**	**255.33**	**11.32**
A4-SW08-3	7.76	9.09	0.775	14.01	252	14
	7.79	9.14	0.788	13.06	248	13.94
	7.81	9.18	0.801	13.2	246	13.93
	7.84	9.18	0.826	13.87	243	12.5
	7.85	9.21	0.851	13.82	240	12.6
	7.88	9.22	0.857	13.85	237	12.8
AVERAGE	**7.82**	**9.17**	**0.82**	**13.64**	**244.33**	**13.30**
A4-SW08-4	7.67	6.26	0.069	12.66	257	9
	7.61	6.14	0.064	12.61	259	9.1
	7.55	6.14	0.062	12.59	261	8.9
	7.48	6.17	0.063	12.47	265	9.5
	7.39	6.12	0.06	12.52	267	9.5
	7.32	6.13	0.06	12.46	269	9.7
AVERAGE	**7.50**	**6.16**	**0.06**	**12.55**	**263.00**	**9.28**
A4-SW08-5	7.07	6.19	0.061	12.53	277	9
	7	6.19	0.06	12.52	280	9
	6.96	6.2	0.061	12.51	281	9
	6.94	6.2	0.06	12.49	282	9
AVERAGE	**6.99**	**6.20**	**0.06**	**12.51**	**280.00**	**9.00**
A4-SW08-6	8.25	7.23	0.138	13.67	255	10.3
	8.11	7.23	0.138	13.72	255	10.4
	8.1	7.23	0.136	13.65	254	10.4
	8.07	7.23	0.136	13.72	254	10.5
	8.07	7.24	0.137	13.76	254	10.4
AVERAGE	**8.12**	**7.23**	**0.14**	**13.70**	**254.40**	**10.40**
A4-SW08-7	8.61	7.53	0.394	12.97	240	14.9
	8.7	7.61	0.05	12.08	242	7.7
	8.57	7.51	0.458	12.72	244	14.3
	8.49	7.56	0.042	12.72	242	16.8
	8.55	7.48	0.046	12.61	244	7.5
	8.42	7.62		12.52	243	13.9
AVERAGE	**7.53**	**7.55**	**0.20**	**12.60**	**242.50**	**12.52**
A4-SW08-8	7.61	7.03	50.0	18.50	302	13.80
	7.51	7.00	50.1	18.89	299	13.90
	7.56	6.98	50.1	18.83	297	14.20
	7.48	6.98	50.2	18.83	295	14.60
AVERAGE	**7.62**	**7.00**	**50.1**	**18.76**	**298**	**14.13**

TABLE 4 - Sediment Observations and Sampling
Vehicle Dump/Community Landfill
Iqaluit, Nunavut

SAMPLE ID	WATER DEPTH (m)	ORGANIC MATTER (%)	RECOVERY (%)	DESCRIPTION	ORGANISMS	DEBRIS
APEC 2 - VEHICLE DUMP						
A2-S008-1	0.04	50	100	Brown fine to medium SAND, no odour, trace orange staining	No	No
A2-S008-2	0.04	70	100	Dark grey fine to coarse SAND , some gravel, no odour, orange staining	No	No
A2-S008-3	0.02	10	100	Dark grey fine to coarse SAND and GRAVEL, some odour, orange staining	No	No
A2-S008-4	0.05	60	100	Brown SAND and GRAVEL, organic odour, heavy orange staining	No	No
APEC 3 - LANDFILL						
A3-S008-2	0.4	10	100	Dark grey fine SAND, organic odour	No	No
A3-S008-3	0.5	30	100	Dark grey/black SAND, no odour or sheen	No	No
A3-S008-4	-	-	-	-	-	-
APEC 4 - DOWN-GRADIENT						
A4-SD08-1	0.35	trace	100	Brown/grey fine SAND, no odour or sheen	Shrimps	Metal debris
A4-SD08-2	0.1	10	100	Brown/grey fine to medium SAND, no odour or sheen	Shrimps, fish, algae	Some debris
A4-SD08-3	0.17	trace	100	Brown fine to coarse SAND and GRAVEL, no odour or staining	Fish	No
A4-SD08-4	0.25	0	100	Brown fine to medium SAND, no odour, sheen or staining	Slight algae growth	No
A4-SD08-5	0.32	0	100	Brown fine to medium SAND, no odour, sheen or staining	Slight algae growth	No
A4-SD08-6	0.2	trace	100	Brown fine to medium SAND and GRAVEL, no odour or staining	Fish	No
A4-SD08-8	0.22	5	100	Dark grey fine SAND, no odour, sheen or staining	Fish and algae growth	No

TABLE 5 - Results for Grain Size Analysis in Soil and Sediment
Vehicle Dump/Community Landfill
Iqaluit, Nunavut

(all units % unless otherwise stated)

Parameters	**GS-1**	**GS-2**	**GS-3**	**GS-4**	**GS-5**	**GS-SD-1**	**GS-SD-2**
Lab ID #	*L682370-23*	*L682370-24*	*L682370-25*	*L682370-26*	*L682370-27*	*L682370-28*	*L682370-29*
Sample Date	*09-SEP-08*	*09-SEP-08*	*09-SEP-08*	*09-SEP-08*	*09-SEP-08*	*09-SEP-08*	*09-SEP-08*
Prepared by:	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**
Particle Size							
% Gravel (>2mm)	17	13	1	4	6	2	4
% Sand (2.0mm - 0.063mm)	68	75	70	63	55	84	55
% Silt (0.063mm - 4um)	12	1	16	19	35	13	33
% Clay (<4um)	2	11	13	13	4	2	8

TABLE 6 - Analytical Results for BTEX, CWS F1 to F4 in Surface Water
Vehicle Dump/Community Landfill
Nunavut, Iqaluit

(all units mg/L unless otherwise stated)

		APEC 2		APEC 3						APEC 4		
Parameters	**CCME Freshwater**	**A2-SW08-3**	**A2-SW08-4**	**A3-SW08-1**	**A3-SW08-2**	**DUP-1**		**A3-SW08-3**	**A3-SW08-4**	**A4- SW08-1**	**A4- SW08-2**	**A4-SW08-3**
Lab ID #		*L681303-3*	*L681303-4*	*L681064-5*	*L681064-1*	*L681064-4*	***RPD***	*L681064-2*	*L681064-3*	*L682349-1*	*L682349-2*	*L682329-2*
Sample Date		*06-SEP-08*	*06-SEP-08*	*07-SEP-08*	*07-SEP-08*	*07-SEP-08*		*07-SEP-08*	*07-SEP-08*	*08-SEP-08*	*08-SEP-08*	*08-SEP-08*
Prepared by:		**Franz**	**Franz**	**Franz**	**Franz**	**Franz**		**Franz**	**Franz**	**Franz**	**Franz**	**Franz**
Volatiles												
Benzene	0.37	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	NC	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	0.09	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	NC	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Methyl t-butyl ether (MTBE)	10	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	NC	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Styrene	0.072	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	NC	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	NC	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
o-Xylene	---	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	NC	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
m & p-Xylene	---	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	NC	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (Total)	---	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	NC	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Extractable Petroleum Hydrocrabons												
CWS F2 (C10-C16)	---	<0.30	<0.30	<0.30	<0.30	<0.30	NC	<0.30	<0.30	<0.30	<0.30	<0.30
CWS F3 (C16-C34)	---	<0.30	<0.30	<0.30	<0.30	<0.30	NC	<0.30	<0.30	<0.30	<0.30	<0.30
F1-BTEX	---	<0.10	<0.10	<0.10	<0.10	<0.10	NC	<0.10	<0.10	<0.10	<0.10	<0.10
CWS F1 (C06-C10)	---	<0.10	<0.10	<0.10	<0.10	<0.10	NC	<0.10	<0.10	<0.10	<0.10	<0.10

Notes (Refer to endnotes for complete list)

10 value is greater than the CCME freshwater Guideline

--- No Guideline.

NC - Not calculated

TABLE 7 - Analytical Results for Total Metals in Surface Water
Vehicle Dump/Community Landfill
Iqaluit Nunavut

(all units mg/L unless otherwise stated)

			APEC 1	APEC 2				APEC 3
Parameters		**CCME Freshwater**	**A1-SW08-1**	**A2-SW08-1**	**A2-SW08-2**	**A2-SW08-3**	**A2-SW08-4**	**A3-SW08-1**
	Lab ID #		*L682329-1*	*L681303-1*	*L681303-2*	*L681303-3*	*L681303-4*	*L681064-5*
	Sample Date		*08-SEP-08*	*06-SEP-08*	*06-SEP-08*	*06-SEP-08*	*06-SEP-08*	*07-SEP-08*
	Prepared by:		**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**
Physical Tests								
pH (Field)		---	-	6.11	6.43	6.4	6.35	6.38
Hardness (as CaCO3)		---	91.6	54.2	41.8	39.6	40.1	79.7
Total Metals								
Aluminum (Al)								
	pH<6.5	0.005[a]	0.0144	0.0288	0.0112	0.119	0.0247	0.0434
	pH>6.5	0.1[a]						
Antimony (Sb)		---	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00062
Arsenic (As)		0.005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Barium (Ba)		---	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Beryllium (Be)		---	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Boron (B)		---	<0.10	<0.10	<0.10	<0.10	<0.10	0.23
Cadmium (Cd)		0.000017	<0.000017	0.000047	<0.000017	0.000087	0.000037	0.000129
Calcium (Ca)		---	24.7	15.8	11.7	11.2	11.5	25.1
Chromium (Cr)		0.0089[c]	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt (Co)		---	<0.00030	<0.00030	0.00032	0.00115	0.00046	0.00286
Copper (Cu)								
	H: 0 - 120mg/L	0.002[b]	0.0013	0.0037	0.0037	0.0071	0.0023	0.0047
	H: >180 mg/L	0.004[b]						
Iron (Fe)		---	0.086	1.07	0.757	8.37	1.72	2.79
Lead (Pb)								
	H: 0 - 60mg/L	0.001[b]		<0.00050	<0.00050	0.002	<0.00050	
	H: 60 - 120mg/L	0.002[b]	<0.00050					0.00277
	H: >180mg/L	0.007[b]						
Lithium (Li)		---	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)		---	7.25	3.58	3.05	2.82	2.8	4.14
Manganese (Mn)		---	0.0198	0.0609	0.066	0.151	0.0755	0.0841
Mercury (Hg)		0.000026	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Molybdenum (Mo)		0.073	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel (Ni)								
	H: 0 - 60mg/L	0.025[b]		<0.0010	<0.0010	<0.0010	<0.0010	
	H: 60 - 120mg/L	0.065[b]	<0.0010					0.0037
	H: >180mg/L	0.15[b]						
Potassium (K)		---	3.1	<2.0	<2.0	<2.0	<2.0	2.5
Selenium (Se)		0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Silver (Ag)		0.0001	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Sodium (Na)		---	16.9	5.4	5.7	5.2	5.3	8.7
Thallium (Tl)		---	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin (Sn)		---	<0.00050	<0.00050	<0.00050	0.00057	<0.00050	<0.00050
Titanium (Ti)		---	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)		---	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Vanadium (V)		---	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)		0.03	<0.0050	0.0191	<0.0050	0.0083	<0.0050	0.163

Notes (Refer to endnotes for complete list)

10 value is greater than the CCME freshwater Guideline

--- No Guideline.

* a - Criteria is pH dependent

* b - Criteria is hardness dependent

* c - Criteria is value for Chromium III

TABLE 7 - Analytical Results for Total Metals in Surface Water
Vehicle Dump/Community Landfill
Iqaluit Nunavut

(all units mg/L unless otherwise stated)

			APEC 3					APEC 4	
Parameters		**CCME Freshwater**	**A3-SW08-2**	**DUP-1**	**RPD**	**A3-SW08-3**	**A3-SW08-4**	**A4- SW08-1**	**A4- SW08-2**
	Lab ID #		*L681064-1*	*L681064-4*		*L681064-2*	*L681064-3*	*L682349-1*	*L682349-2*
	Sample Date		*07-SEP-08*	*07-SEP-08*		*07-SEP-08*	*07-SEP-08*	*08-SEP-08*	*08-SEP-08*
	Prepared by:		**Franz**	**Franz**		**Franz**	**Franz**	**Franz**	**Franz**
Physical Tests									
pH (Field)		---	6.77			6.55	6.91	6.98	6.82
Hardness (as CaCO3)		---	1260	1220	3%	42.2	40.2	471	1080
Total Metals									
Aluminum (Al)									
	pH<6.5	0.005[a]							
	pH>6.5	0.1[a]	<0.25	<0.25	NC	0.0191	0.0119	0.05	<0.10
Antimony (Sb)		---	<0.025	<0.025	NC	<0.00050	<0.00050	<0.0050	<0.010
Arsenic (As)		0.005	<0.025	<0.025	NC	<0.00050	<0.00050	<0.0050	<0.010
Barium (Ba)		---	<0.10	<0.10	NC	<0.020	<0.020	<0.020	<0.040
Beryllium (Be)		---	<0.050	<0.050	NC	<0.0010	<0.0010	<0.010	<0.020
Boron (B)		---	0.95	0.92	3%	<0.10	<0.10	0.34	0.64
Cadmium (Cd)		0.000017	<0.00085	<0.00085	NC	**0.000024**	**0.000018**	<0.00017	<0.00034
Calcium (Ca)		---	93.8	91.5	2%	11.6	11.5	35	117
Chromium (Cr)		0.0089[c]	<0.050	<0.050	NC	<0.0010	<0.0010	<0.010	<0.020
Cobalt (Co)		---	<0.015	<0.015	NC	<0.00030	<0.00030	<0.0030	<0.0060
Copper (Cu)									
	H: 0 - 120mg/L	0.002[b]				<0.0010	<0.0010		
	H: >180 mg/L	0.004[b]	<0.050	<0.050	NC			<0.010	<0.020
Iron (Fe)		---	0.9	0.78	14%	0.709	0.809	0.263	1.5
Lead (Pb)									
	H: 0 - 60mg/L	0.001[b]				<0.00050	<0.00050		
	H: 60 - 120mg/L	0.002[b]							
	H: >180mg/L	0.007[b]	<0.025	<0.025	NC			<0.0050	<0.010
Lithium (Li)		---	<0.25	<0.25	NC	<0.0050	<0.0050	<0.050	<0.10
Magnesium (Mg)		---	248	242	2%	3.2	2.8	93.1	190
Manganese (Mn)		---	0.103	0.104	1%	0.0622	0.0534	0.0157	0.381
Mercury (Hg)		0.000026	<0.000020	<0.000020	NC	<0.000020	<0.000020	<0.000020	<0.000020
Molybdenum (Mo)		0.073	<0.050	<0.050	NC	<0.0010	<0.0010	<0.010	<0.020
Nickel (Ni)									
	H: 0 - 60mg/L	0.025[b]				<0.0010	<0.0010		
	H: 60 - 120mg/L	0.065[b]							
	H: >180mg/L	0.15[b]	<0.050	<0.050	NC			<0.010	<0.020
Potassium (K)		---	80	78	3%	<2.0	<2.0	27.4	50.4
Selenium (Se)		0.001	<0.050	<0.050	NC	<0.0010	<0.0010	<0.010	<0.020
Silver (Ag)		0.0001	<0.0010	<0.0010	NC	<0.000020	<0.000020	<0.00020	<0.00040
Sodium (Na)		---	2080	2040	2%	7.5	5.3	861	1090
Thallium (Tl)		---	<0.010	<0.010	NC	<0.00020	<0.00020	<0.0020	<0.0040
Tin (Sn)		---	<0.025	<0.025	NC	<0.00050	<0.00050	<0.0050	<0.010
Titanium (Ti)		---	<0.050	<0.050	NC	<0.010	<0.010	<0.010	<0.020
Uranium (U)		---	<0.010	<0.010	NC	<0.00020	<0.00020	<0.0020	<0.0040
Vanadium (V)		---	<0.050	<0.050	NC	<0.0010	<0.0010	<0.010	<0.020
Zinc (Zn)		0.03	<0.025	<0.025	NC	<0.0050	<0.0050	<0.0050	<0.010

Notes (Refer to endnotes for complete list)

10 value is greater than the CCME freshwater Guideline

--- No Guideline.

* a - Criteria is pH dependent

* b - Criteria is hardness dependent

* c - Criteria is value for Chromium III

TABLE 7 - Analytical Results for Total Metals in Surface Water
Vehicle Dump/Community Landfill
Iqaluit Nunavut

(all units mg/L unless otherwise stated)

Parameters	**CCME Freshwater**	**APEC 4**							
		A4-SW08-3	**A4- SW08-4**	**A4- SW08-5**	**A4-SW08-6**	**A4-SW08-7**	**A4-SW08-8**	**SW-BK-1**	**SW-BK-2**
Lab ID #		*L682329-2*	*L682349-3*	*L682349-4*	*L682329-3*	*L682329-4*	*L682329-5*	*L682370-13*	*L682370-16*
Sample Date		*08-SEP-08*	*08-SEP-08*	*08-SEP-08*	*08-SEP-08*	*08-SEP-08*	*08-SEP-08*	*09-SEP-08*	*09-SEP-08*
Prepared by:		**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**
Physical Tests									
pH (Field)	---	7.88	7.32	6.94	8.07	8.42	7.65	-	-
Hardness (as CaCO3)	---	105	14.6	480	23.6	22.5	27.2	31.9	15.9
Total Metals									
Aluminum (Al)									
pH<6.5	0.005 [a]								
pH>6.5	0.1 [a]	0.018	0.0222	<0.10	0.0327	0.0256	0.0275	0.0246	0.0261
Antimony (Sb)	---	<0.0010	<0.00050	<0.010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic (As)	0.005	<0.0020	<0.00050	<0.010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Barium (Ba)	---	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Beryllium (Be)	---	<0.0020	<0.0010	<0.020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Boron (B)	---	<0.10	<0.10	0.49	<0.10	<0.10	<0.10	<0.10	<0.10
Cadmium (Cd)	0.000017	**0.000146**	**0.000044**	<0.00034	<0.000017	**0.000082**	<0.000017	<0.000017	<0.000017
Calcium (Ca)	---	14.4	4.18	33.3	4.67	4.58	4.72	9.75	5.03
Chromium (Cr)	0.0089 [c]	<0.0020	<0.0010	<0.020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt (Co)	---	<0.00060	<0.00030	<0.0060	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Copper (Cu)									
H: 0 - 120mg/L	0.002 [b]	**0.0057**	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
H: >180 mg/L	0.004 [b]			<0.020					
Iron (Fe)	---	0.482	<0.030	0.219	0.038	0.04	0.043	0.054	0.037
Lead (Pb)									
H: 0 - 60mg/L	0.001 [b]		<0.00050		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
H: 60 - 120mg/L	0.002 [b]	<0.0010							
H: >180mg/L	0.007 [b]			<0.010					
Lithium (Li)	---	<0.010	<0.0050	<0.10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)	---	16.9	1	96.3	2.9	2.68	3.75	1.84	0.81
Manganese (Mn)	---	0.0138	0.00075	0.0095	0.001	0.00116	0.00107	0.00212	0.00099
Mercury (Hg)	0.000026	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Molybdenum (Mo)	0.073	<0.0020	<0.0010	<0.020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel (Ni)									
H: 0 - 60mg/L	0.025 [b]		<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
H: 60 - 120mg/L	0.065 [b]	<0.0020							
H: >180mg/L	0.15 [b]			<0.020					
Potassium (K)	---	6.8	<2.0	35	<2.0	<2.0	<2.0	<2.0	<2.0
Selenium (Se)	0.001	<0.0040	<0.0010	<0.020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Silver (Ag)	0.0001	<0.000040	<0.000020	<0.00040	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Sodium (Na)	---	153	6.9	1020	23.6	22	37.9	5.5	<2.0
Thallium (Tl)	---	<0.00040	<0.00020	<0.0040	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin (Sn)	---	<0.0010	<0.00050	<0.010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Titanium (Ti)	---	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)	---	<0.00040	<0.00020	<0.0040	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Vanadium (V)	---	<0.0020	<0.0010	<0.020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)	0.03	0.0061	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

Notes (Refer to endnotes for complete list)

10 value is greater than the CCME freshwater Guideline

--- No Guideline.

* a - Criteria is pH dependent

* b - Criteria is hardness dependent

* c - Criteria is value for Chromium III

TABLE 8 - Analytical Results for PCBs in Surface Water
Vehicle Dump/Community Landfill
Iqaluit, Nunavut

(all units mg/L unless otherwise stated)

		APEC 1	APEC 2		APEC 3					
Parameters	**CCME Freshwater**	**A1-SW08-1**	**A2-SW08-3**	**A2-SW08-4**	**A3-SW08-1**	**A3-SW08-2**	**DUP-1**	**RPD**	**A3-SW08-3**	**A3-SW08-4**
Lab ID #		*L682370-19*	*L681303-3*	*L681303-4*	*L681064-5*	*L681064-1*	*L681064-4*		*L681064-2*	*L681064-3*
Sample Date		*09-SEP-08*	*06-SEP-08*	*06-SEP-08*	*07-SEP-08*	*07-SEP-08*	*07-SEP-08*		*07-SEP-08*	*07-SEP-08*
Prepared by:		**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**		**Franz**	**Franz**
Polychlorinated Biphenyls										
PCB-1016	---	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	NC	<0.0010	<0.0010
PCB-1221	---	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	NC	<0.0010	<0.0010
PCB-1232	---	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	NC	<0.0010	<0.0010
PCB-1242	---	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	NC	<0.0010	<0.0010
PCB-1248	---	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	NC	<0.0010	<0.0010
PCB-1254	---	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	NC	<0.0010	<0.0010
PCB-1260	---	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	NC	<0.0010	<0.0010
PCB-1262	---	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	NC	<0.0010	<0.0010
PCB-1268	---	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	NC	<0.0010	<0.0010
Total Polychlorinated Biphenyls	---	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	NC	<0.0010	<0.0010

Notes (Refer to endnotes for complete list)

10	value is greater than the CCME freshwater Guideline

--- No Guideline.

NC - Not Calculated.

TABLE 8 - Analytical Results for PCBs in Surface Water
Vehicle Dump/Community Landfill
Iqaluit, Nunavut

(all units mg/L unless otherwise stated)

			APEC 4							
Parameters		**CCME Freshwater**	**A4- SW08-1**	**A4- SW08-2**	**A4-SW08-3**	**A4- SW08-4**	**A4- SW08-5**	**A4-SW08-6**	**A4-SW08-7**	**A4-SW08-8**
	Lab ID #		*L682349-1*	*L682349-2*	*L682329-2*	*L682349-3*	*L682349-4*	*L682329-3*	*L682329-4*	*L682329-5*
	Sample Date		*08-SEP-08*	*08-SEP-08*	*08-SEP-08*	*08-SEP-08*	*08-SEP-08*	*08-SEP-08*	*08-SEP-08*	*08-SEP-08*
	Prepared by:		**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**
Polychlorinated Biphenyls										
PCB-1016		---	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
PCB-1221		---	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
PCB-1232		---	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
PCB-1242		---	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
PCB-1248		---	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
PCB-1254		---	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
PCB-1260		---	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
PCB-1262		---	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
PCB-1268		---	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Polychlorinated Biphenyls		---	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

Notes (Refer to endnotes for complete list)

10 value is greater than the CCME freshwater Guideline

--- No Guideline.

NC - Not Calculated.

TABLE 9 - Analytical Results for Pesticides in Surface Water
Vehicle Dump/Community Landfill
Iqaluit, Nunavut

(all units mg/L unless otherwise stated)

		APEC 2	APEC 4	
Parameters	**CCME Freshwater**	**A2-SW08-4**	**A4-SW08-3**	**A4- SW08-2**
Lab ID #		*L681303-4*	*L682329-2*	*L682349-2*
Sample Date		*06-SEP-08*	*08-SEP-08*	*08-SEP-08*
Prepared by:		**Franz**	**Franz**	**Franz**
Organochlorine Pesticides				
Aldrin	---	<0.000050	<0.000050	<0.000050
alpha-BHC	---	<0.000050	<0.000050	<0.000050
beta-BHC	---	<0.00010	<0.00010	<0.00010
Lindane (gamma - BHC)	0.00001	<0.000050	<0.000050	<0.000050
delta-BHC	---	<0.000050	<0.000050	<0.000050
cis-Chlordane (alpha)	---	<0.000050	<0.000050	<0.000050
trans-Chlordane (gamma)	---	<0.000050	<0.000050	<0.000050
2,4'-DDD	---	<0.00010	<0.00010	<0.00010
4,4'-DDD	---	<0.000050	<0.000050	<0.000050
2,4'-DDE	---	<0.00010	<0.00010	<0.00010
4,4'-DDE	---	<0.000050	<0.000050	<0.000050
2,4'-DDT	---	<0.00010	<0.00010	<0.00010
4,4'-DDT	---	<0.00010	<0.00010	<0.00010
Dieldrin	---	<0.000050	<0.000050	<0.000050
Endosulfan I	0.00002 [a]	<0.000050	<0.000050	<0.000050
Endosulfan II	0.00002 [a]	<0.000050	<0.000050	<0.000050
Endosulfan Sulfate	0.00002 [a]	<0.000050	<0.000050	<0.000050
Endrin	---	<0.00020	<0.00020	<0.00020
Heptachlor	---	<0.00010	<0.00010	<0.00010
Heptachlor Epoxide	---	<0.000050	<0.000050	<0.000050
Methoxychlor	---	<0.00020	<0.00020	<0.00020
Mirex	---	<0.000050	<0.000050	<0.000050
cis-Nonachlor	---	<0.000050	<0.000050	<0.000050
trans-Nonachlor	---	<0.000050	<0.000050	<0.000050
Oxychlordane	---	<0.000050	<0.000050	<0.000050

Notes (Refer to endnotes for complete list)

10	value is greater than the CCME freshwater Guideline

--- No Guideline.

*(a) Criteria is for Endosulfan

TABLE 10 - Analytical Results for VOCs in Surface Water
Vehicle Dump/Community Landfill
Iqaluit, Nunavut

(all units mg/L unless otherwise stated)

		APEC 4	
Parameters	**CCME Freshwater**	**A4-SW08-3**	**A4- SW08-2**
Lab ID #		*L682329-2*	*L682349-2*
Sample Date		*08-SEP-08*	*08-SEP-08*
Prepared by:		**Franz**	**Franz**
Volatile Organic Compounds			
Benzene	0.37	<0.00050	<0.00050
Bromodichloromethane	---	<0.0010	<0.0010
Bromoform	---	<0.0010	<0.0010
Carbon Tetrachloride	0.0133	<0.0010	<0.0010
Chlorobenzene	0.0013	<0.0010	<0.0010
Dibromochloromethane	---	<0.0010	<0.0010
Chloroethane	---	<0.0010	<0.0010
Chloroform	0.0018	<0.0010	<0.0010
Chloromethane	---	<0.0010	<0.0010
1,2-Dichlorobenzene	0.0007	0.0007	<0.0007
1,3-Dichlorobenzene	0.15	<0.0010	<0.0010
1,4-Dichlorobenzene	0.026	<0.0010	<0.0010
1,1-Dichloroethane	---	<0.0010	<0.0010
1,2-Dichloroethane	0.1	<0.0010	<0.0010
1,1-Dichloroethylene	---	<0.0010	<0.0010
cis-1,2-Dichloroethylene	---	<0.0010	0.004
trans-1,2-Dichloroethylene	---	<0.0010	<0.0010
Dichloromethane	---	<0.0050	<0.0050
1,2-Dichloropropane	---	<0.0010	<0.0010
cis-1,3-Dichloropropylene	---	<0.0010	<0.0010
trans-1,3-Dichloropropylene	---	<0.0010	<0.0010
Ethylbenzene	0.09	<0.00050	<0.00050
Methyl t-butyl ether (MTBE)	10	<0.0010	<0.0010
Styrene	0.072	<0.00050	<0.00050
1,1,1,2-Tetrachloroethane	---	<0.0010	<0.0010
1,1,2,2-Tetrachloroethane	---	<0.0010	<0.0010
Tetrachloroethylene	0.111	<0.0010	0.0411
Toluene	0.002	<0.0010	<0.0010
1,1,1-Trichloroethane	---	<0.0010	<0.0010
1,1,2-Trichloroethane	---	<0.0010	<0.0010
Trichloroethylene	0.021	<0.0010	**0.0226**
Trichlorofluoromethane	---	<0.0010	<0.0010
Vinyl Chloride	---	<0.0010	<0.0010
ortho-Xylene	---	<0.00050	<0.00050
meta- & para-Xylene	---	<0.00050	<0.00050
Xylenes	---	<0.0010	<0.0010

Notes (Refer to endnotes for complete list)

10	value is greater than the CCME freshwater Guideline

--- No Guideline

TABLE 11 - Analytical Results for PAHs in Surface Water
Vehicle Dump/Community Landfill
Iqaluit, Nunavut

(all units mg/L unless otherwise stated)

		APEC 4	
Parameters	**CCME Freshwater**	**A4- SW08-2**	**A4-SW08-3**
Lab ID #		*L682349-2*	*L682329-2*
Sample Date		*08-SEP-08*	*08-SEP-08*
Prepared by:		**Franz**	**Franz**
Polycyclic Aromatic Hydrocarbons			
Acenaphthene	0.0058	<0.000050	<0.000050
Acenaphthylene	---	<0.000050	<0.000050
Acridine	0.0044	<0.000050	<0.000050
Anthracene	0.000012	<0.000012	<0.000012
Benz(a)anthracene	0.000018	<0.000018	<0.000018
Benzo(a)pyrene	0.000015	<0.000010	<0.000010
Benzo(b)fluoranthene	---	<0.000050	<0.000050
Benzo(g,h,i)perylene	---	<0.000050	<0.000050
Benzo(k)fluoranthene	---	<0.000050	<0.000050
Chrysene	---	<0.000050	<0.000050
Dibenz(a,h)anthracene	---	<0.000050	<0.000050
Fluoranthene	0.00004	<0.00004	<0.000040
Fluorene	0.003	<0.000050	<0.000050
Indeno(1,2,3-c,d)pyrene	---	<0.000050	<0.000050
Naphthalene	0.0011	<0.000050	<0.000050
Phenanthrene	0.0004	<0.000050	<0.000050
Pyrene	0.000025	<0.000025	<0.000025
Quinoline	0.0034	<0.000050	<0.000050

Notes (Refer to endnotes for complete list)

10	value is greater than the CCME freshwater Guideline

--- No Guideline.

TABLE 12 - Analytical Results for Metals in Vegetation
Vehicle Dump/Community Landfill
Iqaluit Nunavut

(all units mg/kg wwt unless otherwise stated)

		APEC 1	APEC 2	APEC 3			
Parameters	**Vegetation Foliage (Rural)**	**VEG-6**	**VEG-4**	**VEG-1**	**VEG-2**	**VEG-3**	**VEG-5**
Lab ID #		*L682370-6*	*L682370-4*	*L682370-1*	*L682370-2*	*L682370-3*	*L682370-5*
Sample Date		*09-SEP-08*	*09-SEP-08*	*09-SEP-08*	*09-SEP-08*	*09-SEP-08*	*09-SEP-08*
Prepared by:		**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**
Physical Tests							
Hardness (as CaCO3)	---	-	-	-	-	-	-
% Moisture	---	62.4	56.5	59.8	69.5	67.8	68.4
pH	---	-	-	-	-	-	-
Metals							
Aluminum (Al)	500	108	88.4	31	36.1	45.7	24
Antimony (Sb)	0.3*	<0.010	<0.010	<0.010	0.013	<0.010	0.023
Arsenic (As)	0.5,2*	<0.010	0.013	<0.010	<0.010	<0.010	0.012
Barium (Ba)	---	34.8	26.4	9.07	7.88	13.2	36.2
Beryllium (Be)	---	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Bismuth (Bi)	---	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Cadmium (Cd)	1*	0.241	0.495	0.467	0.14	0.118	0.0206
Calcium (Ca)	---	2070	3390	3750	2000	1590	7300
Chromium (Cr)	8	0.19	0.2	0.11	<0.10	0.1	0.12
Cobalt (Co)	2	0.065	0.062	0.027	0.105	0.04	<0.020
Copper (Cu)	20	2.43	3.4	2.52	1.38	1.7	2.89
Iron (Fe)	500	106	133	28.3	35.6	38.2	47.6
Lead (Pb)	30	0.287	0.358	0.095	0.283	0.2	1.45
Lithium (Li)	---	<0.10	0.11	<0.10	<0.10	<0.10	0.13
Magnesium (Mg)	---	734	1030	817	463	484	343
Manganese (Mn)	---	93.1	261	25.9	31.7	90.4	4.02
Mercury (Hg)	---	-	-	-	-	-	-
Molybdenum (Mo)	1.5	0.071	0.094	0.12	0.258	0.066	1.09
Nickel (Ni)	5, 30*	0.61	0.34	0.18	0.16	0.27	0.3
Phosphorus (P)	---	465	365	245	350	397	520
Potassium (K)	---	1730	3210	2340	1780	2170	1690
Selenium (Se)	0.5	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Silver (Ag)	---	-	-	-	-	-	-
Sodium (Na)	50	34	55	62	53	36	21
Strontium (Sr)	---	4.67	7.75	16.4	6.51	4.37	26.7
Thallium (Tl)	---	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Tin (Sn)	---	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Titanium (Ti)	---	4.35	4.7	0.91	1.6	1.77	2.62
Uranium (U)	---	0.0023	0.004	<0.0020	<0.0020	<0.0020	<0.0020
Vanadium (V)	5	0.16	0.13	<0.10	<0.10	<0.10	<0.10
Zinc (Zn)	250	17.8	29.8	46.5	19.1	14.1	22.3

Notes (Refer to endnotes for complete list)

10	value is greater than the Ontario Vegetation Criteria

--- No guideline.

NC - Not calculated

- Not Analysed

Where two values shown, the first is based on Southern Ontario data while the second is based on Northeastern Region data.

TABLE 12 - Analytical Results for Metals in Vegetation
Vehicle Dump/Community Landfill
Iqaluit Nunavut

(all units mg/kg wwt unless otherwise stated)

		APEC 4						
Parameters	**Vegetation Foliage (Rural)**	**A4-VEG-1**	**VEG-DUP**		**A4-VEG-2**	**A4-VEG-3**	**VEG-BK-1**	**VEG-BK-2**
Lab ID #		*L682370-7*	*L682370-10*	***RPD***	*L682370-8*	*L682370-9*	*L682370-17*	*L682370-18*
Sample Date		*10-SEP-08*	*10-SEP-08*		*10-SEP-08*	*10-SEP-08*	*09-SEP-08*	*09-SEP-08*
Prepared by:		**Franz**	**Franz**		**Franz**	**Franz**	**Franz**	**Franz**
Physical Tests								
Hardness (as CaCO3)	---	-	-		-	-	-	-
% Moisture	---	78.8	77.3	2%	71.8	71.7	74	76.1
pH	---	-	-		-	-	-	-
Metals								
Aluminum (Al)	500	271	303	11%	199	255	34.7	10.5
Antimony (Sb)	0.3*	<0.010	<0.010	NC	<0.010	<0.010	<0.010	<0.010
Arsenic (As)	0.5,2*	0.428	0.428	0%	0.074	0.426	0.016	<0.010
Barium (Ba)	---	2.17	2.15	1%	1.4	1.96	11.6	5.73
Beryllium (Be)	---	<0.10	<0.10	NC	<0.10	<0.10	<0.10	<0.10
Bismuth (Bi)	---	<0.030	<0.030	NC	<0.030	<0.030	<0.030	<0.030
Cadmium (Cd)	1*	0.0072	0.0076	5%	0.0087	0.0131	0.0967	0.0171
Calcium (Ca)	---	458	530	15%	1940	899	1320	918
Chromium (Cr)	8	0.9	1.06	16%	0.72	0.8	0.11	<0.10
Cobalt (Co)	2	0.236	0.259	9%	0.405	0.209	0.023	0.036
Copper (Cu)	20	0.663	0.663	0%	0.797	1.21	1.1	0.726
Iron (Fe)	500	7880	7320	7%	627	853	21.7	8.9
Lead (Pb)	30	0.233	0.223	4%	0.17	0.315	0.053	<0.020
Lithium (Li)	---	0.37	0.38	3%	0.36	0.41	<0.10	<0.10
Magnesium (Mg)	---	621	731	16%	2070	1410	395	212
Manganese (Mn)	---	41.3	42.7	3%	122	32.9	56.7	10.8
Mercury (Hg)	---	-	-	-	-	-	-	-
Molybdenum (Mo)	1.5	0.44	0.522	17%	0.184	0.392	0.022	<0.010
Nickel (Ni)	5, 30*	0.39	0.41	5%	0.58	0.44	0.18	0.47
Phosphorus (P)	---	248	324	27%	167	292	241	177
Potassium (K)	---	1710	2050	18%	6390	3450	1560	1710
Selenium (Se)	0.5	<0.20	<0.20	NC	<0.20	<0.20	<0.20	<0.20
Silver (Ag)	---	-	-	-	-	-	-	-
Sodium (Na)	50	2660	3300	21%	6790	6180	32	<20
Strontium (Sr)	---	6.46	6.78	5%	15.6	10.8	1.78	1.7
Thallium (Tl)	---	<0.010	<0.010	NC	<0.010	<0.010	<0.010	<0.010
Tin (Sn)	---	<0.050	0.054	NC	<0.050	<0.050	<0.050	0.084
Titanium (Ti)	---	26.8	33.2	21%	26.8	21.5	1.08	0.2
Uranium (U)	---	0.106	0.0917	14%	0.0414	0.0792	<0.0020	<0.0020
Vanadium (V)	5	2.04	2.5	20%	1.25	1.84	<0.10	<0.10
Zinc (Zn)	250	4.24	4.66	9%	19.5	8.13	11.3	10.2

Notes (Refer to endnotes for complete list)

10	value is greater than the Ontario Vegetation Criteria

--- No guideline.

NC - Not calculated

- Not Analysed

Where two values shown, the first is based on Southern Ontario data while the second is based on Northeastern Region data.

TABLE 13 - Analytical Results for PCBs in Vegetation
Vehicle Dump/Community Landfill
Iqaluit, Nunavut

(all units mg/kg wwt unless otherwise stated)

		APEC 1	**APEC 2**	**APEC 3**				**APEC 4**				
Parameters	**Vegetation Foliage (Rural)**	**VEG-6**	**VEG-4**	**VEG-1**	**VEG-2**	**VEG-3**	**VEG-5**	**A4-VEG-1**	**VEG-DUP**	***RPD***	**A4-VEG-2**	**A4-VEG-3**
Lab ID #		*L682370-6*	*L682370-4*	*L682370-1*	*L682370-2*	*L682370-3*	*L682370-5*	*L682370-7*	*L682370-10*		*L682370-8*	*L682370-9*
Sample Date		*09-SEP-08*	*09-SEP-08*	*09-SEP-08*	*09-SEP-08*	*09-SEP-08*	*09-SEP-08*	*10-SEP-08*	*10-SEP-08*		*10-SEP-08*	*10-SEP-08*
Prepared by:		**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**		**Franz**	**Franz**
Polychlorinated Biphenyls												
PCB-1016	---	<0.20	<0.25	<0.50	<0.10	<0.10	<0.050	<0.050	<0.050	NC	<0.050	<0.050
PCB-1221	---	<0.20	<0.25	<0.50	<0.10	<0.10	<0.050	<0.050	<0.050	NC	<0.050	<0.050
PCB-1232	---	<0.20	<0.25	<0.50	<0.10	<0.10	<0.050	<0.050	<0.050	NC	<0.050	<0.050
PCB-1242	---	<0.20	<0.25	<0.50	<0.10	<0.10	<0.050	<0.050	<0.050	NC	<0.050	<0.050
PCB-1248	---	<0.20	<0.25	<0.50	<0.10	<0.10	<0.050	<0.050	<0.050	NC	<0.050	<0.050
PCB-1254	---	<0.20	<0.25	<0.50	<0.10	<0.10	<0.050	<0.050	<0.050	NC	<0.050	<0.050
PCB-1260	---	<0.20	<0.25	<0.50	<0.10	<0.10	<0.050	<0.050	<0.050	NC	<0.050	<0.050
PCB-1262	---	<0.20	<0.25	<0.50	<0.10	<0.10	<0.050	<0.050	<0.050	NC	<0.050	<0.050
PCB-1268	---	<0.20	<0.25	<0.50	<0.10	<0.10	<0.050	<0.050	<0.050	NC	<0.050	<0.050
Total Polychlorinated Biphenyls	---	<0.20	<0.25	<0.50	<0.10	<0.10	<0.050	<0.050	<0.050	NC	<0.050	<0.050

Notes (Refer to endnotes for complete list)

10 value is greater than the Ontario Vegetation Criteria

--- No Standard.

NC - Not calculated

TABLE 14 - Analytical Results for BTEX, CWS F1 to F4 in Soil
Vehicle Dump/Community Landfill
Nunavut, Iqaluit

(all units mg/kg unless otherwise stated)

					APEC 1	APEC 2		APEC 3				
Parameters	**CCME Soil CL (Coarse)**	**CCME Soil PL (Coarse)**	**CWS Soil CL (Coarse)**	**CWS Soil PL (Coarse)**	**A1-TP08-3**	**A2-TP08-1**	**A2-TP08-2**	**A3-TP08-2**	**A3-TP08-3**	**A3-TP08-5**	**A3-DUP-1**	
Sample Depth (m)					*0.5 - 1.6*	*0.0 - 0.1*	*0.0 - 0.1*	*0.0 - 0.12*	*0.0 - 0.25*	*0.0 - 0.3*		***RPD***
Lab ID #					*L682335-3*	*L681311-1*	*L681311-2*	*L681400-2*	*L681400-3*	*L681400-5*	*L681400-9*	
Sample Date					*08-SEP-08*	*06-SEP-08*	*06-SEP-08*	*06-SEP-08*	*06-SEP-08*	*06-SEP-08*	*06-SEP-08*	
Prepared by:					**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	
Volatiles												
Benzene	0.03[1]	0.03[1]	---	---	<0.03	<0.040	<0.040	<0.03	<0.03	<0.03	<0.03	NC
Ethylbenzene	0.082[1]	0.082[1]	---	---	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	NC
Methyl t-butyl ether (MTBE)	---	---	---	---	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	NC
Styrene	50[2]	5[2]	---	---	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	NC
Toluene	0.37[1]	0.37[1]	---	---	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	NC
o-Xylene	---	---	---	---	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	NC
m & p-Xylene	---	---	---	---	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	NC
Xylenes (Total)	11[1]	11[1]	---	---	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	NC
Extractable Petroleum Hydrocrabons												
F4SG (Heavy Hydrocarbons-SilicaGel)	---	---	---	---	-	<500	-	-	<500	-	-	NC
CWS F2 (C10-C16)	---	---	260[3]	150[3]	<30	<30	<30	***450***	35	<30	<30	NC
CWS F3 (C16-C34)	---	---	1700[3]	300[3]	<50	180	80	***44400***	***343***	<50	<50	NC
CWS F4 (C34-C50)	---	---	3300[3]	2800[3]	<50	93	51	***6960***	213	<50	<50	NC
F1-BTEX	---	---	---	---	<10	<10	<10	<10	<10	<10	<10	NC
CWS F1 (C06-C10)	---	---	320[3]	30[3]	<10	<10	<10	<10	<10	<10	<10	NC

Notes (Refer to endnotes for complete list)

▨ 10	value is greater than the CCME or CWS CL Guideline
10	value is greater than the CCME or CWS PL Guideline

--- No Guideline.

NC - Not calculated

TABLE 14 - Analytical Results for BTEX, CWS F1 to F4 in Soil
Vehicle Dump/Community Landfill
Nunavut, Iqaluit

(all units mg/kg unless otherwise stated)

					APEC 3						
Parameters	**CCME Soil CL (Coarse)**	**CCME Soil PL (Coarse)**	**CWS Soil CL (Coarse)**	**CWS Soil PL (Coarse)**	**A3-TP08-6**	**A3-TP08-7**	**A3-TP08-8**	**A3-TP08-9**	**A3-TP08-10**	**A3-TP08-11**	**A3-TP08-12**
Sample Depth (m)					*0.0 - 0.30*	*0.0 - 0.25*	*0.0 - 0.3*	*0.01 - 0.2*	*0.0 - 0.15*	*0.0 - 0.2*	*0.0 - 0.1*
Lab ID #					*L681400-6*	*L681400-7*	*L681400-8*	*L681268-3*	*L681400-10*	*L681268-10*	*L681268-2*
Sample Date					*06-SEP-08*	*06-SEP-08*	*06-SEP-08*	*07-Sep-08*	*06-SEP-08*	*07-Sep-08*	*07-Sep-08*
Prepared by:					**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**
Volatiles											
Benzene	0.03[1]	0.03[1]	---	---	<0.03	<0.03	<0.03	<0.040	<0.03	<0.040	<0.040
Ethylbenzene	0.082[1]	0.082[1]	---	---	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Methyl t-butyl ether (MTBE)	---	---	---	---	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Styrene	50[2]	5[2]	---	---	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Toluene	0.37[1]	0.37[1]	---	---	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
o-Xylene	---	---	---	---	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
m & p-Xylene	---	---	---	---	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Xylenes (Total)	11[1]	11[1]	---	---	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Extractable Petroleum Hydrocrabons											
F4SG (Heavy Hydrocarbons-SilicaGel)	---	---	---	---	-	-	-	-	-		680
CWS F2 (C10-C16)	---	---	260[3]	150[3]	<30	<30	<30	<30	<30	<30	51
CWS F3 (C16-C34)	---	---	1700[3]	300[3]	<50	<50	<50	<50	<50	<50	244
CWS F4 (C34-C50)	---	---	3300[3]	2800[3]	<50	<50	<50	<50	<50	<50	239
F1-BTEX	---	---	---	---	<10	<10	<10	<10	<10	<10	<10
CWS F1 (C06-C10)	---	---	320[3]	30[3]	<10	<10	<10	<10	<10	<10	<10

Notes (Refer to endnotes for complete list)

10	value is greater than the CCME or CWS CL Guideline
10	value is greater than the CCME or CWS PL Guideline

--- No Guideline.

NC - Not calculated

TABLE 14 - Analytical Results for BTEX, CWS F1 to F4 in Soil
Vehicle Dump/Community Landfill
Nunavut, Iqaluit

(all units mg/kg unless otherwise stated)

					APEC 3							APEC 4	
Parameters	**CCME Soil CL (Coarse)**	**CCME Soil PL (Coarse)**	**CWS Soil CL (Coarse)**	**CWS Soil PL (Coarse)**	**A3-TP08-13**	**A3-TP08-DUP2**	**RPD**	**A3-TP08-14**	**A3-TP08-15**	**A3-TP08-16**	**A3-TP08-18**	**A4-TP08-1**	**A4-TP08-2**
Sample Depth (m)					*0.0 - 0.2*			*0.0 - 0.4*	*0.0 -0.3*	*0.0 - 0.3*	*0.0 - 0.35*	*0.37 - 0.80*	*0.0 - 0.3*
Lab ID #					*L681268-4*	*L681268-5*		*L681268-6*	*L681268-7*	*L681268-8*	*L681268-9*	*L682335-5*	*L682335-6*
Sample Date					*07-Sep-08*	*07-Sep-08*		*07-Sep-08*	*07-Sep-08*	*07-Sep-08*	*07-Sep-08*	*08-SEP-08*	*08-SEP-08*
Prepared by:					**Franz**	**Franz**		**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**
Volatiles													
Benzene	0.03 [1]	0.03 [1]	---	---	<0.040	<0.040	NC	<0.040	<0.040	<0.040	<0.040	<0.03	<0.03
Ethylbenzene	0.082 [1]	0.082 [1]	---	---	<0.050	<0.050	NC	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Methyl t-butyl ether (MTBE)	---	---	---	---	<0.20	<0.20	NC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Styrene	50 [2]	5 [2]	---	---	<0.050	<0.050	NC	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Toluene	0.37 [1]	0.37 [1]	---	---	<0.050	<0.050	NC	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
o-Xylene	---	---	---	---	<0.050	<0.050	NC	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
m & p-Xylene	---	---	---	---	<0.050	<0.050	NC	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Xylenes (Total)	11 [1]	11 [1]	---	---	<0.10	<0.10	NC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Extractable Petroleum Hydrocrabons													
F4SG (Heavy Hydrocarbons-SilicaGel)	---	---	---	---	-	<500	NC					-	-
CWS F2 (C10-C16)	---	---	260 [3]	150 [3]	<30	<30	NC	<30	<30	<30	<30	<30	<40
CWS F3 (C16-C34)	---	---	1700 [3]	300 [3]	69	240	111%	<50	<50	<50	<50	<50	<50
CWS F4 (C34-C50)	---	---	3300 [3]	2800 [3]	<50	82	NC	<50	<50	<50	<50	<50	<50
F1-BTEX	---	---	---	---	<10	<10	NC	<10	<10	<10	<10	<10	<10
CWS F1 (C06-C10)	---	---	320 [3]	30 [3]	<10	<10	NC	<10	<10	<10	<10	<10	<10

Notes (Refer to endnotes for complete list)

10	value is greater than the CCME or CWS CL Guideline
10	value is greater than the CCME or CWS PL Guideline

--- No Guideline.

NC - Not calculated

TABLE 15 - Analytical Results for Total Metals in Soil
Vehicle Dump/Community Landfill
Iqaluit Nunavut

(all units mg/kg unless otherwise stated)

Parameters	CCME Soil CL	CCME Soil PL	A1-TP08-1	A1-TP08-2	A1-DUP 3	RPD	A1-TP08-3	A2-TP08-1	A2-TP08-2	A3-TP08-1	A3-TP08-2	A3-TP08-3
			APEC 1					APEC 2		APEC 3		
Sample Depth (m)			*0.0 - 0.8*	*0.0 - 1.0*			*0.0 - 0.5*	*0.0 - 0.1*	*0.0 - 0.1*	*0.0 - 0.2*	*0.0 - 0.12*	*0.0 - 0.25*
Lab ID #			*L682335-1*	*L682335-2*	*L682335-4*		*L682335-3*	*L681311-1*	*L681311-2*	*L681400-1*	*L681400-2*	*L681400-3*
Sample Date			*08-SEP-08*	*08-SEP-08*	*08-SEP-08*		*08-SEP-08*	*06-SEP-08*	*06-SEP-08*	*06-SEP-08*	*06-SEP-08*	*06-SEP-08*
Prepared by:			**Franz**	**Franz**	**Franz**		**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**
Physical Tests												
% Moisture	---	---	-	-	-		4.94	20	18.6	-	47.3	53.7
pH	6 to 8 [2]	6 to 8 [2]	6.82	6.66	6.72	1%	6.7	6.03	6.3	7.79	***5.9***	6
Total Metals												
Antimony (Sb)	40 [2]	20 [2]	<10	<10	<10	NC	<10	<10	<10	<10	<10	<10
Arsenic (As)	12 [1]	12 [1]	<5.0	<5.0	<5.0	NC	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Barium (Ba)	2000 [1]	500 [1]	40.7	23	26.2	13%	21.6	134	17.7	24.8	425	18.6
Beryllium (Be)	8 [2]	4 [2]	<0.50	<0.50	<0.50	NC	<0.50	<0.50	1.02	<0.50	0.79	<0.50
Cadmium (Cd)	22 [1]	10 [1]	<0.50	<0.50	<0.50	NC	<0.50	***22.4***	<0.50	<0.50	<0.50	<0.50
Chromium (Cr)	87 [1]	64 [1]	20.4	10	12.2	20%	12	22.1	6.4	15.6	8.4	12
Cobalt (Co)	300 [2]	50 [2]	5.9	3.9	4.1	5%	3.4	5.3	2.1	4	2.6	2.4
Copper (Cu)	91 [1]	63 [1]	***103***	8.7	9.2	6%	6.3	29.2	6.4	14.9	18.3	15.1
Lead (Pb)	260 [1]	140 [1]	***190***	<30	<30	NC	<30	100	<30	<30	<30	<30
Mercury (Hg)	24 [1]	6.6 [1]	0.0054	<0.0050	<0.0050	NC	<0.0050	0.0258	0.0474	0.0099	0.0691	0.105
Molybdenum (Mo)	40 [2]	10 [2]	<4.0	<4.0	<4.0	NC	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Nickel (Ni)	50 [1]	50 [1]	8	5.1	5.5	8%	<5.0	7.2	<5.0	5.6	<5.0	<5.0
Selenium (Se)	2.9 [1]	1 [1]	<0.5	<0.5	<0.5	NC	0.5	<2.0	<2.0	<0.5	<0.5	0.51
Silver (Ag)	40 [2]	20 [2]	<2.0	<2.0	<2.0	NC	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Thallium (Tl)	1 [1]	1 [1]	<1.0	<1.0	<1.0	NC	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tin (Sn)	300 [2]	50 [2]	<5.0	<5.0	<5.0	NC	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Vanadium (V)	130 [1]	130 [1]	44.2	32.3	33.4	3%	35.5	40.3	17.9	38	13.9	25.9
Zinc (Zn)	360 [1]	200 [1]	122	36.8	37.6	2%	24.8	92.1	39.2	46.9	126	34.3

Notes (Refer to endnotes for complete list)

▨ 10	value is greater than the CCME CL Guideline
10	value is greater than the CCME PL Guideline

--- No Guideline.

NC - Not calculated

TABLE 15 - Analytical Results for Total Metals in Soil
Vehicle Dump/Community Landfill
Iqaluit Nunavut

(all units mg/kg unless otherwise stated)

Parameters		**CCME Soil CL**	**CCME Soil PL**	**APEC 3**									
				A3-TP08-4	**A3-TP08-5**	**A3-DUP-1**		**A3-TP08-6**	**A3-TP08-7**	**A3-TP08-9**	**A3-TP08-10**	**A3-TP08-11**	**A3-TP08-12**
	Sample Depth (m)			*0.0 - 0.05*	*0.0 - 0.3*		**RPD**	*0.0 - 0.30*	*0.0 - 0.25*	*0.01 - 0.2*	*0.0 - 0.15*	*0.0 - 0.2*	*0.0 - 0.1*
	Lab ID #			*L681400-4*	*L681400-5*	*L681400-9*		*L681400-6*	*L681400-7*	*L681268-3*	*L681400-10*	*L681268-10*	*L681268-2*
	Sample Date			*06-SEP-08*	*06-SEP-08*	*06-SEP-08*		*06-SEP-08*	*06-SEP-08*	*07-Sep-08*	*06-SEP-08*	*07-Sep-08*	*07-Sep-08*
	Prepared by:			**Franz**	**Franz**	**Franz**		**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**
Physical Tests													
% Moisture		---	---	-	10.9	9.54	13%	20.4	27.7	27.5	17.3	10.7	7.73
pH		6 to 8[2]	6 to 8[2]	***5.03***	6	6.16	3%	***5.31***	***5.8***	6.28	***5.98***	***5.81***	6.37
Total Metals													
Antimony (Sb)		40[2]	20[2]	<10	<10	<10	NC	<10	<10	<10	<10	<10	<10
Arsenic (As)		12[1]	12[1]	<5.0	<5.0	<5.0	NC	5.3	<5.0	<5.0	<5.0	<5.0	<5.0
Barium (Ba)		2000[1]	500[1]	24.5	33.6	36.9	9%	44.3	55.9	51	50.3	22.5	25
Beryllium (Be)		8[2]	4[2]	<0.50	<0.50	<0.50	NC	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cadmium (Cd)		22[1]	10[1]	0.64	<0.50	<0.50	NC	<0.50	<0.50	<0.50	0.76	<0.50	1.53
Chromium (Cr)		87[1]	64[1]	15.6	24	25.5	6%	23.1	24	25.2	23.8	15.2	18.7
Cobalt (Co)		300[2]	50[2]	3.2	3	3.6	18%	3.2	3	3.8	3.7	2.7	4.4
Copper (Cu)		91[1]	63[1]	17.9	5.8	5.7	2%	4.7	6.1	13.9	3.9	3.9	***82***
Lead (Pb)		260[1]	140[1]	52	<30	<30	NC	<30	<30	60	<30	<30	***256***
Mercury (Hg)		24[1]	6.6[1]	0.0953	<0.0050	<0.0050	NC	0.0104	0.0104	0.019	0.0073	0.0056	0.285
Molybdenum (Mo)		40[2]	10[2]	<4.0	<4.0	<4.0	NC	4.9	<4.0	<4.0	4.9	<4.0	<4.0
Nickel (Ni)		50[1]	50[1]	6.3	<5.0	5.3	NC	5.7	6.1	6.4	<5.0	<5.0	8.2
Selenium (Se)		2.9[1]	1[1]	<0.5	<0.5	<0.5	NC	<0.5	<0.5	<2.0	<0.5	<2.0	<2.0
Silver (Ag)		40[2]	20[2]	<2.0	<2.0	<2.0	NC	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Thallium (Tl)		1[1]	1[1]	<1.0	<1.0	<1.0	NC	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tin (Sn)		300[2]	50[2]	8.7	<5.0	<5.0	NC	<5.0	<5.0	<5.0	<5.0	<5.0	9.8
Vanadium (V)		130[1]	130[1]	32.5	53.6	55.7	4%	56.2	23.4	42.1	55.9	36.9	16.9
Zinc (Zn)		360[1]	200[1]	38.7	28.3	30.3	NC	25.8	51	34.4	47.3	34.3	***488***

Notes (Refer to endnotes for complete list)

10	value is greater than the CCME CL Guideline
10	value is greater than the CCME PL Guideline

--- No Guideline.

NC - Not calculated

TABLE 15 - Analytical Results for Total Metals in Soil
Vehicle Dump/Community Landfill
Iqaluit Nunavut

(all units mg/kg unless otherwise stated)

			APEC 3								APEC 4			
Parameters	**CCME Soil CL**	**CCME Soil PL**	**A3-TP08-13**	**A3-TP08-DUP2**		**A3-TP08-14**	**A3-TP08-15**	**A3-TP08-16**	**A3-TP08-17**	**A3-TP08-18**	**A4-TP08-1**	**A4-TP08-2**	**TP-BK-1**	**TP-BK-2**
Sample Depth (m)			*0.0 -0.2*		***RPD***	*0.0 - 0.4*	*0.0 -0.3*	*0.0 - 0.3*	*0 - 0.35*	*0.0 - 0.35*	*0.37 - 0.80*	*0.0 - 0.3*	-	-
Lab ID #			*L681268-4*	*L681268-5*		*L681268-6*	*L681268-7*	*L681268-8*	*L681268-1*	*L681268-9*	*L682335-5*	*L682335-6*	*L682370-11*	*L682370-14*
Sample Date			*07-Sep-08*	*07-Sep-08*		*07-Sep-08*	*07-Sep-08*	*07-Sep-08*	*07-Sep-08*	*07-Sep-08*	*08-SEP-08*	*08-SEP-08*	*09-SEP-08*	*09-SEP-08*
Prepared by:			**Franz**	**Franz**		**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**
Physical Tests														
% Moisture	---	---	9.73	13.4	32%	20.2	29.8	22.4	-	42.3	13.1	28.8		-
pH	6 to 8 [2]	6 to 8 [2]	6.57	6.56	0%	6.59	6.22	***5.9***	***5.23***	***5.4***	6.13	***5.15***	6.93	6.28
Total Metals														
Antimony (Sb)	40 [2]	20 [2]	<10	<10	NC	<10	<10	<10	<10	<10	<10	<10	<10	<10
Arsenic (As)	12 [1]	12 [1]	<5.0	<5.0	NC	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Barium (Ba)	2000 [1]	500 [1]	32.3	27.2	17%	43.3	35.5	43	43.8	31.8	30.7	35	29.8	23.5
Beryllium (Be)	8 [2]	4 [2]	<0.50	<0.50	NC	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cadmium (Cd)	22 [1]	10 [1]	0.52	0.93	57%	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Chromium (Cr)	87 [1]	64 [1]	22.4	22.2	1%	21.6	20.3	16.8	24.9	19	14.2	18.3	21.8	10.2
Cobalt (Co)	300 [2]	50 [2]	3.9	3.9	0%	3.7	3.8	3.7	3.2	2.9	3	3.6	5.2	3.2
Copper (Cu)	91 [1]	63 [1]	24.5	33.8	32%	8.3	12.3	5.8	9.1	6.7	6.1	7.5	8.8	5.2
Lead (Pb)	260 [1]	140 [1]	41	34	19%	<30	<30	<30	<30	<30	<30	<30	<30	<30
Mercury (Hg)	24 [1]	6.6 [1]	0.0356	0.0534	40%	0.0107	0.0122	<0.0050	0.0058	<0.0050	0.0061	<0.0050	<0.0050	<0.0050
Molybdenum (Mo)	40 [2]	10 [2]	<4.0	<4.0	NC	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Nickel (Ni)	50 [1]	50 [1]	8	8.8	10%	6.6	7.2	6	6.4	5.6	<5.0	6.8	6.2	<5.0
Selenium (Se)	2.9 [1]	1 [1]	<2.0	<2.0	NC	<2.0	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5
Silver (Ag)	40 [2]	20 [2]	<2.0	<2.0	NC	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Thallium (Tl)	1 [1]	1 [1]	<1.0	<1.0	NC	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tin (Sn)	300 [2]	50 [2]	9.1	7.4	21%	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Vanadium (V)	130 [1]	130 [1]	41.3	45.3	9%	48.8	46.8	34.1	60	40.2	39.9	39.1	55.0	24.2
Zinc (Zn)	360 [1]	200 [1]	***205***	***277***	30%	74.9	33.5	33.8	36.1	35.2	33.6	35.7	35.6	21.1

Notes (Refer to endnotes for complete list)

▨ 10	value is greater than the CCME CL Guideline
10	value is greater than the CCME PL Guideline

--- No Guideline.

NC - Not calculated

TABLE 16 - Analytical Results for PCBs in Soil
Vehicle Dump/Community Landfill
Iqaluit, Nunavut

(all units mg/kg unless otherwise stated)

			APEC 1	APEC 2	APEC 3					
Parameters	**CCME Soil CL**	**CCME Soil PL**	**A1-TP08-3**	**A2-TP08-1**	**A3-TP08-2**	**A3-TP08-5**	**A3-TP08-6**	**A3-TP08-7**	**A3-TP08-9**	**A3-TP08-10**
Sample Depth (m)			*0.5 - 1.6*	*0.0 - 0.1*	*0.0 - 0.12*	*0.0 - 0.3*	*0.0 - 0.30*	*0.0 - 0.25*	*0.01 - 0.2*	*0.0 - 0.15*
Lab ID #			*L682335-3*	*L681311-1*	*L681400-2*	*L681400-5*	*L681400-6*	*L681400-7*	*L681268-3*	*L681400-10*
Sample Date			*08-SEP-08*	*06-SEP-08*	*06-SEP-08*	*06-SEP-08*	*06-SEP-08*	*06-SEP-08*	*07-Sep-08*	*06-SEP-08*
Prepared by:			**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**
Polychlorinated Biphenyls										
PCB-1016	---	---	<0.050	<0.50	<1.5	<0.050	<0.050	<0.060	<0.060	<0.050
PCB-1221	---	---	<0.050	<0.50	<1.5	<0.050	<0.050	<0.060	<0.060	<0.050
PCB-1232	---	---	<0.050	<0.50	<1.5	<0.050	<0.050	<0.060	<0.060	<0.050
PCB-1242	---	---	<0.050	<0.50	<1.5	<0.050	<0.050	<0.060	<0.060	<0.050
PCB-1248	---	---	<0.050	<0.50	<1.5	<0.050	<0.050	<0.060	<0.060	<0.050
PCB-1254	---	---	<0.050	<0.50	<1.5	<0.050	<0.050	<0.060	<0.060	<0.050
PCB-1260	---	---	<0.050	4.76	17.1	<0.050	<0.050	<0.060	<0.060	<0.050
PCB-1262	---	---	<0.050	<0.50	<1.5	<0.050	<0.050	<0.060	<0.060	<0.050
PCB-1268	---	---	<0.050	<0.50	<1.5	<0.050	<0.050	<0.060	<0.060	<0.050
Total Polychlorinated Biphenyls	33 [1]	1.3 [1]	<0.050	***<u>4.76</u>***	***<u>17.1</u>***	<0.050	<0.050	<0.060	<0.060	<0.060

Notes (Refer to endnotes for complete list)

10	value is greater than the CCME CL Guideline
<u>10</u>	value is greater than the CCME PL Guideline

--- No Guideline.

NC - Not calculated

TABLE 16 - Analytical Results for PCBs in Soil
Vehicle Dump/Community Landfill
Iqaluit, Nunavut

(all units mg/kg unless otherwise stated)

			APEC 3						APEC 4	
Parameters	**CCME Soil CL**	**CCME Soil PL**	**A3-TP08-13**	**A3-TP08-DUP2**		**A3-TP08-14**	**A3-TP08-16**	**A3-TP08-18**	**A4-TP08-1**	**A4-TP08-2**
Sample Depth (m)			*0.0 -0.2*			*0.0 - 0.4*	*0.0 - 0.3*	*0.0 - 0.35*	*0.37 - 0.80*	*0.0 - 0.3*
Lab ID #			*L681268-4*	*L681268-5*	***RPD***	*L681268-6*	*L681268-8*	*L681268-9*	*L682335-5*	*L682335-6*
Sample Date			*07-Sep-08*	*07-Sep-08*		*07-Sep-08*	*07-Sep-08*	*07-Sep-08*	*08-SEP-08*	*08-SEP-08*
Prepared by:			**Franz**	**Franz**		**Franz**	**Franz**	**Franz**	**Franz**	**Franz**
Polychlorinated Biphenyls										
PCB-1016	---	---	<0.050	<0.050	NC	<0.050	<0.050	<0.080	<0.050	<0.050
PCB-1221	---	---	<0.050	<0.050	NC	<0.050	<0.050	<0.080	<0.050	<0.050
PCB-1232	---	---	<0.050	<0.050	NC	<0.050	<0.050	<0.080	<0.050	<0.050
PCB-1242	---	---	<0.050	<0.050	NC	<0.050	<0.050	<0.080	<0.050	<0.050
PCB-1248	---	---	<0.050	0.21	NC	<0.050	<0.050	<0.080	<0.050	<0.050
PCB-1254	---	---	<0.050	0.104	NC	<0.050	<0.050	<0.080	<0.050	<0.050
PCB-1260	---	---	0.162	0.127	24%	<0.050	<0.050	<0.080	<0.050	<0.050
PCB-1262	---	---	<0.050	<0.050	NC	<0.050	<0.050	<0.080	<0.050	<0.050
PCB-1268	---	---	<0.050	<0.050	NC	<0.050	<0.050	<0.080	<0.050	<0.050
Total Polychlorinated Biphenyls	33 [1]	1.3 [1]	0.162	0.441	93%	<0.050	<0.050	<0.080	<0.050	<0.050

Notes (Refer to endnotes for complete list)

▨ 10	value is greater than the CCME CL Guideline
10	value is greater than the CCME PL Guideline

--- No Guideline.

NC - Not calculated

TABLE 17 - Analytical Results for Pesticides in Soil
Vehicle Dump/Community Landfill
Iqaluit, Nunavut

(all units mg/kg unless otherwise stated)

			APEC 1	**APEC 2**		**APEC 3**			
Parameters	**CCME Soil CL**	**CCME Soil PL**	**A1-TP08-3**	**A2-TP08-1**	**A2-TP08-2**	**A3-TP08-10**	**A3-TP08-13**	**A3-TP08-DUP2**	**RPD**
Sample Depth (m)			*0.5 - 1.6*	*0.0 - 0.1*	*0.0 - 0.1*	*0.0 - 0.15*	*0.0 -0.2*		
Lab ID #			*L682335-3*	*L682370-20*	*L682370-21*	*L681400-10*	*L681268-4*	*L681268-5*	
Sample Date			*08-SEP-08*	*09-SEP-08*	*09-SEP-08*	*06-SEP-08*	*07-Sep-08*	*07-Sep-08*	
Prepared by:			**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	
Organochlorine Pesticides									
Aldrin	---	---	<0.0010	<0.0010	<0.0010	<0.0015	<0.0020	<0.0020	NC
alpha-BHC	---	---	<0.0010	<0.0010	<0.0010	<0.0015	<0.0020	<0.0020	NC
beta-BHC	---	---	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	NC
Lindane (gamma - BHC)	---	---	<0.0010	<0.0010	<0.0010	<0.0015	<0.0020	<0.0020	NC
delta-BHC	---	---	<0.0010	<0.0010	<0.0010	<0.0015	<0.0020	<0.0020	NC
cis-Chlordane (alpha)	---	---	<0.0010	<0.0010	<0.0010	<0.0015	<0.0020	<0.0020	NC
trans-Chlordane (gamma)	---	---	<0.0010	<0.0010	<0.0010	<0.0015	<0.0020	<0.0020	NC
2,4'-DDD	---	---	<0.0010	<0.0010	<0.0010	<0.0015	<0.0020	<0.0020	NC
4,4'-DDD	---	---	0.0037	0.044	0.0045	<0.0015	0.0028	<0.0020	NC
2,4'-DDE	---	---	<0.0010	<0.0010	<0.0010	<0.0015	<0.0020	<0.0020	NC
4,4'-DDE	---	---	<0.0010	<0.0010	0.0049	<0.0015	0.0024	<0.0020	NC
2,4'-DDT	12 [1a]	0.7 [1a]	0.0062	0.0586	0.0053	<0.0020	<0.0020	<0.0020	NC
4,4'-DDT	12 [1a]	0.7 [1a]	0.0275	0.247	0.0307	<0.0020	0.007	<0.0020	NC
Dieldrin	---	---	<0.0010	<0.0010	<0.0010	<0.0015	<0.0020	<0.0020	NC
Endosulfan I	---	---	<0.0010	<0.0010	<0.0010	<0.0015	<0.0020	<0.0020	NC
Endosulfan II	---	---	<0.0010	<0.0010	<0.0010	<0.0015	<0.0020	<0.0020	NC
Endosulfan Sulfate	---	---	<0.0010	<0.0010	<0.0010	<0.0015	<0.0020	<0.0020	NC
Endrin	---	---	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	NC
Heptachlor	---	---	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	NC
Heptachlor Epoxide	---	---	<0.0010	<0.0010	<0.0010	<0.0015	<0.0020	<0.0020	NC
Methoxychlor	---	---	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	NC
Mirex	---	---	<0.0010	<0.0010	<0.0010	<0.0015	<0.0020	<0.0020	NC
cis-Nonachlor	---	---	<0.0010	<0.020	<0.0010	<0.0015	<0.0020	<0.0020	NC
trans-Nonachlor	---	---	<0.0010	<0.0010	<0.0010	<0.0015	<0.0020	<0.0020	NC
Oxychlordane	---	---	<0.0010	<0.0010	<0.0010	<0.0015	<0.0020	<0.0020	NC

Notes (Refer to endnotes for complete list)

10	value is greater than the CCME CL Guideline
10	value is greater than the CCME PL Guideline

--- No Guideline.

NC - Not calculated

a - Standard for DDT (Total)

TABLE 18 - Analytical Results for VOCs in Soil
Vehicle Dump/Community Landfill
Iqaluit, Nunavut
(all units mg/kg unless otherwise stated)

			APEC 2		APEC 3				
Parameters	**CCME Soil CL (Coarse)**	**CCME Soil PL (Coarse)**	**A2-TP08-1**	**A2-TP08-2**	**A3-TP08-10**	**A3-TP08-13**	**A3-TP08-DUP2**		**A3-TP08-15**
Sample Depth (m)			*0.0 - 0.1*	*0.0 - 0.1*	*0.0 - 0.15*	*0.0 -0.2*			
Lab ID #			*L682370-20*	*L682370-21*	*L681400-10*	*L681268-4*	*L681268-5*	***RPD***	*L681268-7*
Sample Date			*09-SEP-08*	*09-SEP-08*	*06-SEP-08*	*07-Sep-08*	*07-Sep-08*		*07-Sep-08*
Prepared by:			**Franz**	**Franz**	**Franz**	**Franz**	**Franz**		**Franz**
Volatile Organic Compounds									
Benzene	0.03 [1]	0.03 [1]	<0.040	<0.040	<0.040	<0.040	<0.040	NC	<0.040
Bromodichloromethane	---	---	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
Bromoform	---	---	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
Carbon Tetrachloride	50 [2a]	5 [2a]	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
Chlorobenzene	10 [2]	2 [2]	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
Dibromochloromethane	---	---	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
Chloroethane	10 [2]	1 [2]	<0.10	<0.10	<0.10	<0.10	<0.10	NC	<0.10
Chloroform *(a)	50 [2a]	5 [2a]	<0.10	<0.10	<0.10	<0.10	<0.10	NC	<0.10
Chloromethane	---	---	<0.10	<0.10	<0.10	<0.10	<0.10	NC	<0.10
1,2-Dichlorobenzene	10 [2]	1 [2]	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
1,3-Dichlorobenzene	10 [2]	1 [2]	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
1,4-Dichlorobenzene	10 [2]	1 [2]	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
1,1-Dichloroethane	50 [2a]	5 [2a]	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
1,2-Dichloroethane	50 [2a]	5 [2a]	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
1,1-Dichloroethylene	50 [2a]	5 [2a]	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
cis-1,2-Dichloroethylene	50 [2a]	5 [2a]	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
trans-1,2-Dichloroethylene	50 [2a]	5 [2a]	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
Dichloromethane	50 [2a]	5 [2a]	<0.30	<0.80	<0.60	<0.30	<0.30	NC	<0.60
1,2-Dichloropropane	50 [2a]	5 [2a]	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
cis-1,3-Dichloropropylene	50 [2a]	5 [2a]	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
trans-1,3-Dichloropropylene	50 [2a]	5 [2a]	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
Ethylbenzene	0.082 [1]	0.082 [1]	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
Methyl t-butyl ether (MTBE)	---	---	<0.20	<0.20	<0.20	<0.20	<0.20	NC	<0.20
Styrene	50 [2]	5 [2]	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
1,1,1,2-Tetrachloroethane	---	---	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
1,1,2,2-Tetrachloroethane	50 [2a]	5 [2a]	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
Tetrachloroethylene	0.5 [1]	0.2 [1]	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
Toluene	0.37 [1]	0.37 [1]	<0.050	0.116	<0.050	<0.050	<0.050	NC	<0.050
1,1,1-Trichloroethane	50 [2a]	5 [2a]	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
1,1,2-Trichloroethane	50 [2a]	5 [2a]	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
Trichloroethylene	0.01 [1]	0.01 [1]	<0.01	<0.01	<0.01	<0.015	<0.015	NC	<0.01 5
Trichlorofluoromethane	---	---	<0.10	<0.10	<0.10	<0.10	<0.10	NC	<0.10
Vinyl Chloride	---	---	<0.10	<0.10	<0.10	<0.10	<0.10	NC	<0.10
ortho-Xylene	---	---	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
meta- & para-Xylene	---	---	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
Xylenes	11 [1]	11 [1]	<0.10	<0.10	<0.10	<0.10	<0.10	NC	<0.10

Notes (Refer to endnotes for complete list)

10	value is greater than the CCME CL Guideline
<u>10</u>	value is greater than the CCME PL Guideline

--- No Guideline.

NC - Not calculated

(a) - Aliphatic chlorinated hydrocarbons incluede: chloroform; dichloroethane (1,1-1,2-); dichloroethene (1,1-1,2-); dichloromethane; 1,2-dichloropropane; 1,2-dichloropropene (cis and trans); 1,1,2,2-tetrachloroethane; tetrachloroethene; carbon tetrachloride; trichloroethane (1,1,1- 1,1,2-); trichloroethene

TABLE 19 - Analytical Results for PAHs in Soil
Vehicle Dump/Community Landfill
Iqaluit, Nunavut

(all units mg/kg unless otherwise stated)

			APEC 2		APEC 3						
Parameters		**CCME Soil CL**	**CCME Soil PL**	**A2-TP08-1**	**A2-TP08-2**	**A3-TP08-5**	**A3-TP08-7**	**A3-TP08-10**	**A3-TP08-13**	**A3-TP08-DUP2**		**A3-TP08-14**
	Sample Depth (m)			*0.0 - 0.1*	*0.0 - 0.1*	*0.0 - 0.3*	*0.0 - 0.25*	*0.0 - 0.15*	*0.0 - 0.2*			*0.0 - 0.4*
	Lab ID #			*L682370-20*	*L682370-21*	*L681400-5*	*L681400-7*	*L681400-10*	*L681268-4*	*L681268-5*	***RPD***	*L681268-6*
	Sample Date			*09-SEP-08*	*09-SEP-08*	*06-SEP-08*	*06-SEP-08*	*06-SEP-08*	*07-Sep-08*	*07-Sep-08*		*07-Sep-08*
	Prepared by:			**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**		**Franz**
Polycyclic Aromatic Hydrocarbons												
Acenaphthene		---	---	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	NC	<0.040
Acenaphthylene		---	---	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
Anthracene		---	---	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.10	NC	<0.050
Benz(a)anthracene		10[2]	1[2]	<0.050	0.068	<0.050	<0.050	<0.050	<0.050	***1.14***	NC	<0.050
Benzo(a)pyrene		0.7[1]	0.7[1]	<0.050	0.072	<0.050	<0.050	<0.050	<0.050	***1.31***	NC	<0.050
Benzo(b)fluoranthene		10[2]	1[2]	<0.050	0.13	<0.050	<0.050	<0.050	<0.050	***1.78***	NC	<0.050
Benzo(g,h,i)perylene		---	---	<0.050	0.054	<0.050	<0.050	<0.050	<0.050	0.73	NC	<0.050
Benzo(k)fluoranthene		10[2]	1[2]	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.66	NC	<0.050
Chrysene		---	---	<0.050	0.086	<0.050	<0.050	<0.050	<0.050	1.04	NC	<0.050
Dibenz(a,h)anthracene		10[2]	1[2]	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.24	NC	<0.050
Fluoranthene		---	---	0.067	0.129	<0.050	<0.050	<0.050	<0.050	1.07	NC	<0.050
Fluorene		---	---	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
Indeno(1,2,3-c,d)pyrene		10[2]	1[2]	<0.050	<0.080	<0.050	<0.050	<0.050	<0.050	0.88	NC	<0.050
2-Methylnaphthalene		---	---	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
Naphthalene		22[1]	0.6[1]	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	NC	<0.050
Phenanthrene		50[2]	5[2]	<0.050	0.091	<0.050	<0.050	<0.050	<0.050	0.17	NC	<0.050
Pyrene		100[2]	10[2]	0.055	0.105	<0.050	<0.050	<0.050	<0.050	1.04	NC	<0.050

Notes (Refer to endnotes for complete list)

10	value is greater than the CCME CL Guideline
10	value is greater than the CCME PL Guideline

--- No Guideline.

NC - Not calculated

General, CWS, and CCME Endnotes for Soil

General Endnotes:

All values are reported as mg/kg unless otherwise indicated.

10 = value is greater than the CCME CL Guideline

3 = value is greater than the CCME PL Guideline

'--- = No guideline

\- = Not analyzed

NC = Not calculated

RPD = Relative percent difference is calculated as the difference over the average of the two values and is only calculated when both concentrations are greater than 5 times the method detection limit.

Laboratory Notes

Refer to Laboratory reports for sample specific notes

< = less then method detection limit (mdl)

General Canadian Council of Ministers of the Environment (CCME) Endnotes

Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health
CCME, 1999, updated 2001, updated 2002, updated 2004, updated 2007.

1 Table 1 - Soil Quality Guideline, Parkland (PL) and Commercial (CL), Coarse Grained Soils

2 Table 2 - Interim remediation criteria for soil, Parkland (PL) and Commercial (CL),

General CWS for Petroleum Hydrocarbons (PHC) in Soil

3 *Canadian-Wide Standards (CWS) for Petroleum Hydrocarbons (PHC) in Soil* ,
Endorsed by CCME Council of Ministers, April 30-May 1, 2001, Winnipeg, Revised January 2008

(i) PHC are considered to be comprised of 4 fractions
(ii) PHC exclude known carcinogens such as benzene and benzo(a)pyrene, which are addressed as target compounds.
(iii) PHC exclude toluene , ethylbenzene, and xylenes (TEX), which are addressed as target compounds.

PHC sub-fractions

The relative composition of each carbon (equivalent) range sub-fraction within each fraction, and the relative composition of aliphatics and aromatics within each sub-fraction.

F1 35% $>C_5$ to C_6(100% aliphatics); 35% $>C_6$ to C_8(100% aliphatics); 30% $>C_8$ to C_{10}(80% aliphatics, 20% aromatics);

F2 45% $C_{>10}$ to C_{12}(80% aliphatics, 20% aromatics); 55% $>C_{12}$ to C_{16}(80% aliphatics, 20% aromatics);

F3 70% $>C_{16}$ to C_{21}(80% aliphatics, 20% aromatics); 30% $>C_{21}$ to C_{34}(80% aliphatics, 20% aromatics); and

F4 100% $>C_{34}$(80% aliphatics, 20% aromatics).

TABLE 20 - Analytical Results for BTEX, CWS F1 to F4 in Sediment
Vehicle Dump/Community Landfill
Iqaluit, Nunavut

(all units mg/kg unless otherwise stated)

			APEC 2		**APEC 3**					**APEC 4**		
Parameters	**CCME Freshwater Sediment (ISQG)**	**CCME Freshwater Sediment (PEL)**	**A2-S008-3**	**A2-S008-4**	**A3-S008-2**	**SD-DUP 1**	**RPD**	**A3-S008-3**	**A3-S008-4**	**A4-SD08-1**	**A4-SD08-2**	**A4-SD08-3**
Lab ID #			*L681311-5*	*L681311-6*	*L681123-1*	*L681123-4*		*L681123-2*	*L681123-3*	*L682317-1*	*L682317-2*	*L682317-3*
Sample Date			*06-SEP-08*	*06-SEP-08*	*07-SEP-08*	*07-SEP-08*		*07-SEP-08*	*07-SEP-08*	*08-SEP-08*	*08-SEP-08*	*08-SEP-08*
Prepared by:			**Franz**	**Franz**	**Franz**	**Franz**		**Franz**	**Franz**	**Franz**	**Franz**	**Franz**
Volatiles												
Benzene	---	---	<0.040	<0.040	<0.040	<0.040	NC	<0.040	<0.040	<0.040	<0.040	<0.040
Ethylbenzene	---	---	<0.050	<0.050	<0.050	<0.050	NC	<0.050	<0.050	<0.050	<0.050	<0.050
Methyl t-butyl ether (MTBE)	---	---	<0.20	<0.20	<0.20	<0.20	NC	<0.20	<0.20	<0.20	<0.20	<0.20
Styrene	---	---	<0.050	<0.050	<0.050	<0.050	NC	<0.050	<0.050	<0.050	<0.050	<0.050
Toluene	---	---	<0.050	<0.050	<0.050	<0.050	NC	<0.050	<0.050	<0.050	<0.050	<0.050
o-Xylene	---	---	<0.050	<0.050	<0.050	<0.050	NC	<0.050	<0.050	<0.050	<0.050	<0.050
m & p-Xylene	---	---	<0.050	<0.050	<0.050	<0.050	NC	<0.050	<0.050	<0.050	<0.050	<0.050
Xylenes (Total)	---	---	<0.10	<0.10	<0.10	<0.10	NC	<0.10	<0.10	<0.10	<0.10	<0.10
Extractable Petroleum Hydrocrabons												
F4SG (Heavy Hydrocarbons-SilicaGel)	---	---	<500	<500	-	<500	NC	1040	-	-	-	-
CWS F2 (C10-C16)	---	---	<30	33	<30	<30	NC	535	141	<30	<40	<30
CWS F3 (C16-C34)	---	---	220	248	<50	139	NC	568	177	<50	<50	<50
CWS F4 (C34-C50)	---	---	94	99	<50	89	NC	191	71	<50	<50	<50
F1-BTEX	---	---	<10	<10	<10	10	NC	11	<10	<10	<10	<10
CWS F1 (C06-C10)	---	---	<10	<10	<10	10	NC	11	<10	<10	<10	<10

Notes (Refer to endnotes for complete list)

10	value is greater than the PEL Guideline
<u>10</u>	value is greater than the ISQG Guideline

--- No Guideline.

NC - Not calculated

TABLE 21 - Analytical Results for Total Metals in Sediment
Vehicle Dump/Community Landfill
Iqaluit, Nunavut

(all units mg/kg unless otherwise stated)

			APEC 2				APEC 3				
Parameters	**CCME Freshwater Sediment (ISQG)**	**CCME Freshwater Sediment (PEL)**	**A2-S008-1**	**A2-S008-2**	**A2-S008-3**	**A2-S008-4**	**A3-S008-2**	**SD-DUP 1**		**A3-S008-3**	**A3-S008-4**
Lab ID #			*L681311-3*	*L681311-4*	*L681311-5*	*L681311-6*	*L681123-1*	*L681123-4*	***RPD***	*L681123-2*	*L681123-3*
Sample Date			*06-SEP-08*	*06-SEP-08*	*06-SEP-08*	*06-SEP-08*	*07-SEP-08*	*07-SEP-08*		*07-SEP-08*	*07-SEP-08*
Prepared by:			**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**		**Franz**	**Franz**
Physical Tests											
% Moisture	---	---	-	-	50	40.3	25.1	23.7	6%	52	15.8
pH	---	---	5.43	5.94	6.55	6.76	6.85	6.89	1%	6.62	6.99
Total Metals											
Antimony (Sb)	---	---	<10	<10	<10	<10	<10	<10	NC	<10	<10
Arsenic (As)	5.9	17	<5.0	<5.0	<5.0	***6.3***	<5.0	<5.0	NC	<5.0	<5.0
Barium (Ba)	---	---	84.4	59	61.9	155	13.9	19.4	33%	45.3	21.6
Beryllium (Be)	---	---	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	NC	<0.50	<0.50
Cadmium (Cd)	0.6	3.5	<0.50	<0.50	***2.73***	***2.83***	<0.50	<0.50	NC	***1.38***	***0.6***
Chromium (Cr)	37.3	90	16.3	21.4	***55.4***	***50.2***	12.8	14.2	10%	25.4	24.1
Cobalt (Co)	---	---	13.5	13.3	13.7	20.6	2.8	3.4	19%	5.9	3.9
Copper (Cu)	35.7	197	17.6	***292***	***70.3***	***48.9***	4.5	7.9	55%	20.7	13.7
Lead (Pb)	35	91.3	<30	<30	***96***	***201***	<30	***39***	NC	***59***	***57***
Mercury (Hg)	0.17	0.486	0.046	0.0575	0.0414	0.0508	<0.0050	0.0064	NC	0.0384	0.0155
Molybdenum (Mo)	---	---	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	NC	5	<4.0
Nickel (Ni)	---	---	8.8	10.9	23.9	24.6	<5.0	<5.0	NC	8.9	<5.0
Selenium (Se)	---	---	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NC	<2.0	<2.0
Silver (Ag)	---	---	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NC	<2.0	<2.0
Thallium (Tl)	---	---	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NC	<1.0	<1.0
Tin (Sn)	---	---	<5.0	9.8	8.7	8.9	<5.0	<5.0	NC	<5.0	<5.0
Vanadium (V)	---	---	36.8	28.9	23.4	24.1	30.5	41.4	30%	45.1	29.2
Zinc (Zn)	123	315	***499***	111	***145***	***333***	28.3	42.7	41%	***191***	***139***

Notes (Refer to endnotes for complete list)

10	value is greater than the PEL Guideline
10	value is greater than the ISQG Guideline

--- No Guideline.

\- Not analyzed

NC - Not calculated

TABLE 22 - Analytical Results for PCBs in Sediment
Vehicle Dump/Community Landfill
Iqaluit, Nunavut

(all units mg/kg unless otherwise stated)

			APEC 2		APEC 3			
Parameters	**CCME Freshwater Sediment (ISQG)**	**CCME Freshwater Sediment (PEL)**	**A2-S008-3**	**A2-S008-4**	**A3-S008-2**	**SD-DUP 1**	***RPD***	**A3-S008-4**
Lab ID #			*L681311-5*	*L681311-6*	*L681123-1*	*L681123-4*		*L681123-3*
Sample Date			*06-SEP-08*	*06-SEP-08*	*07-SEP-08*	*07-SEP-08*		*07-SEP-08*
Prepared by:			**Franz**	**Franz**	**Franz**	**Franz**		**Franz**
Polychlorinated Biphenyls								
PCB-1016	---	---	<0.01	<0.050	<0.01	<0.01	NC	<0.050
PCB-1221	---	---	<0.01	<0.050	<0.01	<0.01	NC	<0.050
PCB-1232	---	---	<0.01	<0.050	<0.01	<0.01	NC	<0.050
PCB-1242	---	---	<0.01	<0.050	<0.01	<0.01	NC	<0.050
PCB-1248	---	---	<0.01	<0.050	<0.01	<0.01	NC	<0.050
PCB-1254	0.06	0.34	0.024	<0.050	<0.01	<0.01	NC	<0.050
PCB-1260	---	---	0.198	0.56	0.014	<0.01	NC	0.496
PCB-1262	---	---	<0.01	<0.050	<0.01	<0.01	NC	<0.050
PCB-1268	---	---	<0.01	<0.050	<0.01	<0.01	NC	<0.050
Total Polychlorinated Biphenyls	0.0341	0.277	***0.222***	***0.56***	0.014	<0.01	NC	***0.496***

Notes (Refer to endnotes for complete list)

10	value is greater than the PEL Guideline
10	value is greater than the ISQG Guideline

--- No Guideline.

NC - Not calculated

TABLE 22 - Analytical Results for PCBs in Sediment
Vehicle Dump/Community Landfill
Iqaluit, Nunavut

(all units mg/kg unless otherwise stated)

Parameters	**CCME Freshwater Sediment (ISQG)**	**CCME Freshwater Sediment (PEL)**	**APEC 4**						
			A4-SD08-1	**A4-SD08-2**	**A4-SD08-3**	**A4-SD08-4**	**A4-SD08-5**	**A4-SD08-6**	**A4-SD08-8**
Lab ID #			*L682317-1*	*L682317-2*	*L682317-3*	*L682317-4*	*L682317-5*	*L682317-6*	*L682317-7*
Sample Date			*08-SEP-08*	*08-SEP-08*	*08-SEP-08*	*08-SEP-08*	*08-SEP-08*	*08-SEP-08*	*08-SEP-08*
Prepared by:			**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**
Polychlorinated Biphenyls									
PCB-1016	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB-1221	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB-1232	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB-1242	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB-1248	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB-1254	0.06	0.34	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
PCB-1260	---	---	0.011	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
PCB-1262	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB-1268	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Polychlorinated Biphenyls	0.0341	0.277	0.011	<0.01	0.01	<0.01	<0.01	0.01	<0.01

Notes (Refer to endnotes for complete list)

▨ **10**	value is greater than the PEL Guideline
10	value is greater than the ISQG Guideline

--- No Guideline.

NC - Not calculated

TABLE 21 - Analytical Results for Total Metals in Sediment
Vehicle Dump/Community Landfill
Iqaluit, Nunavut

(all units mg/kg unless otherwise stated)

		APEC 4								
Parameters	**CCME Freshwater Sediment (ISQG)**	**A4-SD08-1**	**A4-SD08-2**	**A4-SD08-3**	**A4-SD08-4**	**A4-SD08-5**	**A4-SD08-6**	**A4-SD08-8**	**SD-BK-1**	**SD-BK-2**
Lab ID #		*L682317-1*	*L682317-2*	*L682317-3*	*L682317-4*	*L682317-5*	*L682317-6*	*L682317-7*	*L682370-12*	*L682370-15*
Sample Date		*08-SEP-08*	*08-SEP-08*	*08-SEP-08*	*08-SEP-08*	*08-SEP-08*	*08-SEP-08*	*08-SEP-08*	*09-SEP-08*	*09-SEP-08*
Prepared by:		**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**
Physical Tests										
% Moisture	---	29.6	19.4	19	18.9	22	20.7	25.9	-	-
pH	---	7.11	7.95	7.47	8.33	7.66	8.31	8.04	7.56	7.31
Total Metals										
Antimony (Sb)	---	<10	<10	<10	<10	<10	<10	<10	<10	<10
Arsenic (As)	5.9	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Barium (Ba)	---	37.7	19.7	15.7	17.1	13.2	17.5	25.9	16.7	23.5
Beryllium (Be)	---	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cadmium (Cd)	0.6	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Chromium (Cr)	37.3	17.4	15.5	9.3	14	10.2	11.4	10.4	13.7	10.2
Cobalt (Co)	---	4.7	2.9	2.3	3.3	2.6	3.1	3	3.5	3.2
Copper (Cu)	35.7	8.1	5.4	6.7	4.9	4.6	4.9	5	5	5.2
Lead (Pb)	35	<30	<30	<30	<30	<30	<30	<30	<30	<30
Mercury (Hg)	0.17	0.0067	<0.0050	0.0091	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Molybdenum (Mo)	---	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Nickel (Ni)	---	6.8	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Selenium (Se)	---	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Silver (Ag)	---	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Thallium (Tl)	---	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tin (Sn)	---	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Vanadium (V)	---	39.6	37.2	23.2	41.8	33.2	28.6	24.1	36.9	24.2
Zinc (Zn)	123	52.9	26.8	49.4	21.8	23.2	23.3	36.1	22	21.1

Notes (Refer to endnotes for complete list)

10	value is greater than the PEL Guideline
10	value is greater than the ISQG Guideline

--- No Guideline.

- Not analyzed

NC - Not calculated

TABLE 23 - Analytical Results for Pesticides in Sediment
Vehicle Dump/Community Landfill

(all units mg/kg unless otherwise stated)

			APEC 2	**APEC 4**	
Parameters	**CCME Freshwater Sediment (ISQG)**	**CCME Freshwater Sediment (PEL)**	**A2-S008-4**	**A4-SD08-2**	**A4-SD08-3**
Lab ID #			*L681311-6*	*L682317-2*	*L682317-3*
Sample Date			*06-SEP-08*	*08-SEP-08*	*08-SEP-08*
Prepared by:			**Franz**	**Franz**	**Franz**
Organochlorine Pesticides					
Aldrin	---	---	<0.0020	<0.0010	<0.0010
alpha-BHC	---	---	<0.0020	<0.0010	<0.0010
beta-BHC	---	---	<0.0020	<0.0020	<0.0020
Lindane (gamma - BHC)	0.00094	0.00138	<0.0020	<0.00094	<0.00094
delta-BHC	---	---	<0.0020	<0.0010	<0.0010
cis-Chlordane (alpha)	0.0045 [a]	0.00887 [a]	<0.0020	<0.0010	<0.0010
trans-Chlordane (gamma)	0.0045 [a]	0.00887 [a]	<0.0020	<0.0010	<0.0010
2,4'-DDD	0.00354 [b]	0.0851 [b]	<0.0020	<0.0010	<0.0010
4,4'-DDD	0.00354 [b]	0.0851 [b]	***0.0149***	<0.0010	<0.0010
2,4'-DDE	0.00142 [c]	0.00675 [c]	<0.0020	<0.0010	<0.0010
4,4'-DDE	0.00142 [c]	0.00675 [c]	***0.029***	<0.0010	<0.0010
2,4'-DDT	0.00119 [d]	0.00477 [d]	<0.0020	<0.00119	<0.002
4,4'-DDT	0.00119 [d]	0.00477 [d]	***0.0175***	<0.00119	<0.002
Dieldrin	0.00285	0.00667	<0.0020	<0.0010	<0.0010
Endosulfan I	---	---	<0.0020	<0.0010	<0.0010
Endosulfan II	---	---	<0.0020	<0.0010	<0.0010
Endosulfan Sulfate	---	---	<0.0020	<0.0010	<0.0010
Endrin	0.00267	0.0624	<0.0050	<0.00267	<0.0050
Heptachlor	---	---	<0.0020	<0.0020	<0.0020
Heptachlor Epoxide	0.0006	0.00274	<0.0020	<0.0006	<0.0010
Methoxychlor	---	---	<0.0050	<0.0050	<0.0050
Mirex	---	---	<0.0020	<0.0010	<0.0010
cis-Nonachlor	---	---	<0.0020	<0.0010	<0.0010
trans-Nonachlor	---	---	<0.0020	<0.0010	<0.0010
Oxychlordane	---	---	<0.0020	<0.0010	<0.0010

Notes (Refer to endnotes for complete list)

10	value is greater than the PEL Guideline
10	value is greater than the ISQG Guideline

--- No Guideline.

*a - Standard for Chlordane

*b - Standard for DDD (2,2-Bis(p-chlorophenyl)-1,1-dichloroethane; Dichloro diphenyl dichloroethane)

*c - Standard for DDE (1,1-Dichloro-2,2,bis(p-chlorophenyl)-ethene; Diphenyl dichloro ethylene)

*d - Standard for DDT (2,2-Bis(p-chlorophenyl)-1,1,1-trichloroethane; Dichloro diphenyl trichloroethane)

TABLE 24 - Analytical Results for VOCs in Sediment
Vehicle Dump/Community Landfill

(all units mg/kg unless otherwise stated)

			APEC 2	APEC 4	
Parameters	**CCME Freshwater Sediment (ISQG)**	**CCME Freshwater Sediment (PEL)**	**A2-SD08-4**	**A4-SD08-2**	**A4-SD08-3**
Lab ID #			*L682370-22*	*L682317-2*	*L682317-3*
Sample Date			*09-SEP-08*	*08-SEP-08*	*08-SEP-08*
Prepared by:			**Franz**	**Franz**	**Franz**
Volatile Organic Compounds					
Benzene	---	---	<0.040	<0.040	<0.040
Bromodichloromethane	---	---	<0.050	<0.050	<0.050
Bromoform	---	---	<0.050	<0.050	<0.050
Carbon Tetrachloride	---	---	<0.050	<0.050	<0.050
Chlorobenzene	---	---	<0.050	<0.050	<0.050
Dibromochloromethane	---	---	<0.050	<0.050	<0.050
Chloroethane	---	---	<0.10	<0.10	<0.10
Chloroform	---	---	<0.10	<0.10	<0.10
Chloromethane	---	---	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	---	---	<0.050	<0.050	<0.050
1,3-Dichlorobenzene	---	---	<0.050	<0.050	<0.050
1,4-Dichlorobenzene	---	---	<0.050	<0.050	<0.050
1,1-Dichloroethane	---	---	<0.050	<0.050	<0.050
1,2-Dichloroethane	---	---	<0.050	<0.050	<0.050
1,1-Dichloroethylene	---	---	<0.050	<0.050	<0.050
cis-1,2-Dichloroethylene	---	---	<0.050	<0.050	<0.050
trans-1,2-Dichloroethylene	---	---	<0.050	<0.050	<0.050
Dichloromethane	---	---	<0.60	<0.30	<0.30
1,2-Dichloropropane	---	---	<0.050	<0.050	<0.050
cis-1,3-Dichloropropylene	---	---	<0.050	<0.050	<0.050
trans-1,3-Dichloropropylene	---	---	<0.050	<0.050	<0.050
Ethylbenzene	---	---	<0.050	<0.050	<0.050
Methyl t-butyl ether (MTBE)	---	---	<0.20	<0.20	<0.20
Styrene	---	---	<0.050	<0.050	<0.050
1,1,1,2-Tetrachloroethane	---	---	<0.050	<0.050	<0.050
1,1,2,2-Tetrachloroethane	---	---	<0.050	<0.050	<0.050
Tetrachloroethylene	---	---	<0.050	<0.050	<0.050
Toluene	---	---	0.12	<0.050	<0.050
1,1,1-Trichloroethane	---	---	<0.050	<0.050	<0.050
1,1,2-Trichloroethane	---	---	<0.050	<0.050	<0.050
Trichloroethylene	---	---	<0.015	<0.040	<0.015
Trichlorofluoromethane	---	---	<0.10	<0.10	<0.10
Vinyl Chloride	---	---	<0.10	<0.10	<0.10
ortho-Xylene	---	---	<0.050	<0.050	<0.050
meta- & para-Xylene	---	---	<0.050	<0.050	<0.050
Xylenes	---	---	<0.10	<0.10	<0.10

Notes (Refer to endnotes for complete list)

10	value is greater than the PEL Guideline
<u>10</u>	value is greater than the ISQG Guideline

--- No Guideline.

TABLE 25 - Analytical Results for PAHs in Sediment
Vehicle Dump/Community Landfill

(all units mg/kg unless otherwise stated)

			APEC 2	APEC 4	
Parameters	**CCME Freshwater Sediment (ISQG)**	**CCME Freshwater Sediment (PEL)**	**A2-SD08-4**	**A4-SD08-2**	**A4-SD08-3**
Lab ID #			*L682370-22*	*L682317-2*	*L682317-3*
Sample Date			*09-SEP-08*	*08-SEP-08*	*08-SEP-08*
Prepared by:			**Franz**	**Franz**	**Franz**
Polycyclic Aromatic Hydrocarbons					
Acenaphthene	0.00671	0.0889	<0.040	<0.00671	<0.00671
Acenaphthylene	0.00587	0.128	<0.050	<0.00587	<0.00587
Anthracene	0.0469	0.245	<0.050	<0.0469	<0.0469
Benz(a)anthracene	0.0317	0.385	<0.050	<0.0317	<0.0317
Benzo(a)pyrene	0.0319	0.782	<0.050	<0.0319	<0.0319
Benzo(b)fluoranthene	---	---	0.061	<0.050	<0.050
Benzo(g,h,i)perylene	---	---	<0.050	<0.050	<0.050
Benzo(k)fluoranthene	---	---	<0.050	<0.050	<0.050
Chrysene	0.0571	0.862	<0.050	<0.050	<0.050
Dibenz(a,h)anthracene	0.00622	0.135	<0.050	<0.00622	<0.00622
Fluoranthene	0.111	2.355	0.05	<0.05	<0.05
Fluorene	0.0212	0.144	<0.050	<0.0212	<0.0212
Indeno(1,2,3-c,d)pyrene	---	---	<0.050	<0.050	<0.050
2-Methylnaphthalene	0.0202	0.201	<0.050	<0.0202	<0.0202
Naphthalene	0.0346	0.391	<0.050	<0.0346	<0.0346
Phenanthrene	0.0419	0.515	<0.050	<0.0419	<0.0419
Pyrene	0.053	0.875	<0.050	<0.050	<0.050

Notes (Refer to endnotes for complete list)

10	value is greater than the PEL Guideline
10	value is greater than the ISQG Guideline

--- No Guideline.

General CCME Endnotes for Sediment

General Endnotes:

All values are reported as mg/kg unless otherwise indicated.

10 = value is greater than the PEL Guideline

3 = value is greater than the ISQG Guideline

'--- = No guideline

\- = Not analyzed

NC = Not calculated

RPD = Relative percent difference is calculated as the difference over the average of the two values and is only calculated when both concentrations are greater than 5 times the method detection limit.

Laboratory Notes

Refer to Laboratory reports for sample specific notes

< = less then method detection limit (mdl)

General Canadian Council of Ministers of the Environment (CCME) Endnotes

Canadian Sediment Quality Guidelines for the Protection of Aquatic Life
CCME, 1999, updated 2001 and 2002.

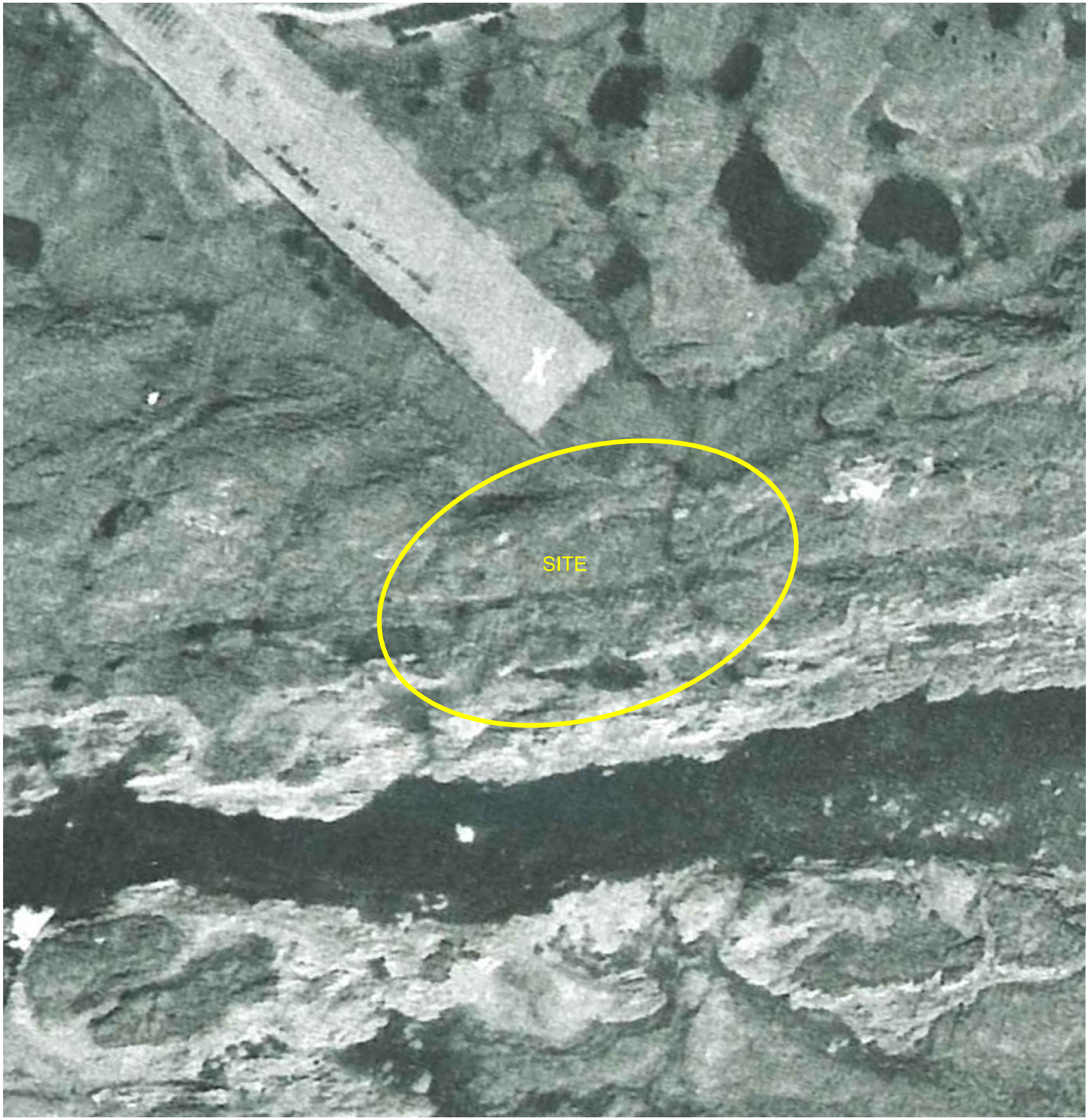
Table 1 Interim Freshwater Sediment Quality Guidelines (ISQG; dry weight), and *Probable Effect Levels (PELs; dry weight)*

Table 26
Waste Material Characterization

AREA	DIMENSIONS/SIZE/AREA	ITEM(S)	DESCRIPTION OF WASTE - COMPONENTS	PAINTED (Y/N)	COLOUR	POTENTIALHAZARDOUS MATERIALS	OTHER COMMENTS
APEC 1 - UP-GRADIENT DEBRIS AREA							
A1-TP08-1 (mound)	290 m^2	Buried Debris	Drums, sheet metal, piping (steel), steel cable, vehicle parts (axles, bracing, chassis), steel 'I' beams, wheel rims (steel), wood debris	N	N/A	None observed	All metal debris was rusted and contained no paint. Barrels were observed to be crushed. Unable to advance test pit due to intermingled metallic debris.
A1-TP08-2 (mound)	~ 1500 m^2	Buried Debris	Drums, steel rods, sheet metal, wood debris	N	N/A	None observed	All metal debris was rusted and contained no paint. Barrels were crushed. Debris was not as concentrated as A1-TP08-1 mound.
A1-TP08-3 (mound)	450 m^2	Buried Debris	Tires, drums, iron bracing (heavy), vehicle parts (chassis, hinges, axle, springs), rubber hose, steel cable, wire (electrical and bare), steel rods, sheet metal	N	N/A	None observed	All metal debris was rusted and contained no paint. Barrels were crushed. Debris in this mound seemed more concentrated than the previous two areas. Unable to advance test pit due to intermingled debris.
APEC 2 - VEHICLE DUMP							
UPPER SECTION	750 m^2	Vehicles	Water trucks, cars, boilers, flat bed trucks (military), fuel trucks (military and transport), vehicle engines, plows, dump trucks, boat	Y	Military green, blue, yellow, and orangey red	Asbestos may be present (brake lining, insulation materials) Lead-amended paint may be present on vehicles	The upper section contained vehicles which have recently been removed from the main vehicle pile with intentions of recycling (word of mouth). The upper section contains approximately 23 vehicles.
		Scattered Debris	Partial vehicles, tanks, drums, vehicle parts, brackets, sheet metal, wood debris, material (fabric), steel cables, tires, bicycle frames, electrical parts, leaf springs, radiators, scrap metal debris, inner tubes, batteries, hydraulic cylinders and equipment	Y	Military green, blue, yellow, and orangey red	Vehicle batteries Asbestos may be present (brake lining, insulation materials) Lead-amended paint may be present on vehicles	
LOWER SECTION	1400 m2	Vehicles	Water trucks, cars, boilers, flat bed trucks (military - green), fuel trucks (military and transport - orange), vehicle engines, plows, dump trucks, boat	Y	military green, Blue, yellow, and orangey red	Asbestos may be present (brake lining, insulation materials) Lead-amended paint may be present on vehicles	The lower section contains a higher concentration of vehicles and vehicle parts, as well as miscellaneous debris. There are approximately 63 vehicles in the lower section. The vehicles are stacked on top of one another in the drainage gully. Most of the drums on site were found in the lower section (two identifiable as kerosene and lubricating oil). Much scrap and random debris is located within the vehicle pile towards the bottom beneath the vehicles.
		Scattered Debris	Partial vehicles, tanks, drums, vehicle parts, brackets, sheet metal, wood debris, material (fabric), steel cables, tires, bicycle frames, electrical parts, leaf springs, radiators, scrap metal debris, inner tubes, batteries, hydraulic cylinders and equipment	Y	Military green, blue, yellow, and orangey red	Vehicle batteries Asbestos may be present (brake lining, insulation materials) Lead-amended paint may be present on vehicles	
APEC 3 - MAIN LANDFILL							
UPPER SECTION - EAST	1150 m^2	Scattered debris	Tires (~70), metal culverts, food waste (cans, bottles, aluminum, plastic), drums, some vehicle parts, snowmobiles (3), scrap metal, car (1), camp stove, mattress springs, metal strapping, steel studding (construction debris), metal piping, wood debris, plastic debris, pressure tank, sheet metal, re-bar, propane cylinder, tarpaulin, kerosene fuel cans (camping), computer parts, cook stoves (camp - 2), paint cans	Y	Multiple colours	Lead-amended paint may be present on some of the painted surfaces	The upper east section is a small area of exposed debris suspected to have been used recently as a dumping area for locals. Items seemed in newer condition than those observed at the bottom of the landfill area. Faint hydrocarbon odour from area surrounding A3-TP08-2. No capping material applied to this small area.
UPPER SECTION - CENTER	3700 m^2	Buried debris	Scrap metal debris, some plastic, some wood debris.	N	N/A	None observed	This area is well capped with granular fill. Some minor areas of exposed debris exist. The area is heavily vegetated with grass and sedges.
LOWER SECTION	3400 m^2	Buried, exposed, and scattered debris	Drums (~150 crushed), fuel tanks (~15-20), scrap metal, snow machines, steel hut, camp fuel cans (30), cooking stoves/ovens, culverts, piping, refrigerators (several), tires (many), washer/dryers (several), vehicle engines, vehicles (cars, truck, parts), paint thinner jugs, fire extinguishers, compressed gas cylinders (several), radiators, burnt wood debris, wood debris, propane cylinders, electric motors, food waste debris (cans, bottles, plastic, aluminum, etc...), mattress springs, generator (yellow), paint cans (many - some still with contents), pails (unknown contents), oil cans/bottles	Y	Multiple colours	Vehicle batteries Asbestos may be present (brake lining, insulation materials) Lead-amended paint may be present on vehicles Used paint remaining in cans	This area includes the slope and debris at the toe of the landfill. The debris is mixed with granular fill material. Most of the larger debris has collected at the toe of the slope. Much of the debris appears to be exposed, although it is very difficult to extrapolate debris thicknesses. Heavy orange staining is present at the toe of the slope.
DRUM PILE 1	~ 55 drums	piled drums	No identifiable drums present, metal culvert (18"), large compressed gas cylinder	N	N/A	Unknown, no evidence observed	This drum pile contained rusted drums with no legible writing. Contents of drums unknown. Stressed vegetation was observed on SE corner of drum pile.
DRUM PILE 2	~ 184 drums	piled drums	No identifiable drums present, few contained green paint	Y	Military green	Lead-amended paint may be present drums	This drum pile contained rusted drums with no legible writing. Contents of drums unknown. Large black soil stain was observed on west side of drum pile.
DRUM PILE 3	~ 73 drums	piled drums	Rusted drums, few contained orange and yellow paint	Y	Orange and yellow	Lead-amended paint may be present drums	This drum pile contained mostly rusted drums with no legible writing with the exception of one drum labelled "Kerosene". Very stressed vegetation was observed on the SE corner of the drum pile.
DRUM PILE 4	~ 22 drums	piled drums	Rusted drums, none contained painted surfaces	N	N/A	None observed	This drum pile contained mostly rusted drums with no legible writing with the exception of one drum labelled "Perchloroethylene".
APEC 4 - DOWN GRADIENT AND OFF SITE AREAS							
LOWER BENCH	~ 8 Ha	Scattered Debris	Scrap metal debris, tires, plastic, tent, some wood debris	N	N/A	None observed	This area contains only a very few pieces of scattered debris. Some debris is also present in the bottom of the ponds buried in the sediment.

APPENDIX A
Official Site Survey
(electronic)

APPENDIX B
Aerial Photographs



REFERENCE:
Aerial photo A11535-43, (original scale 1:15000). Taken 1948/07/23. Scanned photocopy. National Airphoto Library, Ottawa, Ontario

Title: 1948 AERIAL PHOTOGRAPH

FRANZ ENVIRONMENTAL INC.
◆ CONSULTING ◆ ENGINEERING ◆ TECHNOLOGIES ◆

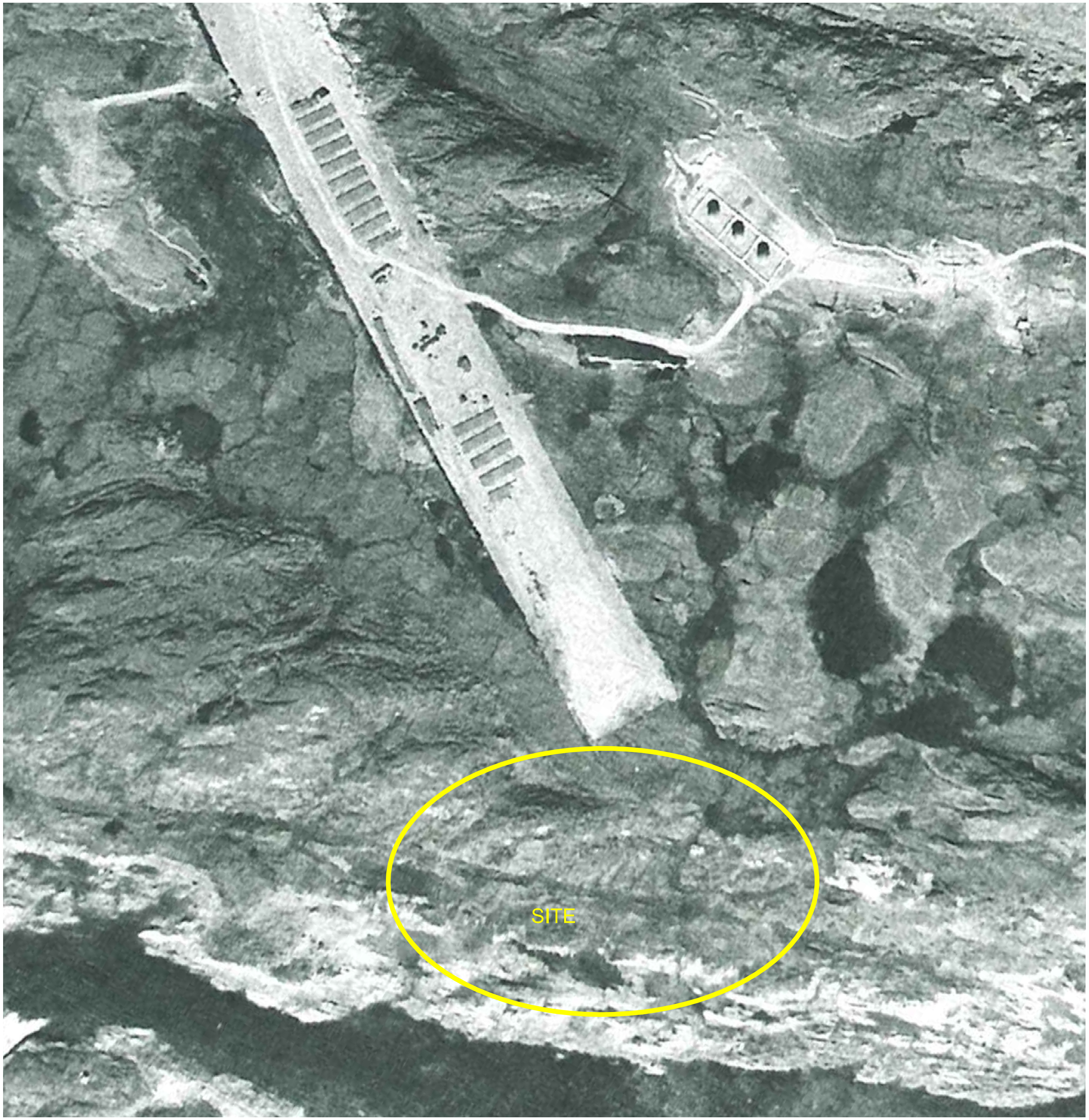
Project: DUMP SITE
IQALUIT, NUNAVUT

Date: JANUARY 2009

Client: TRANSPORT CANADA

NO SCALE

Z:\Projects\2008\1584-0801 TC Iqaluit dump\Figures



REFERENCE:
Aerial photo A13519-343, (original scale 1:15000). Taken 1952/07/21. Scanned photocopy. National Airphoto Library, Ottawa, Ontario

Title: 1952 AERIAL PHOTOGRAPH	
FRANZ ENVIRONMENTAL INC. ♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦	Project: DUMP SITE IQALUIT, NUNAVUT
Date: JANUARY 2009	Client: TRANSPORT CANADA
NO SCALE	

Z:\Projects\2008\1584-0801 TC Iqaluit dump\Figures

REFERENCE:
Aerial photo A14869-3, (original scale 1:15000).
Taken 1955/07/23. Scanned from negetive. National
Airphoto Library, Ottawa, Ontario

Title: 1955 AERIAL PHOTOGRAPH	
FRANZ ENVIRONMENTAL INC. ♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦	Project: DUMP SITE IQALUIT, NUNAVUT
Date: JANUARY 2009	Client: TRANSPORT CANADA
NO SCALE	

Z:\Projects\2008\1584-0801 TC Iqaluit dump\Figures

REFERENCE:
Aerial photo VRR2618-195, (original scale 1:6000). Taken 1964/08/14. Scanned from negetive. National Airphoto Library, Ottawa, Ontario

Title:
1964 AERIAL PHOTOGRAPH

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Project:
DUMP SITE
IQALUIT, NUNAVUT

Date:
JANUARY 2009

Client:
TRANSPORT CANADA

NO SCALE

Z:\Projects\2008\1584-0801 TC Iqaluit dump\Figures

REFERENCE:
Aerial photo A24492-70 (original scale 1:20000).
Taken 1976/08/19. Scanned photocopy. National
Airphoto Library, Ottawa, Ontario

Title:
1976 AERIAL PHOTOGRAPH

FRANZ ENVIRONMENTAL INC.
◆ CONSULTING ◆ ENGINEERING ◆ TECHNOLOGIES ◆

Project:
DUMP SITE
IQALUIT, NUNAVUT

Date:
JANUARY 2009

Client:
TRANSPORT CANADA

NO SCALE

Z:\Projects\2008\1584-0801 TC Iqaluit dump\Figures

REFERENCE:
Aerial photo A26763-22, (original scale 1:10000).
Taken 1985/07/10. Scanned photocopy. National
Airphoto Library, Ottawa, Ontario

Title:
1985 AERIAL PHOTOGRAPH

FRANZ
ENVIRONMENTAL
INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Project:
DUMP SITE
IQALUIT, NUNAVUT

Date:
JANUARY 2009

Client:
TRANSPORT CANADA

NO SCALE

Z:\Projects\2008\1584-0801 TC Iqaluit dump\Figures

REFERENCE:
Satellite Image. Google Earth, 2008.

Title: GOOGLE EARTH SATELLITE IMAGE	
FRANZ ENVIRONMENTAL INC. ♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦	Project: DUMP SITE IQALUIT, NUNAVUT
Date: JANUARY 2009	Client: TRANSPORT CANADA
NO SCALE	

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APPENDIX C
Current Site Photos

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 1

Date: 2008

Direction Photo taken: NW

Description:

Showing A1-SW08-1, facing northwest.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 2

Date: 2008

Direction Photo taken: NE

Description:

Showing Veg-6 in APEC 1, facing northeast. Some metal debris visible in background.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 3

Date: 2008

Direction Photo taken: NW

Description:

Showing A1-TP08-1, facing northwest.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 4

Date: 2008

Direction Photo taken: ESE

Description:

Showing A1-TP08-2, facing ESE. Metal debris in foreground and marshy area top left.

Client Name: Public Works and Government Services Canada	Site Location: Sylvia Grinnell Park Dump	Project No. 1584-0801

Photo No. 5

Date: 2008

Direction Photo taken: NE

Description:

Showing A1-TP08-3, facing northeast. Some debris if visible in foreground.

Client Name: Public Works and Government Services Canada	Site Location: Sylvia Grinnell Park Dump	Project No. 1584-0801

Photo No. 6

Date: 2008

Direction Photo taken: NE

Description:

Panorama showing APEC 1 in background.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 7

Date: 2008

Direction Photo taken: **N**

Description:

Panorama showing scrap vehicles.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 8

Date: 2008

Direction Photo taken: **NE**

Description:

Panorama showing western extent of vehicle dump, APEC 1 in background.

Client Name: Public Works and Government Services Canada	Site Location: Sylvia Grinnell Park Dump	Project No. 1584-0801

Photo No. 9

Date: 2008

Direction Photo taken: SE

Description:

Panorama showing vehicle dump center, drainage visible at right of photo.

Client Name: Public Works and Government Services Canada	Site Location: Sylvia Grinnell Park Dump	Project No. 1584-0801

Photo No. 10

Date: 2008

Direction Photo taken: S

Description:

Panorama taken from center of vehicle pile, drainage visible at center left.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 11

Date: 2008

Direction Photo taken: NE

Description:

View down center of vehicle pile where vehicles have been dragged out of the gully area, staining along trail.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 12

Date: 2008

Direction Photo taken: ESE

Description:

Old boiler located along trail northwest of main vehicle dump.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 13

Date: 2008

Direction Photo taken: ESE

Description:

End of trail before main vehicle pile, staining. A2-TP08-1 taken in center of photo.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 14

Date: 2008

Direction Photo taken: SSW

Description:

Showing southwestern extent of vehicle pile, staining visible at far right of photo.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 15

Date: 2008

Direction Photo taken: NE

Description:

Old tanker at pooled water above vehicle dump. Bottom right of photo is where the main vehicle dump drainage begins.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 16

Date: 2008

Direction Photo taken: SE

Description:

Beginning of main vehicle dump drainage.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 17

Date: 2008

Direction Photo taken: W

Description:

Showing examples of metals found in vehicle dump. Note drums and military vehicles.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 18

Date: 2008

Direction Photo taken: SW

Description:

Another example of scrap metal types found in dump.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 19

Date: 2008

Direction Photo taken: **W**

Description:

Drainage running through centre eastern extent of vehicle pile, orange staining visible. A2-SW08-3 and A2-SD08-2 taken here.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 20

Date: 2008

Direction Photo taken: **WNW**

Description:

Showing vehicle dump with main landfill at top left in background

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 21

Date: 2008

Direction Photo taken: NE

Description:

Location where drainage exits vehicle dump. Veg 4 collected just off left extent of photo.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 22

Date: 2008

Direction Photo taken: NE

Description:

Taken from below vehicle dump, showing types of metals found. Note vegetation regeneration on slopes.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 23

Date: 2008

Direction Photo taken: SE

Description:

Showing staining between main landfill (APEC 3) and vehicle dump, soil staining at bottom right. A2-TP08-2 collected in stained area.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 24

Date: 2008

Direction Photo taken: NW

Description:

Showing the top of the landfill area from the east side.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 25

Date: 2008

Direction Photo taken: NW

Description:

Showing east extent of landfill and rock outcrops.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 26

Date: 2008

Direction Photo taken: N

Description:

Showing area used for burning of wood and other debris. Currently active.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 27

Date: 2008

Direction Photo taken: SW

Description:

Showing bottom of landfill and main slope from the top looking down. Note barrel piles and ponds.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 28

Date: 2008

Direction Photo taken: **NE**

Description:

Showing extent of landfill area taken from bottom center of landfill area.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 29

Date: 2008

Direction Photo taken: **ENE**

Description:

Showing western extent of landfill, photo taken from bottom plateau. Note cliff bands at left.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 30

Date: 2008

Direction Photo taken: NE

Description:

Wide angle of western extent of landfill. Small pond and barrels at left below cliff bands.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 31

Date: 2008

Direction Photo taken: NE

Description:

Close up of western extent of landfill.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 32	
Date: 2008	
Direction Photo taken: **N**	
Description: Showing close up of center of landfill area.	

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 33	
Date: 2008	
Direction Photo taken: **NNW**	
Description: Showing center right of landfill extent.	

Client Name: Public Works and Government Services Canada	Site Location: Sylvia Grinnell Park Dump	Project No. 1584-0801

Photo No. 34

Date: 2008

Direction Photo taken: NW

Description:

Showing eastern extent of landfill area. Note bedrock features at bottom left trending parallel to landfill.

Client Name: Public Works and Government Services Canada	Site Location: Sylvia Grinnell Park Dump	Project No. 1584-0801

Photo No. 35

Date: 2008

Direction Photo taken: SW

Description:

Showing gully leading from top of landfill to lower section.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 36

Date: 2008

Direction Photo taken: W

Description:

Showing another gully leading from top of landfill to lower section.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 37

Date: 2008

Direction Photo taken: W

Description:

Showing top of landfill. Burn area at middle right.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 38

Date: 2008

Direction Photo taken:
S

Description:

Showing example of some exposed debris at top of landfill.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 39

Date: 2008

Direction Photo taken:
NW

Description:

Showing re-vegetation on top of landfill area.

Client Name: Public Works and Government Services Canada	Site Location: Sylvia Grinnell Park Dump	Project No. 1584-0801

Photo No. 40

Date: 2008

Direction Photo taken: NW

Description:

Showing barrel piles stacked by INAC in the 1980’s. Photo taken on lower section of landfill.

Client Name: Public Works and Government Services Canada	Site Location: Sylvia Grinnell Park Dump	Project No. 1584-0801

Photo No. 41

Date: 2008

Direction Photo taken: NE

Description:

Showing rock outcrop ramp diverting drainage down towards the center of the landfill from the top.

Photo No. 42

Date: 2008

Direction Photo taken:
E

Description:

Showing barrel piles created by INAC in the 1980's.

Photo No. 43

Date: 2008

Direction Photo taken:
NE

Description:

Showing small barrel pile at west extent of lower landfill area. Perchloroethelyne printed on one of the barrels was observed.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 44

Date: 2008

Direction Photo taken: N

Description:

Showing scattered barrels beneath cliff band at western extent of landfill area. Area of water pooling.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 45

Date: 2008

Direction Photo taken: WSW

Description:

Showing water pooling at western extent of landfill area with some scattered debris beneath cliff bands.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 46

Date: 2008

Direction Photo taken: **N**

Description:

Showing debris and tanker at bottom of landfill area.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 47

Date: 2008

Direction Photo taken: **N**

Description:

Showing rusting and staining associated with landfill debris. A3-TP08-13 collected in this area.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 48

Date: 2008

Direction Photo taken: E

Description:

Showing example of debris at the toe of the landfill. Note slope is greater than appears.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 48

Date: 2008

Direction Photo taken: NW

Description:

Showing example of debris located at bottom toe of landfill area. Note linear bedrock outcrops running parallel with the toe of the landfill.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 49

Date: 2008

Direction Photo taken:
NE

Description:

Showing panoramic view of pond 1 with main landfill in background.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 50

Date: 2008

Direction Photo taken:
SE

Description:

Showing panoramic view of Pond 2.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 51

Date: 2008

Direction Photo taken: NE

Description:

Showing panoramic view of pond 3. Main landfill in background (left).

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 52

Date: 2008

Direction Photo taken: NE

Description:

Showing panoramic view of pond 4 and discharge drainage. Main landfill visible at far left.

Client Name: Public Works and Government Services Canada	Site Location: Sylvia Grinnell Park Dump	Project No. 1584-0801

Photo No. 53

Date: 2008

Direction Photo taken: ENE

Description:

Showing panoramic view of pond 5. Vehicle dump visible in top left.

Client Name: Public Works and Government Services Canada	Site Location: Sylvia Grinnell Park Dump	Project No. 1584-0801

Photo No. 54

Date: 2008

Direction Photo taken: SW

Description:

Showing wide angle view of pond 6.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 55

Date: 2008

Direction Photo taken: E

Description:

Showing pond 1 and eastern feed with main landfill in background.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 56

Date: 2008

Direction Photo taken: NNE

Description:

Showing pond 1 discharge into Silvia Grinnell. Western extent of main landfill visible at right.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 57

Date: 2008

Direction Photo taken:
W

Description:

Showing discharge from pond 1 to Sylvia Grinnell.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 58

Date: 2008

Direction Photo taken:
SE

Description:

Showing eastern feed to pond 1 with some metallic sheen present and orange staining. Some debris is also noted.

Client Name: Public Works and Government Services Canada	Site Location: Sylvia Grinnell Park Dump	Project No. 1584-0801

Photo No. 59

Date: 2008

Direction Photo taken: NA

Description:

Showing metallic sheen present at eastern feed to pond 1.

Client Name: Public Works and Government Services Canada	Site Location: Sylvia Grinnell Park Dump	Project No. 1584-0801

Photo No. 60

Date: 2008

Direction Photo taken: SE

Description:

Showing eastern feed of pond 1. Note orange staining on banks of feed.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 61

Date: 2008

Direction Photo taken:
NW

Description:

Showing western feed to pond 1 from pond 2.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 62

Date: 2008

Direction Photo taken:
NE

Description:

Showing discharge from pond 2 to pond 1.

Client Name: Public Works and Government Services Canada	Site Location: Sylvia Grinnell Park Dump	Project No. 1584-0801

Photo No. 63

Date: 2008

Direction Photo taken: SE

Description:

Showing pond 2, western extent of landfill at rocky outcrop to top left.

Client Name: Public Works and Government Services Canada	Site Location: Sylvia Grinnell Park Dump	Project No. 1584-0801

Photo No. 64

Date: 2008

Direction Photo taken: NW

Description:

Showing precipitation even feed into pond 2. No up gradient sources of potential impact were noted.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 65

Date: 2008

Direction Photo taken: ENE

Description:

Showing pond 2 with main landfill visible top center.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 66

Date: 2008

Direction Photo taken: ENE

Description:

Showing pond 2 with eastern feed from main landfill visible in center of photo.

Client Name: Public Works and Government Services Canada	Site Location: Sylvia Grinnell Park Dump	Project No. 1584-0801

Photo No. 67

Date: 2008

Direction Photo taken: NE

Description:

Showing eastern extent of pond 2. A4-SW08 -1 and A4-SD08-1 collected here.

Client Name: Public Works and Government Services Canada	Site Location: Sylvia Grinnell Park Dump	Project No. 1584-0801

Photo No. 68

Date: 2008

Direction Photo taken: SE

Description:

Showing western arm of pond 3 with some metallic debris.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 69

Date: 2008

Direction Photo taken:
E

Description:

Showing western up-gradient feed area for pond 3. A3-TP08-16 collected here.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 70

Date: 2008

Direction Photo taken:
ESE

Description:

Showing pond 3.

Client Name: Public Works and Government Services Canada	Site Location: Sylvia Grinnell Park Dump	Project No. 1584-0801

Photo No. 71

Date: 2008

Direction Photo taken: NE

Description:

Showing pond 3 with main landfill visible to left and vehicle dump to right.

Client Name: Public Works and Government Services Canada	Site Location: Sylvia Grinnell Park Dump	Project No. 1584-0801

Photo No. 72

Date: 2008

Direction Photo taken: SSE

Description:

Showing discharge from pond 3 into Sylvia Grinnell.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 73

Date: 2008

Direction Photo taken: W

Description:

Showing discharge from pond 3 into Sylvia Grinnell.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 74

Date: 2008

Direction Photo taken: NW

Description:

Showing eastern feed for pond 3. A3-TP08-18 collected here.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 75

Date: 2008

Direction Photo taken: SE

Description:

Showing pond 4.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 76

Date: 2008

Direction Photo taken: NE

Description:

Showing pond 4 with vehicle dump visible in center top of photo.

Client Name: Public Works and Government Services Canada	Site Location: Sylvia Grinnell Park Dump	Project No. 1584-0801

Photo No. 77

Date: 2008

Direction Photo taken:
NA

Description:

Showing orange staining on shores of pond 4.

Client Name: Public Works and Government Services Canada	Site Location: Sylvia Grinnell Park Dump	Project No. 1584-0801

Photo No. 78

Date: 2008

Direction Photo taken:
SE

Description:

Showing discharge from pond 4 into Sylvia Grinnell through several smaller pondings.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 79

Date: 2008

Direction Photo taken: W

Description:

Showing final discharge from pond 4 into Sylvia Grinnell.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 80

Date: 2008

Direction Photo taken: NW

Description:

Showing feed into pond 4 from pond 5 and 5, as well as from the vehicle dump drainage.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 81

Date: 2008

Direction Photo taken:
NNE

Description:

Showing discharge from pond 5 into pond 4.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 82

Date: 2008

Direction Photo taken:
NE

Description:

Showing pond 5 with vehicle dump visible in top left.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 83

Date: 2008

Direction Photo taken: SW

Description:

Showing pond 5.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 84

Date: 2008

Direction Photo taken: NE

Description:

Showing feed for pond 5 from pond 6 and vehicle dump drainage.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 85

Date: 2008

Direction Photo taken:
NNE

Description:

Showing pond 6 and vehicle dump discharge drainage.

Client Name: Public Works and Government Services Canada	**Site Location: Sylvia Grinnell Park Dump**	**Project No. 1584-0801**

Photo No. 86

Date: 2008

Direction Photo taken:
NE

Description:

Showing main drainage through vehicle dump. Vehicle dump clearly visible at top right**.**

APPENDIX D
Health and Safety Plan

SITE SAFETY PLAN

SAFETY POLICY STATEMENT

All operations will comply with all applicable Territorial guidelines other specified safety protocol's and/or operating procedure specified by the site owner and/or operator and will be conducted in a safe and professional manner. No site work will be undertaken prior to the safety meeting will be conducted on the site prior to commencement of work.

Site Name	Dump Site 1 – Sylvia Grinnel Park Dump (West 40)
Site Location	Southwest of old airstrip, Iqaluit Airport, Iqaluit, Nunavut
Site Description	Scrap metal dump site, landfill area, and downstream ponding areas
Owner/Operator	Transport Canada

SITE MAP ATTACHED

LOCAL EMERGENCY AND PROJECT TELEPHONE NUMBERS

EMERGENCY NUMBERS	**Name**	**Telephone Number**
Hospital	Baffin Regional Hospital	(867) 979-7300
Ambulance	Iqaluit Dispatch Center	(867) 979-5662
Police	RCMP	(867) 899-8832
Fire	Same as Ambulance	(867) 979-5662
UTILITY EMERGENCY NUMBERS		
PROJECT PERSONNEL NUMBERS		
Site Health and Safety Officer	Ryan Fletcher	Office: (613) 721-0555
Project Manager	Richard Wells (Vancouver)/ Steve Livingstone (Ottawa)	Office: (613) 721-0555 (Ottawa) Office: (604) 632-9941 (Vancouver) Cell (S. Livingstone): 613-791-8515 Cell (R. Wells): 778-834-0447
Site Contact		
Client Contacts	PWGSC: Andrew Smith	PWGSC: Office: (250) 363-8441
Regulatory Agency		

EMERGENCY ROUTES

Route from off-site property to hospital

Head north on Hubbard to Akilliq, continue straight ahead on Akkiliq to Mivvik, turn right (east) on Mivvik. Follow Mivvik to the "four corners" continue straight through (the road now turns into Niaqunngusiariaq). The Hospital is on the left (west) side of the road (0.4 km past the four corners)

HOSPITAL LOCATION MAP ATTACHED

PERSONAL PROTECTIVE EQUIPMENT

Hard hat	☒	Steel toed boots	☒
Safety glasses	☒	Visible vest	☒
Hearing protection (as required)	☒	Respirator (as required)	☒
Fire retardant coveralls	☒		

SAFETY EQUIPMENT

Fire extinguisher	☒	First aid kit	☒
Eye wash	☒	Kill switch	☒

Note: Fire Extinguisher and First Aid Kit supplied by excavation contractor.

POTENTIAL CONTAMINANTS OF CONCERN

Petroleum Hydrocarbons, PAHs, metals, PCBs, VOCs

Hazard	dermal contact, and inhalation

Mitigation	Wear the appropriate protective equipment and avoid skin contact with soil
samples.	

SCOPE OF WORK AND HEALTH AND SAFETY RESPONSIBILITY

Scope of Work

Test pitting (excavator and hand) and installation of monitoring wells (if conditions allow).
Gather soil samples from test pits and collect soil/sediment/water samples.

Survey (horizontally) in the test pit, surface water, and sediment locations.

Responsibilities

The Site Health and Safety Officer will implement the Plan. He/She has the authority to stop work or prohibit any personnel from working on the site at any time for not complying with any aspect of the Plan.

The Subcontractor Field Supervisor is directly responsible for implementing the Plan for his/her own employees.

Each person on the site has responsibility for their own health and safety, as well as, assisting others in carrying out the Plan. Any person observed to be in violation of the Plan should be assisted in complying with the Plan, or reported to the Site Health and Safety Officer or the Subcontractor Field Supervisor.

Any site personnel may shut down field activities if there is a real or perceived immediate danger to life or health.

SITE SAFETY PLAN

SITE HAZARDS AND MITGATION

TYPE OF HAZARD	DESCRIPTION OF HAZARD	MITIGATION	YES	NO
Overhead Hazards	Overhead power lines	<Contractor> locate and ensure equipment maintains safe distance	☐	☒
Underground Hazards	Water and storm lines and High Pressure Gas and Fluid lines	Do not excavate until all utilities have been located	☐	☒
Equipment Hazards	Trucks	Stay out of equipment work zone or inform the operator before entering work zone.	☒	☐
Drilling Hazards	No drilling to be conducted	NA	☐	☒
Excavation Hazards	No underground utilities expected	NA	☐	☒
Machinery Hazards	Excavation equipment	Stay out of equipment work zone or inform the operator before entering work zone. Discuss hand signals and approach protocols with operator	☒	☐
Heat Exposure	Warm temperatures are not very likely during the project duration.	If temperatures are warm use sunscreen and drink fluids to prevent dehydration.	☒	☐
Cold Exposure	Cold temperatures or raining	Dress appropriately; take frequent breaks as needed to stay warm. Do not work in wet clothing	☒	☐
Electrical Hazards	None expected	NA	☐	☒
Oxygen Deficiency			☐	☒
Noise Hazards	Trucks	Wear proper personal protective equipment	☒	☐
Ionizing Radiation			☐	☒
Non-Ionizing Radiation			☐	☒
Fire/Explosion Hazards	Drilling abandoned fuel tanks, or pipelines.	Conduct utility locates prior to drilling	☒	☐

SITE SAFETY PLAN

TYPE OF HAZARD	DESCRIPTION OF HAZARD	MITIGATION	YES	NO
Chemical Hazards	Petroleum Hydrocarbons, metals, PAHs	Wear personal protective equipment at all times during field investigations	☒	☐
Other (please specify)			☐	☒
Holes/Ditches	Open excavations		☒	☐
Steep Grades			☐	☒
Slippery Surfaces			☐	☒
Uneven Terrain			☐	☒
Unstable Surfaces			☒	☐
Elevated Work Surfaces			☒	☐
Shoring/Scaffolding				☒
Public Risk			☐	☒
Vehicular			☐	☒

POTENTIAL WASTE GENERATION

Waste Generation (Types and Quantities Expected) **TO BE DETERMINED (GROUND WATER DISSPOSAL MAY BE REQUIRED**

TYPE	QUANTITY	TYPE	QUANTITY	TYPE	QUANTITY

Other (describe)

CHARACTERISTICS EXPECTED

Waste Generation (Types and Quantities Expected)

TYPE	QUANTITY	TYPE	QUANTITY
Corrosive			
Reactive			
Toxic			

Other (describe)

PACKAGING REQUIREMENT FOR WASTE MATERIAL EXPECTED

Open head 55 gallon drum	
Closed head 55 gallon drum	
Overpack drum	
Baker tanks	
Lined waste bins	
Other (Specify)	

DISPOSAL AND/OR TREATMENT METHODS PROPOSED

SITE SAFETY PLAN

The person signing will be responsible for characterizing, packaging, labelling, storing and disposing of suspected or known waste
Signature

RISKS FROM THE PUBLIC

This section is for any personal risks from the public at secluded site, high profile sites etc.

UNDERGROUND AND OVERHEAD UTILITIES AND INSTALLATIONS

Utility locate undertaken	☒ Yes	☐ No	Information attached	☐ Yes	☒ No
Private locate undertaken	☒ Yes	☐ No	Information attached	☐ Yes	☒ No

Sewer mains	☐ Yes	☐ No	☐ n/a
Water mains	☐Yes	☐ No	☐ n/a
Underground telecommunications and telephone utilities	☐ Yes	☐ No	☐ n/a
Cable utilities	☐ Yes	☐ No	☐ n/a
Electrical utilities	☐ Yes	☐ No	☐ n/a
Gas mains	☐ Yes	☐ No	☐ n/a
Steam heat mains	☐ Yes	☐ No	☐ n/a
Transit utilities	☐ Yes	☐ No	☐ n/a
Street lights and traffic signals incl. connections and appurtenances	☐ Yes	☐ No	☐ n/a
All pipes, cables, valves, and all facilities associated	☐ Yes	☐ No	☐ n/a
Equipment incidental thereto located in the roads	☐ Yes	☐ No	☐ n/a

Location cleared by Site Owner/Operator ☒ Yes ☐ No

Name of Locator	
Hazard	
Mitigation	Do not drill/excavate where utilities are located (maintain proper
clearance from utilities).	

SITE SAFETY PLAN

SITE SAFETY PLAN REVIEWED BY

Project Manager

Date

Senior Review

Date

SIGNATURES OF AGREEMENT

By signing below, I have read and understood the safety policy statement and site hazards and mitigation as outlined above

Ryan Fletcher

Sept. 1/08

FRANZ . Representative

Date

Tina

Sept 1/08

~~Site Owner/Operator Representative~~ Franz

Date

Contractor

Date

Contractor Representative

Date

Contractor Representative

Date

Contractor Representative

Date

Contractor Representative

Date

APPENDIX E
Certified Laboratory Reports

Certificate of Analysis

FRANZ ENVIRONMENTAL INC.
ATTN: TINA RANGER
200 - 329 CHURCHILL AVENUE NORTH
OTTAWA ON K1Z 5B8

Reported On: 29-SEP-08 06:08 PM

Lab Work Order #: **L681064**

Date Received: **10-SEP-08**

Project P.O. #: TC-IQALUIT LANDFILL
Job Reference: 1584-0801
Legal Site Desc:
CofC Numbers: C064679

Other Information:

Comments:

JANINE WEEKS
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L681064-1	L681064-2	L681064-3	L681064-4	L681064-5
	Description					
	Sampled Date	07-SEP-08	07-SEP-08	07-SEP-08	07-SEP-08	07-SEP-08
	Sampled Time					
	Client ID	A3-SW08-2	A3-SW08-3	A3-SW08-4	DUP-1	A3-SW08-1
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	1260	42.2	40.2	1220	79.7
Total Metals	Aluminum (Al)-Total (mg/L)	<0.25	0.0191	0.0119	<0.25	0.0434
	Antimony (Sb)-Total (mg/L)	<0.025	<0.00050	<0.00050	<0.025	0.00062
	Arsenic (As)-Total (mg/L)	<0.025	<0.00050	<0.00050	<0.025	<0.00050
	Barium (Ba)-Total (mg/L)	<0.10	<0.020	<0.020	<0.10	<0.020
	Beryllium (Be)-Total (mg/L)	<0.050	<0.0010	<0.0010	<0.050	<0.0010
	Boron (B)-Total (mg/L)	0.95	<0.10	<0.10	0.92	0.23
	Cadmium (Cd)-Total (mg/L)	<0.00085	0.000024	0.000018	<0.00085	0.000129
	Calcium (Ca)-Total (mg/L)	93.8	11.6	11.5	91.5	25.1
	Chromium (Cr)-Total (mg/L)	<0.050	<0.0010	<0.0010	<0.050	<0.0010
	Cobalt (Co)-Total (mg/L)	<0.015	<0.00030	<0.00030	<0.015	0.00286
	Copper (Cu)-Total (mg/L)	<0.050	<0.0010	<0.0010	<0.050	0.0047
	Iron (Fe)-Total (mg/L)	0.90	0.709	0.809	0.78	2.79
	Lead (Pb)-Total (mg/L)	<0.025	<0.00050	<0.00050	<0.025	0.00277
	Lithium (Li)-Total (mg/L)	<0.25	<0.0050	<0.0050	<0.25	<0.0050
	Magnesium (Mg)-Total (mg/L)	248	3.20	2.80	242	4.14
	Manganese (Mn)-Total (mg/L)	0.103	0.0622	0.0534	0.104	0.0841
	Mercury (Hg)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Molybdenum (Mo)-Total (mg/L)	<0.050	<0.0010	<0.0010	<0.050	<0.0010
	Nickel (Ni)-Total (mg/L)	<0.050	<0.0010	<0.0010	<0.050	0.0037
	Potassium (K)-Total (mg/L)	80	<2.0	<2.0	78	2.5
	Selenium (Se)-Total (mg/L)	<0.050	<0.0010	<0.0010	<0.050	<0.0010
	Silver (Ag)-Total (mg/L)	<0.0010	<0.000020	<0.000020	<0.0010	<0.000020
	Sodium (Na)-Total (mg/L)	2080	7.5	5.3	2040	8.7
	Thallium (Tl)-Total (mg/L)	<0.010	<0.00020	<0.00020	<0.010	<0.00020
	Tin (Sn)-Total (mg/L)	<0.025	<0.00050	<0.00050	<0.025	<0.00050
	Titanium (Ti)-Total (mg/L)	<0.050	<0.010	<0.010	<0.050	<0.010
	Uranium (U)-Total (mg/L)	<0.010	<0.00020	<0.00020	<0.010	<0.00020
	Vanadium (V)-Total (mg/L)	<0.050	<0.0010	<0.0010	<0.050	<0.0010
	Zinc (Zn)-Total (mg/L)	<0.025	<0.0050	<0.0050	<0.025	0.163
Volatile Organic Compounds	Benzene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Ethylbenzene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Methyl t-butyl ether (MTBE) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Styrene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Toluene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	ortho-Xylene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	meta- & para-Xylene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Xylenes (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte					
	Sample ID	L681064-1	L681064-2	L681064-3	L681064-4	L681064-5
	Description					
	Sampled Date	07-SEP-08	07-SEP-08	07-SEP-08	07-SEP-08	07-SEP-08
	Sampled Time					
	Client ID	A3-SW08-2	A3-SW08-3	A3-SW08-4	DUP-1	A3-SW08-1
WATER						
Volatile Organic Compounds	Surrogate: 4-Bromofluorobenzene (SS) (%)	92	95	104	95	101
	Surrogate: Fluorobenzene (SS) (%)	101	100	97	96	101
Hydrocarbons	F2 (C10-C16) (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	F3 (C16-C34) (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	F1-BTEX (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	F1 (C6-C10) (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Surrogate: 2,4-Dichlorotoluene (SS) (%)	110	101	102	106	97
Polychlorinated Biphenyls	PCB-1016 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1221 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1232 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1242 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1248 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1254 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1260 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1262 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1268 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Total Polychlorinated Biphenyls (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments

Qualifiers for Sample Submission Listed:

Qualifier	Description
SPL	Sample was Preserved at the laboratory - samples #1-5 - Total Metals

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

F1-BTX-CALC-VA Water F1-Total BTX CCME CWS PHC TIER 1 (2001)

This analysis is based on the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10), the sample undergoes a purge and trap extraction prior to analysis by GC/FID. The F1-BTEX result is calculated as follows:

F1-BTEX: F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).

F1-PT-FID-VA Water CCME F1 By P&T with GCFID EPA SW-846, METHOD 8260

This analysis is based on the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10), the sample undergoes a purge and trap extraction prior to analysis by GC/FID.

F1 (C6-C10): Sum of all hydrocarbons that elute between nC6 and nC10.

F2-F3-SF-FID-VA Water Extractable Hydrocanbons in water GCFID CWS (CCME)

Petroleum Hydrocarbons (F2-F3) in Water

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, published by the United States Environmental Protection Agency (EPA) and the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." The procedure involves a liquid-liquid extraction of the entire water sample using dichloromethane prior to capillary column gas chromatography with flame ionization detection (GC/FID).

A silica gel cleanup procedure is applied before GC analysis, which is intended to selectively remove most naturally occurring organics.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-TOT-CCME-CVAFS-VA Water Total Mercury in Water by CVAFS (CCME) EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-TOT-CCME-ICP-VA Water Total Metals in Water by ICPOES (CCME) EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-CCME-MS-VA Water Total Metals in Water by ICPMS (CCME) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

PCB-SF-ECD-VA Water PCB by Extraction with GCECD EPA 3510/8082 Liq-Liq GCECD

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3510, 3620, 3660, 3665 & 8082, published by the United States Environmental Protection Agency (EPA). The procedure involves a liquid-liquid extraction of the entire water sample using dichloromethane. The extract is then solvent exchanged to hexane followed by one or more of the following clean-up procedures (if required): florisil clean-up, sulphur clean-up and/or sulphuric acid clean-up. The final extract is analysed by capillary column gas chromatography with electron capture detection (GC/ECD).

VOC7-PT-MS-VA	Water	BTEX by Purge Trap GCMS	EPA 8260b, BCMELP CSR Method

This procedure involves the purge and trap extraction of the sample prior to analysis for specific Volatile Organic Compounds (VOC) by capillary column gas chromatography with mass spectrometric detection (GC/MS). The VOC analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260, published by the United States Environmental Protection Agency (EPA). Note: For chlorinated waters certain conditions may cause the formation of trihalomethanes after sample collection. Appropriate chemical treatment of chlorinated waters will prevent trihalomethane formation in the samples. Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

XYLENES-CALC-VA	Water	CSR VOC7 by MeOH with DI GCMS	CALCULATION

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.
The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
N/A - Result not available. Refer to qualifier code and definition for explanation

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

L681064
Attachment
25-Sep-08

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample ID	L681064-1	L681064-2	L681064-3	L681064-4	L681064-5	BLK
Description						QC
Client ID	A3-SW08-2	A3-SW08-3	A3-SW08-4	DUP1	A3-SW08-1	
Class in Matrix (units)	Water	Water	Water	Water	Water	
Analyte	F4(mg/L)	F4(mg/L)	F4(mg/L)	F4(mg/L)	F4(mg/L)	
Parameter 1	<0.30	<0.30	<0.30	<0.30	<0.30	<0.3
Surrogate 1 (%)	98	102	101	96	99	105

Unit of Measurement =
blue highlight = raised detection limit due to interference
green highlight = surrogate recovery (%)

Notes:

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

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CANADA TOLL FREE 1-800-668-9878

www.alsenviro.com

COC # C064679

Page 1 of 1

REPORT TO:
COMPANY: Franz Environmental, Inc.
CONTACT: Tina Ranger / Ryan Fletcher
ADDRESS: 329 Churchill Avenue
Ottawa, Ontario
PHONE: (613) 721-0555 FAX:

INVOICE TO: SAME AS REPORT ? [✓ YES] / NO
COMPANY:
CONTACT:
ADDRESS:
PHONE: FAX:

Lab Work Order # (lab use only) L681064

REPORT FORMAT / DISTRIBUTION
STANDARD ____ OTHER ____
PDF ✓ EXCEL ✓ CUSTOM ____ FAX ____
EMAIL 1: tranger@franzenvironmental.com
EMAIL 2: rfletcher@franzenvironmental.com

INDICATE BOTTLES: FILTERED / PRESERVED (F/P) → → →

CLIENT / PROJECT INFORMATION:
JOB #: 1584-0801
PO /AFE: TC- Iqaluit Landfill
Legal Site Description:
QUOTE #:

SAMPLER (Initials):

SERVICE REQUESTED
✓ REGULAR SERVICE (DEFAULT)
RUSH SERVICE (2-3 DAYS)
PRIORITY SERVICE (1 DAY or ASAP)
EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS

ANALYSIS REQUEST

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	F1 Btex	F2-F4	Metals	PAH	Pesticides OC	PCB total						HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
	A3-SW08-1	Sept 7/08		Surface Water	X	X	X			X								8
	A3-SW08-2	Sept 7/08		Surface Water	X	X	X			X								8
	A3-SW08-3	Sept 7/08		Surface Water	X	X	X			X								8
	A3-SW08-4	Sept 7/08		Surface Water	X	X	X			X								8
	A3- Dup-1	Sept 7/08		Surface Water	X	X	X			X								8

GUIDELINES / REGULATIONS

SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS

Failure to complete all portions of this form may delay analysis. Please fill in this form *LEGIBLY*.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the reverse page of the white report copy.

RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:
Tina Ranger	Sept 7/08	ZH	Sept 10.08 11:37
RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:

SAMPLE CONDITION (lab use only)
TEMPERATURE 10
SAMPLES RECEIVED IN GOOD CONDITION ? [✓ YES] / NO
(If no provide details)

REFER TO BACK PAGE FOR REGIONAL LOCATIONS AND SAMPLING INFORMATION

WHITE - REPORT COPY, PINK - FILE COPY, YELLOW - CLIENT COPY

GENF14.00

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Certificate of Analysis

FRANZ ENVIRONMENTAL INC.
ATTN: TINA RANGER
200 - 329 CHURCHILL AVENUE NORTH
OTTAWA ON K1Z 5B8

Reported On: 26-SEP-08 03:59 PM

Lab Work Order #: **L681123**

Date Received: **10-SEP-08**

Project P.O. #:
Job Reference: 1584-0801
Legal Site Desc:
CofC Numbers: C064683

Other Information:

Comments:

JANINE WEEKS
Account Manager

	Sample ID	L681123-1	L681123-2	L681123-3	L681123-4	
	Description					
	Sampled Date	07-SEP-08	07-SEP-08	07-SEP-08	07-SEP-08	
	Sampled Time					
	Client ID	A3-S008-2	A3-S008-3	A3-S008-4	SD-DUP 1	
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	25.1	52.0	15.8	23.7	
	pH (pH)	6.85	6.62	6.99	6.89	
Metals	Antimony (Sb) (mg/kg)	<10	<10	<10	<10	
	Arsenic (As) (mg/kg)	<5.0	<5.0	<5.0	<5.0	
	Barium (Ba) (mg/kg)	13.9	45.3	21.6	19.4	
	Beryllium (Be) (mg/kg)	<0.50	<0.50	<0.50	<0.50	
	Cadmium (Cd) (mg/kg)	<0.50	1.38	0.60	<0.50	
	Chromium (Cr) (mg/kg)	12.8	25.4	24.1	14.2	
	Cobalt (Co) (mg/kg)	2.8	5.9	3.9	3.4	
	Copper (Cu) (mg/kg)	4.5	20.7	13.7	7.9	
	Lead (Pb) (mg/kg)	<30	59	57	39	
	Mercury (Hg) (mg/kg)	<0.0050	0.0384	0.0155	0.0064	
	Molybdenum (Mo) (mg/kg)	<4.0	5.0	<4.0	<4.0	
	Nickel (Ni) (mg/kg)	<5.0	8.9	<5.0	<5.0	
	Selenium (Se) (mg/kg)	<2.0	<2.0	<2.0	<2.0	
	Silver (Ag) (mg/kg)	<2.0	<2.0	<2.0	<2.0	
	Thallium (Tl) (mg/kg)	<1.0	<1.0	<1.0	<1.0	
	Tin (Sn) (mg/kg)	<5.0	<5.0	<5.0	<5.0	
	Vanadium (V) (mg/kg)	30.5	45.1	29.2	41.4	
	Zinc (Zn) (mg/kg)	28.3	191	139	42.7	
Volatile Organic Compounds	Benzene (mg/kg)	<0.040	<0.040	<0.040	<0.040	
	Ethylbenzene (mg/kg)	<0.050	<0.050	<0.050	<0.050	
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20	<0.20	<0.20	<0.20	
	Styrene (mg/kg)	<0.050	<0.050	<0.050	<0.050	
	Toluene (mg/kg)	<0.050	<0.050	<0.050	<0.050	
	ortho-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	
	meta- & para-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	
	Xylenes (mg/kg)	<0.10	<0.10	<0.10	<0.10	
	Surrogate: 4-Bromofluorobenzene (SS) (%)	95	78	95	86	
	Surrogate: Fluorobenzene (SS) (%)	92	79	92	79	
Hydrocarbons	F4G-SG (mg/kg)		1040		<500	
	F2 (C10-C16) (mg/kg)	<30	535	141	<30	
	F3 (C16-C34) (mg/kg)	<50	568	177	139	
	F4 (C34-C50) (mg/kg)	<50	191	71	89	
	F1-BTEX (mg/kg)	<10	11	<10	10	
	F1 (C6-C10) (mg/kg)	<10	11	<10	10	
	Chrom. to baseline at nC50	YES	NO	YES	NO	
	Surrogate: 2,4-Dichlorotoluene (SS) (%)	99	91	100	90	

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L681123-1	L681123-2	L681123-3	L681123-4	
	Description					
	Sampled Date	07-SEP-08	07-SEP-08	07-SEP-08	07-SEP-08	
	Sampled Time					
	Client ID	A3-S008-2	A3-S008-3	A3-S008-4	SD-DUP 1	
Grouping	**Analyte**					
SOIL						
Polychlorinated Biphenyls	PCB-1016 (mg/kg)	<0.050		<0.050	<0.060	
	PCB-1221 (mg/kg)	<0.050		<0.050	<0.060	
	PCB-1232 (mg/kg)	<0.050		<0.050	<0.060	
	PCB-1242 (mg/kg)	<0.050		<0.050	<0.060	
	PCB-1248 (mg/kg)	<0.050		<0.050	<0.060	
	PCB-1254 (mg/kg)	<0.050		<0.050	<0.060	
	PCB-1260 (mg/kg)	<0.050		0.496	<0.060	
	PCB-1262 (mg/kg)	<0.050		<0.050	<0.060	
	PCB-1268 (mg/kg)	<0.050		<0.050	<0.060	
	Total Polychlorinated Biphenyls (mg/kg)	<0.050		0.496	<0.060	

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
F1-BTX-CALC-VA	Soil	F1-Total BTX	CCME CWS PHC TIER 1 (2001)

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10) and F1-BTEX, a subsample of the sediment/soil is extracted with methanol and analysed by purge & trap GC/FID. The F1-BTEX result is then calculated as follows:

F1-BTEX: F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).

F1-MET-PT-FID-VA	Soil	CCME by Purge and Trap with GCMS	EPA 8260B & 524.2

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10), a subsample of the sediment/soil is extracted with methanol and analysed by purge & trap GC/FID.

Notes:
1. F1 (C6-C10): Sum of all hydrocarbons that elute between nC6 and nC10.
2. Reported results are expressed as milligrams per dry kilogram.
3. This method is validated for use.
4. Data from analysis of quality control samples is available upon request.

F2F4-TUMB-H/A-FID-VA	Soil	Petroleum Hydrocarbon by Tumbler GCFID	CCME

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For C10 to C50 hydrocarbons (F2, F3, F4) and gravimetric heavy hydrocarbons (F4G-sg), a subsample of the sediment/soil is extracted with 1:1 hexane:acetone using a rotary extractor. The extract undergoes a silica-gel clean-up to remove polar compounds. F2, F3 & F4 are analyzed by on-column GC/FID, and F4G-sg is analyzed gravimetrically.

Notes:
1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where F4 (C34-C50) and F4G-sg results are reported for a sample, the larger of the reported values is used for comparison against the relevant CCME standard for F4.
7. The gravimetric heavy hydrocarbon results (F4G-sg), cannot be added to the C6 to C50 hydrocarbon results.
8. This method is validated for use.
9. Data from analysis of quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram.

HG-CCME-CVAFS-VA	Soil	CVAFS Hg in Soil (CCME)	CCME

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry (EPA Method 7000 series).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

MET-CSR-FULL-ICP-VA	Soil	Metals in Soil by ICPOES (CSR SALM)	BCMELP CSR SALM METHOD 8

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

mobile in the environment.

MOISTURE-VA	Soil	Moisture content	ASTM METHOD D2794-00

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

MOISTURE-VA	Soil		ASTM METHOD D2794-00

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

OGG-F4G-TUMB-SG-VA	Soil	CWS F4G with Silica Gel	CCME

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For gravimetric heavy hydrocarbons (F4G-sg), a subsample of the sediment/soil is extracted with 1:1 hexane:acetone using a rotary extractor. The extract undergoes a silica-gel clean-up to remove polar compounds prior to gravimetric analysis.

Notes:
1. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
3. Where F4 (C34-C50) and F4G-sg results are reported for a sample, the larger of the reported values is used for comparison against the relevant CCME standard for F4.
4. The gravimetric heavy hydrocarbon (F4G-sg) result cannot be added to the C6 to C50 hydrocarbons results.
5. This method is validated for use.
6. Data from analysis of quality control samples is available upon request.
7. Reported results are expressed as milligrams per dry kilogram.

PCB-SE-ECD-VA	Soil	PCB by Extraction with GCECD	EPA 3630/8082 GCECD

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3500, 3620, 3630, 3660, 3665 & 8082, published by the United States Environmental Protection Agency (EPA). The procedure involves a solid-liquid extraction of a subsample of the sediment/soil using a mixture of hexane and acetone. Water is added to the extract and the resulting hexane extract undergoes one or more of the following clean-up procedures (if required): florisil clean-up, silica gel clean-up, sulphur clean-up and/or sulphuric acid clean-up. The final extract is analysed by capillary column gas chromatography with electron capture detection (GC/ECD).

PH-1:2-VA	Soil	CSR pH by 1:2 Water Leach	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (10 mesh /2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

TL-CSR-MS-VA	Soil	ICPMS Tl in Soil by CSR SALM	BCMELP CSR SALM Method 8

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by either hotplate or block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

VOC7-MET-PT-MS-VA	Soil	BTEX by MeOH with Purge and Trap GCMS	EPA 8260B & 524.2

Volatile Organic Compounds (VOC) are extracted from sediment or soil with methanol, following a procedure from the British Columbia Ministry of Water Land and Air Protection (BCWLAP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999). Aliquots of the extract are analyzed by Purge and Trap by gas hromatography with mass spectrometric detection (GC/MS), using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260B, published by the United States Environmental Protection Agency (EPA). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

		CSR VOC7 by MeOH with DI GCMS	EPA 8260B & 524.2

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
XYLENES-CALC-VA	Soil	Calculation of Total Xylenes	

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.
The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
N/A - Result not available. Refer to qualifier code and definition for explanation

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

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CANADA TOLL FREE 1-800-668-9878

www.alsenviro.com

COC # C064683

Page 1 of 1

REPORT TO:
COMPANY: Franz Environmental
CONTACT: 329 Churchill Avenue
ADDRESS: Ottawa, Ontario
→ Tina Ranger / Ryan Fletcher
PHONE: (613) 721-0555 FAX:

INVOICE TO: SAME AS REPORT ? [✓ YES] / NO
COMPANY: 〃
CONTACT:
ADDRESS:
PHONE: FAX:

Lab Work Order # (lab use only) L681123

REPORT FORMAT / DISTRIBUTION
STANDARD ____ OTHER ____
PDF ✓ EXCEL ✓ CUSTOM ____ FAX ____
EMAIL 1: franger@franzenvironmental.com
EMAIL 2: rfletcher@franzenvironmental.com

INDICATE BOTTLES: FILTERED / PRESERVED (F/P) → → →

CLIENT / PROJECT INFORMATION:
JOB #: 1584-0801
PO / AFE:
Legal Site Description:
QUOTE #:
SAMPLER (Initials):

SERVICE REQUESTED
✓ REGULAR SERVICE (DEFAULT)
RUSH SERVICE (2-3 DAYS)
PRIORITY SERVICE (1 DAY or ASAP)
EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS

ANALYSIS REQUEST

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	[illegible] Fi-Btex	F2-F4	Metals	[illegible]	PCB total	OC Pesticides	VOC					HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
	[illegible]	Sept 7/08		Sediment														
	A3-SD08-2	↓		|	X	X	X	[illegible]	X									7
	A3-SD08-3			|	X	X	X	[illegible]										5
	A3-SD08-4			|	X	X	X	[illegible]	X									7
	[illegible] A3-SD-Dup1				X	X	X	[illegible]	X									7

GUIDELINES / REGULATIONS

SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS

Failure to complete all portions of this form may delay analysis. Please fill in this form *LEGIBLY*.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the reverse page of the white report copy.

RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:	SAMPLE CONDITION (lab use only)	
Tina Ranger	Sept 7/08		Sept 12/08 10:39	TEMPERATURE 9	SAMPLES RECEIVED IN GOOD CONDITION ? [✓ YES] NO (If no provide details)
RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:		

REFER TO BACK PAGE FOR REGIONAL LOCATIONS AND SAMPLING INFORMATION

WHITE - REPORT COPY, PINK - FILE COPY, YELLOW - CLIENT COPY

GENF 14.00

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Certificate of Analysis

FRANZ ENVIRONMENTAL INC.
ATTN: TINA RANGER
200 - 329 CHURCHILL AVENUE NORTH
OTTAWA ON K1Z 5B8

Reported On: 01-OCT-08 01:42 PM
Revision: 1

Lab Work Order #: **L681268**
Date Received: **10-SEP-08**

Project P.O. #: TC - IQALUIT / LANDFILL
Job Reference: 1584-0801
Legal Site Desc:
CofC Numbers: C064680

Other Information:

Comments: 01-Oct -08 - Total PCB result adjusted for sample L681268 - 5.

JANINE WEEKS
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L681268-1	L681268-2	L681268-3	L681268-4	L681268-5
	Description					
	Sampled Date	07-SEP-08	07-SEP-08	07-SEP-08	07-SEP-08	07-SEP-08
	Sampled Time					
	Client ID	A3-TP08-17	A3-TP08-12	A3-TP08-9	A3-TP08-13	A3-TP08-DUP2
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)		7.73	27.5	9.73	13.4
	pH (pH)	5.23	6.37	6.28	6.57	6.56
Metals	Antimony (Sb) (mg/kg)	<10	<10	<10	<10	<10
	Arsenic (As) (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Barium (Ba) (mg/kg)	43.8	25.0	51.0	32.3	27.2
	Beryllium (Be) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Cadmium (Cd) (mg/kg)	<0.50	1.53	<0.50	0.52	0.93
	Chromium (Cr) (mg/kg)	24.9	18.7	25.2	22.4	22.2
	Cobalt (Co) (mg/kg)	3.2	4.4	3.8	3.9	3.9
	Copper (Cu) (mg/kg)	9.1	82.0	13.9	24.5	33.8
	Lead (Pb) (mg/kg)	<30	256	60	41	34
	Mercury (Hg) (mg/kg)	0.0058	0.285	0.0190	0.0356	0.0534
	Molybdenum (Mo) (mg/kg)	<4.0	<4.0	<4.0	<4.0	<4.0
	Nickel (Ni) (mg/kg)	6.4	8.2	6.4	8.0	8.8
	Selenium (Se) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Silver (Ag) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Thallium (Tl) (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Tin (Sn) (mg/kg)	<5.0	9.8	<5.0	9.1	7.4
	Vanadium (V) (mg/kg)	60.0	16.9	42.1	41.3	45.3
	Zinc (Zn) (mg/kg)	36.1	488	34.4	205	277
Volatile Organic Compounds	Benzene (mg/kg)		<0.040	<0.040	<0.040	<0.040
	Bromodichloromethane (mg/kg)				<0.050	<0.050
	Bromoform (mg/kg)				<0.050	<0.050
	Carbon Tetrachloride (mg/kg)				<0.050	<0.050
	Chlorobenzene (mg/kg)				<0.050	<0.050
	Dibromochloromethane (mg/kg)				<0.050	<0.050
	Chloroethane (mg/kg)				<0.10	<0.10
	Chloroform (mg/kg)				<0.10	<0.10
	Chloromethane (mg/kg)				<0.10	<0.10
	1,2-Dichlorobenzene (mg/kg)				<0.050	<0.050
	1,3-Dichlorobenzene (mg/kg)				<0.050	<0.050
	1,4-Dichlorobenzene (mg/kg)				<0.050	<0.050
	1,1-Dichloroethane (mg/kg)				<0.050	<0.050
	1,2-Dichloroethane (mg/kg)				<0.050	<0.050
	1,1-Dichloroethylene (mg/kg)				<0.050	<0.050
	cis-1,2-Dichloroethylene (mg/kg)				<0.050	<0.050
	trans-1,2-Dichloroethylene (mg/kg)				<0.050	<0.050
	Dichloromethane (mg/kg)				<0.30	<0.30

	Sample ID	L681268-6	L681268-7	L681268-8	L681268-9	L681268-10
	Description					
	Sampled Date	07-SEP-08	07-SEP-08	07-SEP-08	07-SEP-08	07-SEP-08
	Sampled Time					
	Client ID	A3-TP08-14	A3-TP08-15	A3-TP08-16	A3-TP08-18	A3-TP08-11
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	20.2	29.8	22.4	42.3	10.7
	pH (pH)	6.59	6.22	5.90	5.40	5.81
Metals	Antimony (Sb) (mg/kg)	<10	<10	<10	<10	<10
	Arsenic (As) (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Barium (Ba) (mg/kg)	43.3	35.5	43.0	31.8	22.5
	Beryllium (Be) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Cadmium (Cd) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Chromium (Cr) (mg/kg)	21.6	20.3	16.8	19.0	15.2
	Cobalt (Co) (mg/kg)	3.7	3.8	3.7	2.9	2.7
	Copper (Cu) (mg/kg)	8.3	12.3	5.8	6.7	3.9
	Lead (Pb) (mg/kg)	<30	<30	<30	<30	<30
	Mercury (Hg) (mg/kg)	0.0107	0.0122	<0.0050	<0.0050	0.0056
	Molybdenum (Mo) (mg/kg)	<4.0	<4.0	<4.0	<4.0	<4.0
	Nickel (Ni) (mg/kg)	6.6	7.2	6.0	5.6	<5.0
	Selenium (Se) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Silver (Ag) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Thallium (Tl) (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Tin (Sn) (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Vanadium (V) (mg/kg)	48.8	46.8	34.1	40.2	36.9
	Zinc (Zn) (mg/kg)	74.9	33.5	33.8	35.2	34.3
Volatile Organic Compounds	Benzene (mg/kg)	<0.040	<0.040	<0.040	<0.040	<0.040
	Bromodichloromethane (mg/kg)		<0.050			
	Bromoform (mg/kg)		<0.050			
	Carbon Tetrachloride (mg/kg)		<0.050			
	Chlorobenzene (mg/kg)		<0.050			
	Dibromochloromethane (mg/kg)		<0.050			
	Chloroethane (mg/kg)		<0.10			
	Chloroform (mg/kg)		<0.10			
	Chloromethane (mg/kg)		<0.10			
	1,2-Dichlorobenzene (mg/kg)		<0.050			
	1,3-Dichlorobenzene (mg/kg)		<0.050			
	1,4-Dichlorobenzene (mg/kg)		<0.050			
	1,1-Dichloroethane (mg/kg)		<0.050			
	1,2-Dichloroethane (mg/kg)		<0.050			
	1,1-Dichloroethylene (mg/kg)		<0.050			
	cis-1,2-Dichloroethylene (mg/kg)		<0.050			
	trans-1,2-Dichloroethylene (mg/kg)		<0.050			
	Dichloromethane (mg/kg)		<0.60			

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L681268-1	L681268-2	L681268-3	L681268-4	L681268-5
	Description					
	Sampled Date	07-SEP-08	07-SEP-08	07-SEP-08	07-SEP-08	07-SEP-08
	Sampled Time					
	Client ID	A3-TP08-17	A3-TP08-12	A3-TP08-9	A3-TP08-13	A3-TP08-DUP2
Grouping	**Analyte**					
SOIL						
Volatile Organic Compounds	1,2-Dichloropropane (mg/kg)				<0.050	<0.050
	cis-1,3-Dichloropropylene (mg/kg)				<0.050	<0.050
	trans-1,3-Dichloropropylene (mg/kg)				<0.050	<0.050
	Ethylbenzene (mg/kg)		<0.050	<0.050	<0.050	<0.050
	Methyl t-butyl ether (MTBE) (mg/kg)		<0.20	<0.20	<0.20	<0.20
	Styrene (mg/kg)		<0.050	<0.050	<0.050	<0.050
	1,1,1,2-Tetrachloroethane (mg/kg)				<0.050	<0.050
	1,1,2,2-Tetrachloroethane (mg/kg)				<0.050	<0.050
	Tetrachloroethylene (mg/kg)				<0.050	<0.050
	Toluene (mg/kg)		<0.050	<0.050	<0.050	<0.050
	1,1,1-Trichloroethane (mg/kg)				<0.050	<0.050
	1,1,2-Trichloroethane (mg/kg)				<0.050	<0.050
	Trichloroethylene (mg/kg)				<0.015	<0.015
	Trichlorofluoromethane (mg/kg)				<0.10	<0.10
	Vinyl Chloride (mg/kg)				<0.10	<0.10
	ortho-Xylene (mg/kg)		<0.050	<0.050	<0.050	<0.050
	meta- & para-Xylene (mg/kg)		<0.050	<0.050	<0.050	<0.050
	Xylenes (mg/kg)		<0.10	<0.10	<0.10	<0.10
	Surrogate: 4-Bromofluorobenzene (SS) (%)		87	83	85	93
	Surrogate: Fluorobenzene (SS) (%)		90	78	89	91
Hydrocarbons	F4G-SG (mg/kg)		680			<500
	F2 (C10-C16) (mg/kg)		51	<30	<30	<30
	F3 (C16-C34) (mg/kg)		244	<50	69	240
	F4 (C34-C50) (mg/kg)		239	<50	<50	82
	F1-BTEX (mg/kg)		<10	<10	<10	<10
	F1 (C6-C10) (mg/kg)		<10	<10	<10	<10
	Chrom. to baseline at nC50		NO	YES	YES	NO
	Surrogate: 2,4-Dichlorotoluene (SS) (%)		100	111	109	96
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)				<0.040	<0.040
	Acenaphthylene (mg/kg)				<0.050	<0.050
	Anthracene (mg/kg)				<0.050	0.100
	Benz(a)anthracene (mg/kg)				<0.050	1.14
	Benzo(a)pyrene (mg/kg)				<0.050	1.31
	Benzo(b)fluoranthene (mg/kg)				<0.050	1.78
	Benzo(g,h,i)perylene (mg/kg)				<0.050	0.728
	Benzo(k)fluoranthene (mg/kg)				<0.050	0.662
	Chrysene (mg/kg)				<0.050	1.04

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L681268-6	L681268-7	L681268-8	L681268-9	L681268-10
	Description					
	Sampled Date	07-SEP-08	07-SEP-08	07-SEP-08	07-SEP-08	07-SEP-08
	Sampled Time					
	Client ID	A3-TP08-14	A3-TP08-15	A3-TP08-16	A3-TP08-18	A3-TP08-11
Grouping	**Analyte**					
SOIL						
Volatile Organic Compounds	1,2-Dichloropropane (mg/kg)		<0.050			
	cis-1,3-Dichloropropylene (mg/kg)		<0.050			
	trans-1,3-Dichloropropylene (mg/kg)		<0.050			
	Ethylbenzene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Styrene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	1,1,1,2-Tetrachloroethane (mg/kg)		<0.050			
	1,1,2,2-Tetrachloroethane (mg/kg)		<0.050			
	Tetrachloroethylene (mg/kg)		<0.050			
	Toluene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	1,1,1-Trichloroethane (mg/kg)		<0.050			
	1,1,2-Trichloroethane (mg/kg)		<0.050			
	Trichloroethylene (mg/kg)		<0.015			
	Trichlorofluoromethane (mg/kg)		<0.10			
	Vinyl Chloride (mg/kg)		<0.10			
	ortho-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	meta- & para-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Xylenes (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Surrogate: 4-Bromofluorobenzene (SS) (%)	93	82	87	81	85
	Surrogate: Fluorobenzene (SS) (%)	90	83	83	81	87
Hydrocarbons	F4G-SG (mg/kg)					
	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
	F3 (C16-C34) (mg/kg)	<50	<50	<50	<50	<50
	F4 (C34-C50) (mg/kg)	<50	<50	<50	<50	<50
	F1-BTEX (mg/kg)	<10	<10	<10	<10	<10
	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10
	Chrom. to baseline at nC50	YES	YES	YES	YES	YES
	Surrogate: 2,4-Dichlorotoluene (SS) (%)	101	98	95	102	102
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.040				
	Acenaphthylene (mg/kg)	<0.050				
	Anthracene (mg/kg)	<0.050				
	Benz(a)anthracene (mg/kg)	<0.050				
	Benzo(a)pyrene (mg/kg)	<0.050				
	Benzo(b)fluoranthene (mg/kg)	<0.050				
	Benzo(g,h,i)perylene (mg/kg)	<0.050				
	Benzo(k)fluoranthene (mg/kg)	<0.050				
	Chrysene (mg/kg)	<0.050				

	Sample ID	L681268-1	L681268-2	L681268-3	L681268-4	L681268-5
	Description					
	Sampled Date	07-SEP-08	07-SEP-08	07-SEP-08	07-SEP-08	07-SEP-08
	Sampled Time					
	Client ID	A3-TP08-17	A3-TP08-12	A3-TP08-9	A3-TP08-13	A3-TP08-DUP2
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Dibenz(a,h)anthracene (mg/kg)				<0.050	0.235
	Fluoranthene (mg/kg)				<0.050	1.07
	Fluorene (mg/kg)				<0.050	<0.050
	Indeno(1,2,3-c,d)pyrene (mg/kg)				<0.050	0.881
	2-Methylnaphthalene (mg/kg)				<0.050	<0.050
	Naphthalene (mg/kg)				<0.050	<0.050
	Phenanthrene (mg/kg)				<0.050	0.171
	Pyrene (mg/kg)				<0.050	1.04
	Surrogate: d10-Acenaphthene (SS) (%)				95	87
	Surrogate: d12-Chrysene (SS) (%)				101	95
	Surrogate: d8-Naphthalene (SS) (%)				95	88
	Surrogate: d10-Phenanthrene (SS) (%)				95	86
Polychlorinated Biphenyls	PCB-1016 (mg/kg)			<0.060	<0.050	<0.050
	PCB-1221 (mg/kg)			<0.060	<0.050	<0.050
	PCB-1232 (mg/kg)			<0.060	<0.050	<0.050
	PCB-1242 (mg/kg)			<0.060	<0.050	<0.050
	PCB-1248 (mg/kg)			<0.060	<0.050	0.210
	PCB-1254 (mg/kg)			<0.060	<0.050	0.104
	PCB-1260 (mg/kg)			<0.060	0.162	0.127
	PCB-1262 (mg/kg)			<0.060	<0.050	<0.050
	PCB-1268 (mg/kg)			<0.060	<0.050	<0.050
	Total Polychlorinated Biphenyls (mg/kg)			<0.060	0.162	0.441
Organochlorine Pesticides	Aldrin (mg/kg)				<0.0020	<0.0020
	alpha-BHC (mg/kg)				<0.0020	<0.0020
	beta-BHC (mg/kg)				<0.0020	<0.0020
	Lindane (gamma - BHC) (mg/kg)				<0.0020	<0.0020
	delta-BHC (mg/kg)				<0.0020	<0.0020
	cis-Chlordane (alpha) (mg/kg)				<0.0020	<0.0020
	trans-Chlordane (gamma) (mg/kg)				<0.0020	<0.0020
	2,4’-DDD (mg/kg)				<0.0020	<0.0020
	4,4’-DDD (mg/kg)				0.0028	<0.0020
	2,4’-DDE (mg/kg)				<0.0020	<0.0020
	4,4’-DDE (mg/kg)				0.0024	<0.0020
	2,4’-DDT (mg/kg)				<0.0020	<0.0020
	4,4’-DDT (mg/kg)				0.0070	<0.0020
	Dieldrin (mg/kg)				<0.0020	<0.0020
	Endosulfan I (mg/kg)				<0.0020	<0.0020

Grouping	Analyte	L681268-6	L681268-7	L681268-8	L681268-9	L681268-10
	Sample ID	L681268-6	L681268-7	L681268-8	L681268-9	L681268-10
	Description					
	Sampled Date	07-SEP-08	07-SEP-08	07-SEP-08	07-SEP-08	07-SEP-08
	Sampled Time					
	Client ID	A3-TP08-14	A3-TP08-15	A3-TP08-16	A3-TP08-18	A3-TP08-11
SOIL						
Polycyclic Aromatic Hydrocarbons	Dibenz(a,h)anthracene (mg/kg)	<0.050				
	Fluoranthene (mg/kg)	<0.050				
	Fluorene (mg/kg)	<0.050				
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.050				
	2-Methylnaphthalene (mg/kg)	<0.050				
	Naphthalene (mg/kg)	<0.050				
	Phenanthrene (mg/kg)	<0.050				
	Pyrene (mg/kg)	<0.050				
	Surrogate: d10-Acenaphthene (SS) (%)	94				
	Surrogate: d12-Chrysene (SS) (%)	101				
	Surrogate: d8-Naphthalene (SS) (%)	95				
	Surrogate: d10-Phenanthrene (SS) (%)	94				
Polychlorinated Biphenyls	PCB-1016 (mg/kg)	<0.050		<0.050	<0.080	
	PCB-1221 (mg/kg)	<0.050		<0.050	<0.080	
	PCB-1232 (mg/kg)	<0.050		<0.050	<0.080	
	PCB-1242 (mg/kg)	<0.050		<0.050	<0.080	
	PCB-1248 (mg/kg)	<0.050		<0.050	<0.080	
	PCB-1254 (mg/kg)	<0.050		<0.050	<0.080	
	PCB-1260 (mg/kg)	<0.050		<0.050	<0.080	
	PCB-1262 (mg/kg)	<0.050		<0.050	<0.080	
	PCB-1268 (mg/kg)	<0.050		<0.050	<0.080	
	Total Polychlorinated Biphenyls (mg/kg)	<0.050		<0.050	<0.080	
Organochlorine Pesticides	Aldrin (mg/kg)					
	alpha-BHC (mg/kg)					
	beta-BHC (mg/kg)					
	Lindane (gamma - BHC) (mg/kg)					
	delta-BHC (mg/kg)					
	cis-Chlordane (alpha) (mg/kg)					
	trans-Chlordane (gamma) (mg/kg)					
	2,4'-DDD (mg/kg)					
	4,4'-DDD (mg/kg)					
	2,4'-DDE (mg/kg)					
	4,4'-DDE (mg/kg)					
	2,4'-DDT (mg/kg)					
	4,4'-DDT (mg/kg)					
	Dieldrin (mg/kg)					
	Endosulfan I (mg/kg)					

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L681268-1	L681268-2	L681268-3	L681268-4	L681268-5
	Description					
	Sampled Date	07-SEP-08	07-SEP-08	07-SEP-08	07-SEP-08	07-SEP-08
	Sampled Time					
	Client ID	A3-TP08-17	A3-TP08-12	A3-TP08-9	A3-TP08-13	A3-TP08-DUP2
Grouping	**Analyte**					
SOIL						
Organochlorine Pesticides	Endosulfan II (mg/kg)				<0.0020	<0.0020
	Endosulfan Sulfate (mg/kg)				<0.0020	<0.0020
	Endrin (mg/kg)				<0.0050	<0.0050
	Heptachlor (mg/kg)				<0.0020	<0.0020
	Heptachlor Epoxide (mg/kg)				<0.0020	<0.0020
	Methoxychlor (mg/kg)				<0.0050	<0.0050
	Mirex (mg/kg)				<0.0020	<0.0020
	cis-Nonachlor (mg/kg)				<0.0020	<0.0020
	trans-Nonachlor (mg/kg)				<0.0020	<0.0020
	Oxychlordane (mg/kg)				<0.0020	<0.0020

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L681268-6	L681268-7	L681268-8	L681268-9	L681268-10
	Description					
	Sampled Date	07-SEP-08	07-SEP-08	07-SEP-08	07-SEP-08	07-SEP-08
	Sampled Time					
	Client ID	A3-TP08-14	A3-TP08-15	A3-TP08-16	A3-TP08-18	A3-TP08-11
Grouping	**Analyte**					
SOIL						
Organochlorine Pesticides	Endosulfan II (mg/kg)					
	Endosulfan Sulfate (mg/kg)					
	Endrin (mg/kg)					
	Heptachlor (mg/kg)					
	Heptachlor Epoxide (mg/kg)					
	Methoxychlor (mg/kg)					
	Mirex (mg/kg)					
	cis-Nonachlor (mg/kg)					
	trans-Nonachlor (mg/kg)					
	Oxychlordane (mg/kg)					

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
F1-BTX-CALC-VA	Soil	F1-Total BTX	CCME CWS PHC TIER 1 (2001)

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10) and F1-BTEX, a subsample of the sediment/soil is extracted with methanol and analysed by purge & trap GC/FID. The F1-BTEX result is then calculated as follows:

F1-BTEX: F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
F1-MET-PT-FID-VA	Soil	CCME by Purge and Trap with GCMS	EPA 8260B & 524.2

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10), a subsample of the sediment/soil is extracted with methanol and analysed by purge & trap GC/FID.

Notes:
1. F1 (C6-C10): Sum of all hydrocarbons that elute between nC6 and nC10.
2. Reported results are expressed as milligrams per dry kilogram.
3. This method is validated for use.
4. Data from analysis of quality control samples is available upon request.

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
F2F4-TUMB-H/A-FID-VA	Soil	Petroleum Hydrocarbon by Tumbler GCFID	CCME

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For C10 to C50 hydrocarbons (F2, F3, F4) and gravimetric heavy hydrocarbons (F4G-sg), a subsample of the sediment/soil is extracted with 1:1 hexane:acetone using a rotary extractor. The extract undergoes a silica-gel clean-up to remove polar compounds. F2, F3 & F4 are analyzed by on-column GC/FID, and F4G-sg is analyzed gravimetrically.

Notes:
1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where F4 (C34-C50) and F4G-sg results are reported for a sample, the larger of the reported values is used for comparison against the relevant CCME standard for F4.
7. The gravimetric heavy hydrocarbon results (F4G-sg), cannot be added to the C6 to C50 hydrocarbon results.
8. This method is validated for use.
9. Data from analysis of quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram.

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
HG-CCME-CVAFS-VA	Soil	CVAFS Hg in Soil (CCME)	CCME

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry (EPA Method 7000 series).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
MET-CSR-FULL-ICP-VA	Soil	Metals in Soil by ICPOES (CSR SALM)	BCMELP CSR SALM METHOD 8

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

mobile in the environment.

MOISTURE-VA	Soil	Moisture content	ASTM METHOD D2794-00

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

MOISTURE-VA	Soil		ASTM METHOD D2794-00

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

OCP1-SOX-ECD-VA	Soil	OCP-1 in Soil by Soxhlet GCECD	EPA METHODS 3540, 3545, 3610, 3630, 3660

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3540, 3545, 3610, 3630, 3660 & 8081, published by the United States Environmental Protection Agency (EPA). The procedure uses an automated system (Accelerated Solvent Extractor - ASE) at high temperature and pressure or a Soxhlet system to extract a subsample of the sediment/soil with dichloromethane. The extract is then solvent exchanged to hexane followed by one or more of the following clean-up procedures (if required): alumina clean-up, silica gel clean-up and/or sulphur clean-up. The final extract is analysed by dual capillary column gas chromatography with electron capture detection (GC/ECD).

OGG-F4G-TUMB-SG-VA	Soil	CWS F4G with Silica Gel	CCME

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For gravimetric heavy hydrocarbons (F4G-sg), a subsample of the sediment/soil is extracted with 1:1 hexane:acetone using a rotary extractor. The extract undergoes a silica-gel clean-up to remove polar compounds prior to gravimetric analysis.

Notes:
1. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
3. Where F4 (C34-C50) and F4G-sg results are reported for a sample, the larger of the reported values is used for comparison against the relevant CCME standard for F4.
4. The gravimetric heavy hydrocarbon (F4G-sg) result cannot be added to the C6 to C50 hydrocarbons results.
5. This method is validated for use.
6. Data from analysis of quality control samples is available upon request.
7. Reported results are expressed as milligrams per dry kilogram.

PAH-TUMB-H/A-MS-VA	Soil	PAH by Tumbler HEX/ACE with GCMS	EPA METHODS 3570 & 8270.

Polycyclic Aromatic Hydrocarbons in Sediment/Soil
This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3570 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a mechanical shaking technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

PCB-SE-ECD-VA	Soil	PCB by Extraction with GCECD	EPA 3630/8082 GCECD

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3500, 3620, 3630, 3660, 3665 & 8082, published by the United States Environmental Protection Agency (EPA). The procedure involves a solid-liquid extraction of a subsample of the sediment/soil using a mixture of hexane and acetone. Water is added to the extract and the resulting hexane extract undergoes one or more of the following clean-up procedures (if required): florisil clean-up, silica gel clean-up, sulphur clean-up and/or sulphuric acid clean-up. The final extract is analysed by capillary column gas chromatography with electron capture detection (GC/ECD).

PH-1:2-VA	Soil	CSR pH by 1:2 Water Leach	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (10 mesh /2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

TL-CSR-MS-VA	Soil	ICPMS Tl in Soil by CSR SALM	BCMELP CSR SALM Method 8

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by either hotplate or block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

VOC-MET-PT-MS-VA	Soil	VOC by MeOH with Purge and Trap GCMS	EPA 8260B & 524.2

Volatile Organic Compounds (VOC) are extracted from sediment or soil with methanol, following a procedure from the British Columbia Ministry of Water Land and Air Protection (BCWLAP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999). Aliquots of the extract are analyzed by direct injection capillary column gas chromatography with mass spectrometric detection (GC/MS), using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260B, published by the United States Environmental Protection Agency (EPA). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

VOC7-MET-PT-MS-VA	Soil	BTEX by MeOH with Purge and Trap GCMS	EPA 8260B & 524.2

Volatile Organic Compounds (VOC) are extracted from sediment or soil with methanol, following a procedure from the British Columbia Ministry of Water Land and Air Protection (BCWLAP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999). Aliquots of the extract are analyzed by Purge and Trap by gas hromatography with mass spectrometric detection (GC/MS), using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260B, published by the United States Environmental Protection Agency (EPA). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

XYLENES-CALC-VA	Soil	CSR VOC7 by MeOH with DI GCMS	EPA 8260B & 524.2

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.
The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
N/A - Result not available. Refer to qualifier code and definition for explanation

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CANADA TOLL FREE 1-800-668-9878

www.alsenviro.com

COC # C064680

Page 1 of 1

REPORT TO:
COMPANY: Franz Environmental Inc
CONTACT: Tina Ranger / Ryan Fletcher
ADDRESS: 329 Churchill Avenue
Ottawa, Ontario
PHONE: (613) 721-0555 FAX:

INVOICE TO: SAME AS REPORT ? [✓ YES] / NO
COMPANY:
CONTACT:
ADDRESS:
PHONE: FAX:

Lab Work Order # (lab use only): L681268

REPORT FORMAT / DISTRIBUTION
STANDARD ____ OTHER ____
PDF ✓ EXCEL ✓ CUSTOM ____ FAX ____
EMAIL 1: tranger@franzenvironmental.com
EMAIL 2: rfletcher@franzenvironmental.com

INDICATE BOTTLES: FILTERED / PRESERVED (F/P) → → →

CLIENT / PROJECT INFORMATION:
JOB #: 1584-0801
~~PO~~/AFE: TC - Iqaluit Landfill
Legal Site Description:
QUOTE #:

SAMPLER (Initials):

SERVICE REQUESTED
✓ REGULAR SERVICE (DEFAULT)
RUSH SERVICE (2-3 DAYS)
PRIORITY SERVICE (1 DAY or ASAP)
EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS

ANALYSIS REQUEST

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	F1 Btex	F2-F4	Metals	PAH	PCB total	VOC	OC/Pesticides					HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
	A3-TP08-17	Sept 7/08		Soil			X											1
	A3-TP08-12				X	X	X											5
	A3-TP08-9				X	X	X		X									5
	A3-TP08-13				X	X	X	X	X	X	X							7
	A3-TP08-Dup2				X	X	X	X	X	X	X							6
	A3-TP08-14				X	X	X	X	X									7
	A3-TP08-15				X	X	X			X								6
	A3-TP08-16				X	X	X		X									6
	A3-TP08-18				X	X	X		X									6
	A3-TP08-11				X	X	X											5

GUIDELINES / REGULATIONS

SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS

Failure to complete all portions of this form may delay analysis. Please fill in this form *LEGIBLY*.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the reverse page of the white report copy.

RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:
Tina Ranger	Sept 7/08		Sept 10,08 11:58
RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:

SAMPLE CONDITION (lab use only)
TEMPERATURE: 7
SAMPLES RECEIVED IN GOOD CONDITION ? [✓ YES] / NO
(If no provide details)

REFER TO BACK PAGE FOR REGIONAL LOCATIONS AND SAMPLING INFORMATION

WHITE - REPORT COPY, PINK - FILE COPY, YELLOW - CLIENT COPY

GENF14.00

Certificate of Analysis

FRANZ ENVIRONMENTAL INC.
ATTN: TINA RANGER
200 - 329 CHURCHILL AVENUE NORTH
OTTAWA ON K1Z 5B8

Reported On: 29-SEP-08 06:08 PM

Lab Work Order #: **L681303** **Date Received:** **10-SEP-08**

Project P.O. #:
Job Reference: 1584-0801
Legal Site Desc:
CofC Numbers: C065000

Other Information:

Comments:

JANINE WEEKS
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L681303-1	L681303-2	L681303-3	L681303-4
	Description				
	Sampled Date	06-SEP-08	06-SEP-08	06-SEP-08	06-SEP-08
	Sampled Time				
	Client ID	A2-SW08-1	A2-SW08-2	A2-SW08-3	A2-SW08-4
Grouping	**Analyte**				
WATER					
Physical Tests	Hardness (as CaCO3) (mg/L)	54.2	41.8	39.6	40.1
Total Metals	Aluminum (Al)-Total (mg/L)	0.0288	0.0112	0.119	0.0247
	Antimony (Sb)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050
	Arsenic (As)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050
	Barium (Ba)-Total (mg/L)	<0.020	<0.020	<0.020	<0.020
	Beryllium (Be)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	Boron (B)-Total (mg/L)	<0.10	<0.10	<0.10	<0.10
	Cadmium (Cd)-Total (mg/L)	0.000047	<0.000017	0.000087	0.000037
	Calcium (Ca)-Total (mg/L)	15.8	11.7	11.2	11.5
	Chromium (Cr)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	Cobalt (Co)-Total (mg/L)	<0.00030	0.00032	0.00115	0.00046
	Copper (Cu)-Total (mg/L)	0.0037	0.0037	0.0071	0.0023
	Iron (Fe)-Total (mg/L)	1.07	0.757	8.37	1.72
	Lead (Pb)-Total (mg/L)	<0.00050	<0.00050	0.00200	<0.00050
	Lithium (Li)-Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050
	Magnesium (Mg)-Total (mg/L)	3.58	3.05	2.82	2.80
	Manganese (Mn)-Total (mg/L)	0.0609	0.0660	0.151	0.0755
	Mercury (Hg)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020
	Molybdenum (Mo)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	Nickel (Ni)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	Potassium (K)-Total (mg/L)	<2.0	<2.0	<2.0	<2.0
	Selenium (Se)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	Silver (Ag)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020
	Sodium (Na)-Total (mg/L)	5.4	5.7	5.2	5.3
	Thallium (Tl)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020
	Tin (Sn)-Total (mg/L)	<0.00050	<0.00050	0.00057	<0.00050
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	0.0191	<0.0050	0.0083	<0.0050
Volatile Organic Compounds	Benzene (mg/L)			<0.00050	<0.00050
	Ethylbenzene (mg/L)			<0.00050	<0.00050
	Methyl t-butyl ether (MTBE) (mg/L)			<0.0010	<0.0010
	Styrene (mg/L)			<0.00050	<0.00050
	Toluene (mg/L)			<0.0010	<0.0010
	ortho-Xylene (mg/L)			<0.00050	<0.00050
	meta- & para-Xylene (mg/L)			<0.00050	<0.00050
	Xylenes (mg/L)			<0.0010	<0.0010

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L681303-1	L681303-2	L681303-3	L681303-4	
	Description					
	Sampled Date	06-SEP-08	06-SEP-08	06-SEP-08	06-SEP-08	
	Sampled Time					
	Client ID	A2-SW08-1	A2-SW08-2	A2-SW08-3	A2-SW08-4	
Grouping	**Analyte**					
WATER						
Volatile Organic Compounds	Surrogate: 4-Bromofluorobenzene (SS) (%)			92	96	
	Surrogate: Fluorobenzene (SS) (%)			102	104	
Hydrocarbons	F2 (C10-C16) (mg/L)			<0.30	<0.30	
	F3 (C16-C34) (mg/L)			<0.30	<0.30	
	F1-BTEX (mg/L)			<0.10	<0.10	
	F1 (C6-C10) (mg/L)			<0.10	<0.10	
	Surrogate: 2,4-Dichlorotoluene (SS) (%)			123	100	
Polychlorinated Biphenyls	PCB-1016 (mg/L)			<0.0010	<0.0010	
	PCB-1221 (mg/L)			<0.0010	<0.0010	
	PCB-1232 (mg/L)			<0.0010	<0.0010	
	PCB-1242 (mg/L)			<0.0010	<0.0010	
	PCB-1248 (mg/L)			<0.0010	<0.0010	
	PCB-1254 (mg/L)			<0.0010	<0.0010	
	PCB-1260 (mg/L)			<0.0010	<0.0010	
	PCB-1262 (mg/L)			<0.0010	<0.0010	
	PCB-1268 (mg/L)			<0.0010	<0.0010	
	Total Polychlorinated Biphenyls (mg/L)			<0.0010	<0.0010	
Organochlorine Pesticides	Aldrin (mg/L)				<0.000050	
	alpha-BHC (mg/L)				<0.000050	
	beta-BHC (mg/L)				<0.00010	
	Lindane (gamma - BHC) (mg/L)				<0.000050	
	delta-BHC (mg/L)				<0.000050	
	cis-Chlordane (alpha) (mg/L)				<0.000050	
	trans-Chlordane (gamma) (mg/L)				<0.000050	
	2,4’-DDD (mg/L)				<0.00010	
	4,4’-DDD (mg/L)				<0.000050	
	2,4’-DDE (mg/L)				<0.00010	
	4,4’-DDE (mg/L)				<0.000050	
	2,4’-DDT (mg/L)				<0.00010	
	4,4’-DDT (mg/L)				<0.00010	
	Dieldrin (mg/L)				<0.000050	
	Endosulfan I (mg/L)				<0.000050	
	Endosulfan II (mg/L)				<0.000050	
	Endosulfan Sulfate (mg/L)				<0.000050	
	Endrin (mg/L)				<0.00020	
	Heptachlor (mg/L)				<0.00010	
	Heptachlor Epoxide (mg/L)				<0.000050	

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L681303-1	L681303-2	L681303-3	L681303-4	
	Description					
	Sampled Date	06-SEP-08	06-SEP-08	06-SEP-08	06-SEP-08	
	Sampled Time					
	Client ID	A2-SW08-1	A2-SW08-2	A2-SW08-3	A2-SW08-4	
Grouping	**Analyte**					
WATER						
Organochlorine Pesticides	Methoxychlor (mg/L)				<0.00020	
	Mirex (mg/L)				<0.000050	
	cis-Nonachlor (mg/L)				<0.000050	
	trans-Nonachlor (mg/L)				<0.000050	
	Oxychlordane (mg/L)				<0.000050	

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
F1-BTX-CALC-VA	Water	F1-Total BTX	CCME CWS PHC TIER 1 (2001)

This analysis is based on the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10), the sample undergoes a purge and trap extraction prior to analysis by GC/FID. The F1-BTEX result is calculated as follows:

F1-BTEX: F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
F1-PT-FID-VA	Water	CCME F1 By P&T with GCFID	EPA SW-846, METHOD 8260

This analysis is based on the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10), the sample undergoes a purge and trap extraction prior to analysis by GC/FID.

F1 (C6-C10): Sum of all hydrocarbons that elute between nC6 and nC10.

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
F2-F3-SF-FID-VA	Water	Extractable Hydrocanbons in water GCFID	CWS (CCME)

Petroleum Hydrocarbons (F2-F3) in Water

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, published by the United States Environmental Protection Agency (EPA) and the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." The procedure involves a liquid-liquid extraction of the entire water sample using dichloromethane prior to capillary column gas chromatography with flame ionization detection (GC/FID).

A silica gel cleanup procedure is applied before GC analysis, which is intended to selectively remove most naturally occurring organics.

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
HG-TOT-CCME-CVAFS-VA	Water	Total Mercury in Water by CVAFS (CCME)	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
MET-TOT-CCME-ICP-VA	Water	Total Metals in Water by ICPOES (CCME)	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
MET-TOT-CCME-MS-VA	Water	Total Metals in Water by ICPMS (CCME)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
OCP1-SF-ECD-VA	Water	OCP-1 in Water by GCECD	EPA METHODS 3510, 3610, 3630, 3660, 8081

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3510, 3610, 3630, 3660 & 8081, published by the United States Environmental Protection Agency (EPA). The procedure involves extraction of the entire water sample with dichloromethane. The extract is then solvent exchanged to hexane followed by one or more of the following clean-up procedures (if required): alumina clean-up, silica gel clean-up and/or sulphur clean-up. The final extract is analysed by dual capillary column gas chromatography with electron capture detection (GC/ECD) and/or mass spectrometric detection (GC/MS).

Reference Information

Methods Listed (if applicable):

<table>
<tr><th>ALS Test Code</th><th>Matrix</th><th>Test Description</th><th>Analytical Method Reference(Based On)</th></tr>
<tr><td>PCB-SF-ECD-VA</td><td>Water</td><td>PCB by Extraction with GCECD</td><td>EPA 3510/8082 Liq-Liq GCECD</td></tr>
<tr><td colspan="4">This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3510, 3620, 3660, 3665 & 8082, published by the United States Environmental Protection Agency (EPA). The procedure involves a liquid-liquid extraction of the entire water sample using dichloromethane. The extract is then solvent exchanged to hexane followed by one or more of the following clean-up procedures (if required): florisil clean-up, sulphur clean-up and/or sulphuric acid clean-up. The final extract is analysed by capillary column gas chromatography with electron capture detection (GC/ECD).</td></tr>
<tr><td>VOC7-PT-MS-VA</td><td>Water</td><td>BTEX by Purge Trap GCMS</td><td>EPA 8260b, BCMELP CSR Method</td></tr>
<tr><td colspan="4">This procedure involves the purge and trap extraction of the sample prior to analysis for specific Volatile Organic Compounds (VOC) by capillary column gas chromatography with mass spectrometric detection (GC/MS). The VOC analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260, published by the United States Environmental Protection Agency (EPA). Note: For chlorinated waters certain conditions may cause the formation of trihalomethanes after sample collection. Appropriate chemical treatment of chlorinated waters will prevent trihalomethane formation in the samples. Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.</td></tr>
<tr><td>XYLENES-CALC-VA</td><td>Water</td><td>CSR VOC7 by MeOH with DI GCMS</td><td>CALCULATION</td></tr>
<tr><td colspan="4">Calculation of Total Xylenes
Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.</td></tr>
</table>

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.
The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
N/A - Result not available. Refer to qualifier code and definition for explanation

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

L681303
Attachment
25-Sep-08

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample ID	L681303-3	L681303-4	BLK
Description			QC
Client ID	A2-SW08-3	A2-SW08-4	
Class in Matrix (units)	Water	Water	
Analyte	F4(mg/L)	F4(mg/L)	
Parameter 1	<0.30	<0.30	<0.3
Surrogate 1 (%)	71	114	105

Unit of Measurement =
blue highlight = raised detection limit due to interference
green highlight = surrogate recovery (%)

Notes:

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CANADA TOLL FREE 1-800-668-9878

www.alsenviro.com

COC # C065000

Page ___ of ___

REPORT TO:
COMPANY: Franz Environmental Inc
CONTACT: Ryan Fletcher / Tina Ranger
ADDRESS: 329 Churchill Avenue
PHONE: (613) 721-0555 FAX:

INVOICE TO: **SAME AS REPORT ?** [✓ YES] NO
COMPANY:
CONTACT:
ADDRESS:
PHONE: FAX:

REPORT FORMAT / DISTRIBUTION
STANDARD ___ OTHER ___
PDF X EXCEL X CUSTOM ___ FAX ___
EMAIL 1: tranger@franzenvironmental.com
EMAIL 2: rfletcher@franzenvironmental.com

INDICATE BOTTLES: FILTERED / PRESERVED (F/P) → → →

CLIENT / PROJECT INFORMATION:
JOB #: TA Iqaluit Landfill [illegible]
PO /AFE: 1584-0801
Legal Site Description:
QUOTE #:

SAMPLER (Initials): TR

SERVICE REQUESTED
☒ REGULAR SERVICE (DEFAULT)
☐ RUSH SERVICE (2-3 DAYS)
☐ PRIORITY SERVICE (1 DAY or ASAP)
☐ EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS

ANALYSIS REQUEST

SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	F1 Btex	F2-F4	PAH	Metals	VOC	PCB total	Pesticides OC					HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
A2-SW08-1	Sept 6/08		Surface Water				X										1
A2-SW08-2	↓		Surface Water				X										1
A2-SW08-3			Surface Water	X	X		X		X								8
A2-SW08-4			Surface Water	X	X		X		X	X							10

GUIDELINES / REGULATIONS

SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS

Failure to complete all portions of this form may delay analysis. Please fill in this form *LEGIBLY*.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the reverse page of the white report copy.

RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:
Tina Ranger	Sept 6/08	ZN	Sept 10/08 11:40
RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:

TEMPERATURE 5

SAMPLES RECEIVED IN GOOD CONDITION ? [✓ YES] NO
(If no provide details)

REFER TO BACK PAGE FOR REGIONAL LOCATIONS AND SAMPLING INFORMATION

WHITE - REPORT COPY, PINK - FILE COPY, YELLOW - CLIENT COPY

GENF14.00

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Certificate of Analysis

FRANZ ENVIRONMENTAL INC.
ATTN: TINA RANGER
200 - 329 CHURCHILL AVENUE NORTH
OTTAWA ON K1Z 5B8

Reported On: 30-SEP-08 09:16 PM

Lab Work Order #: **L681311**

Date Received: **10-SEP-08**

Project P.O. #:
Job Reference: 1584-0801
Legal Site Desc:
CofC Numbers: C064996

Other Information:

Comments:

JANINE WEEKS
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L681311-1	L681311-2	L681311-3	L681311-4	L681311-5
	Description					
	Sampled Date	06-SEP-08	06-SEP-08	06-SEP-08	06-SEP-08	06-SEP-08
	Sampled Time					
	Client ID	A2-TP08-1	A2-TP08-2	A2-S008-1	A2-S008-2	A2-S008-3
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	20.0	18.6			50.0
	pH (pH)	6.03	6.30	5.43	5.94	6.55
Metals	Antimony (Sb) (mg/kg)	<10	<10	<10	<10	<10
	Arsenic (As) (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Barium (Ba) (mg/kg)	134	17.7	84.4	59.0	61.9
	Beryllium (Be) (mg/kg)	<0.50	1.02	<0.50	<0.50	<0.50
	Cadmium (Cd) (mg/kg)	22.4	<0.50	<0.50	<0.50	2.73
	Chromium (Cr) (mg/kg)	22.1	6.4	16.3	21.4	55.4
	Cobalt (Co) (mg/kg)	5.3	2.1	13.5	13.3	13.7
	Copper (Cu) (mg/kg)	29.2	6.4	17.6	292	70.3
	Lead (Pb) (mg/kg)	100	<30	<30	<30	96
	Mercury (Hg) (mg/kg)	0.0258	0.0474	0.0460	0.0575	0.0414
	Molybdenum (Mo) (mg/kg)	<4.0	<4.0	<4.0	<4.0	<4.0
	Nickel (Ni) (mg/kg)	7.2	<5.0	8.8	10.9	23.9
	Selenium (Se) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Silver (Ag) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Thallium (Tl) (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Tin (Sn) (mg/kg)	<5.0	<5.0	<5.0	9.8	8.7
	Vanadium (V) (mg/kg)	40.3	17.9	36.8	28.9	23.4
	Zinc (Zn) (mg/kg)	92.1	39.2	499	111	145
Volatile Organic Compounds	Benzene (mg/kg)	<0.040	<0.040			<0.040
	Ethylbenzene (mg/kg)	<0.050	<0.050			<0.050
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20	<0.20			<0.20
	Styrene (mg/kg)	<0.050	<0.050			<0.050
	Toluene (mg/kg)	<0.050	<0.050			<0.050
	ortho-Xylene (mg/kg)	<0.050	<0.050			<0.050
	meta- & para-Xylene (mg/kg)	<0.050	<0.050			<0.050
	Xylenes (mg/kg)	<0.10	<0.10			<0.10
	Surrogate: 4-Bromofluorobenzene (SS) (%)	93	90			107
	Surrogate: Fluorobenzene (SS) (%)	89	85			85
Hydrocarbons	F4G-SG (mg/kg)	<500				<500
	F2 (C10-C16) (mg/kg)	<30	<30			<30
	F3 (C16-C34) (mg/kg)	180	80			220
	F4 (C34-C50) (mg/kg)	93	51			94
	F1-BTEX (mg/kg)	<10	<10			<10
	F1 (C6-C10) (mg/kg)	<10	<10			<10
	Chrom. to baseline at nC50	NO	YES			NO
	Surrogate: 2,4-Dichlorotoluene (SS) (%)	94	106			97

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID **Description** **Sampled Date** **Sampled Time** **Client ID**	L681311-6 06-SEP-08 A2-S008-4				
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	40.3				
	pH (pH)	6.76				
Metals	Antimony (Sb) (mg/kg)	<10				
	Arsenic (As) (mg/kg)	6.3				
	Barium (Ba) (mg/kg)	155				
	Beryllium (Be) (mg/kg)	<0.50				
	Cadmium (Cd) (mg/kg)	2.83				
	Chromium (Cr) (mg/kg)	50.2				
	Cobalt (Co) (mg/kg)	20.6				
	Copper (Cu) (mg/kg)	48.9				
	Lead (Pb) (mg/kg)	201				
	Mercury (Hg) (mg/kg)	0.0508				
	Molybdenum (Mo) (mg/kg)	<4.0				
	Nickel (Ni) (mg/kg)	24.6				
	Selenium (Se) (mg/kg)	<2.0				
	Silver (Ag) (mg/kg)	<2.0				
	Thallium (Tl) (mg/kg)	<1.0				
	Tin (Sn) (mg/kg)	8.9				
	Vanadium (V) (mg/kg)	24.1				
	Zinc (Zn) (mg/kg)	333				
Volatile Organic Compounds	Benzene (mg/kg)	<0.040				
	Ethylbenzene (mg/kg)	<0.050				
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20				
	Styrene (mg/kg)	<0.050				
	Toluene (mg/kg)	<0.050				
	ortho-Xylene (mg/kg)	<0.050				
	meta- & para-Xylene (mg/kg)	<0.050				
	Xylenes (mg/kg)	<0.10				
	Surrogate: 4-Bromofluorobenzene (SS) (%)	94				
	Surrogate: Fluorobenzene (SS) (%)	91				
Hydrocarbons	F4G-SG (mg/kg)	<500				
	F2 (C10-C16) (mg/kg)	33				
	F3 (C16-C34) (mg/kg)	248				
	F4 (C34-C50) (mg/kg)	99				
	F1-BTEX (mg/kg)	<10				
	F1 (C6-C10) (mg/kg)	<10				
	Chrom. to baseline at nC50	NO				
	Surrogate: 2,4-Dichlorotoluene (SS) (%)	90				

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L681311-1	L681311-2	L681311-3	L681311-4	L681311-5
	Description					
	Sampled Date	06-SEP-08	06-SEP-08	06-SEP-08	06-SEP-08	06-SEP-08
	Sampled Time					
	Client ID	A2-TP08-1	A2-TP08-2	A2-S008-1	A2-S008-2	A2-S008-3
Grouping	**Analyte**					
SOIL						
Polychlorinated Biphenyls	PCB-1016 (mg/kg)	<0.50				<0.080
	PCB-1221 (mg/kg)	<0.50				<0.080
	PCB-1232 (mg/kg)	<0.50				<0.080
	PCB-1242 (mg/kg)	<0.50				<0.080
	PCB-1248 (mg/kg)	<0.50				<0.080
	PCB-1254 (mg/kg)	<0.50				<0.080
	PCB-1260 (mg/kg)	4.76				0.976
	PCB-1262 (mg/kg)	<0.50				<0.080
	PCB-1268 (mg/kg)	<0.50				<0.080
	Total Polychlorinated Biphenyls (mg/kg)	4.76				0.976
Organochlorine Pesticides	Aldrin (mg/kg)					
	alpha-BHC (mg/kg)					
	beta-BHC (mg/kg)					
	Lindane (gamma - BHC) (mg/kg)					
	delta-BHC (mg/kg)					
	cis-Chlordane (alpha) (mg/kg)					
	trans-Chlordane (gamma) (mg/kg)					
	2,4’-DDD (mg/kg)					
	4,4’-DDD (mg/kg)					
	2,4’-DDE (mg/kg)					
	4,4’-DDE (mg/kg)					
	2,4’-DDT (mg/kg)					
	4,4’-DDT (mg/kg)					
	Dieldrin (mg/kg)					
	Endosulfan I (mg/kg)					
	Endosulfan II (mg/kg)					
	Endosulfan Sulfate (mg/kg)					
	Endrin (mg/kg)					
	Heptachlor (mg/kg)					
	Heptachlor Epoxide (mg/kg)					
	Methoxychlor (mg/kg)					
	Mirex (mg/kg)					
	cis-Nonachlor (mg/kg)					
	trans-Nonachlor (mg/kg)					
	Oxychlordane (mg/kg)					

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L681311-6				
	Description					
	Sampled Date	06-SEP-08				
	Sampled Time					
	Client ID	A2-S008-4				
Grouping	**Analyte**					
SOIL						
Polychlorinated Biphenyls	PCB-1016 (mg/kg)	<0.050				
	PCB-1221 (mg/kg)	<0.050				
	PCB-1232 (mg/kg)	<0.050				
	PCB-1242 (mg/kg)	<0.050				
	PCB-1248 (mg/kg)	<0.050				
	PCB-1254 (mg/kg)	<0.050				
	PCB-1260 (mg/kg)	0.560				
	PCB-1262 (mg/kg)	<0.050				
	PCB-1268 (mg/kg)	<0.050				
	Total Polychlorinated Biphenyls (mg/kg)	0.560				
Organochlorine Pesticides	Aldrin (mg/kg)	<0.0020				
	alpha-BHC (mg/kg)	<0.0020				
	beta-BHC (mg/kg)	<0.0020				
	Lindane (gamma - BHC) (mg/kg)	<0.0020				
	delta-BHC (mg/kg)	<0.0020				
	cis-Chlordane (alpha) (mg/kg)	<0.0020				
	trans-Chlordane (gamma) (mg/kg)	<0.0020				
	2,4’-DDD (mg/kg)	<0.0020				
	4,4’-DDD (mg/kg)	0.0149				
	2,4’-DDE (mg/kg)	<0.0020				
	4,4’-DDE (mg/kg)	0.0290				
	2,4’-DDT (mg/kg)	<0.0020				
	4,4’-DDT (mg/kg)	0.0175				
	Dieldrin (mg/kg)	<0.0020				
	Endosulfan I (mg/kg)	<0.0020				
	Endosulfan II (mg/kg)	<0.0020				
	Endosulfan Sulfate (mg/kg)	<0.0020				
	Endrin (mg/kg)	<0.0050				
	Heptachlor (mg/kg)	<0.0020				
	Heptachlor Epoxide (mg/kg)	<0.0020				
	Methoxychlor (mg/kg)	<0.0050				
	Mirex (mg/kg)	<0.0020				
	cis-Nonachlor (mg/kg)	<0.0020				
	trans-Nonachlor (mg/kg)	<0.0020				
	Oxychlordane (mg/kg)	<0.0020				

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
F1-BTX-CALC-VA	Soil	F1-Total BTX	CCME CWS PHC TIER 1 (2001)

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10) and F1-BTEX, a subsample of the sediment/soil is extracted with methanol and analysed by purge & trap GC/FID. The F1-BTEX result is then calculated as follows:

F1-BTEX: F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).

F1-MET-PT-FID-VA	Soil	CCME by Purge and Trap with GCMS	EPA 8260B & 524.2

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10), a subsample of the sediment/soil is extracted with methanol and analysed by purge & trap GC/FID.

Notes:
1. F1 (C6-C10): Sum of all hydrocarbons that elute between nC6 and nC10.
2. Reported results are expressed as milligrams per dry kilogram.
3. This method is validated for use.
4. Data from analysis of quality control samples is available upon request.

F2F4-TUMB-H/A-FID-VA	Soil	Petroleum Hydrocarbon by Tumbler GCFID	CCME

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For C10 to C50 hydrocarbons (F2, F3, F4) and gravimetric heavy hydrocarbons (F4G-sg), a subsample of the sediment/soil is extracted with 1:1 hexane:acetone using a rotary extractor. The extract undergoes a silica-gel clean-up to remove polar compounds. F2, F3 & F4 are analyzed by on-column GC/FID, and F4G-sg is analyzed gravimetrically.

Notes:
1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where F4 (C34-C50) and F4G-sg results are reported for a sample, the larger of the reported values is used for comparison against the relevant CCME standard for F4.
7. The gravimetric heavy hydrocarbon results (F4G-sg), cannot be added to the C6 to C50 hydrocarbon results.
8. This method is validated for use.
9. Data from analysis of quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram.

HG-CCME-CVAFS-VA	Soil	CVAFS Hg in Soil (CCME)	CCME

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry (EPA Method 7000 series).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

MET-CSR-FULL-ICP-VA	Soil	Metals in Soil by ICPOES (CSR SALM)	BCMELP CSR SALM METHOD 8

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

mobile in the environment.

MOISTURE-VA	Soil	Moisture content	ASTM METHOD D2794-00

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

MOISTURE-VA	Soil		ASTM METHOD D2794-00

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

OCP1-SOX-ECD-VA	Soil	OCP-1 in Soil by Soxhlet GCECD	EPA METHODS 3540, 3545, 3610, 3630, 3660

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3540, 3545, 3610, 3630, 3660 & 8081, published by the United States Environmental Protection Agency (EPA). The procedure uses an automated system (Accelerated Solvent Extractor - ASE) at high temperature and pressure or a Soxhlet system to extract a subsample of the sediment/soil with dichloromethane. The extract is then solvent exchanged to hexane followed by one or more of the following clean-up procedures (if required): alumina clean-up, silica gel clean-up and/or sulphur clean-up. The final extract is analysed by dual capillary column gas chromatography with electron capture detection (GC/ECD).

OGG-F4G-TUMB-SG-VA	Soil	CWS F4G with Silica Gel	CCME

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For gravimetric heavy hydrocarbons (F4G-sg), a subsample of the sediment/soil is extracted with 1:1 hexane:acetone using a rotary extractor. The extract undergoes a silica-gel clean-up to remove polar compounds prior to gravimetric analysis.

Notes:
1. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
3. Where F4 (C34-C50) and F4G-sg results are reported for a sample, the larger of the reported values is used for comparison against the relevant CCME standard for F4.
4. The gravimetric heavy hydrocarbon (F4G-sg) result cannot be added to the C6 to C50 hydrocarbons results.
5. This method is validated for use.
6. Data from analysis of quality control samples is available upon request.
7. Reported results are expressed as milligrams per dry kilogram.

PCB-SE-ECD-VA	Soil	PCB by Extraction with GCECD	EPA 3630/8082 GCECD

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3500, 3620, 3630, 3660, 3665 & 8082, published by the United States Environmental Protection Agency (EPA). The procedure involves a solid-liquid extraction of a subsample of the sediment/soil using a mixture of hexane and acetone. Water is added to the extract and the resulting hexane extract undergoes one or more of the following clean-up procedures (if required): florisil clean-up, silica gel clean-up, sulphur clean-up and/or sulphuric acid clean-up. The final extract is analysed by capillary column gas chromatography with electron capture detection (GC/ECD).

PH-1:2-VA	Soil	CSR pH by 1:2 Water Leach	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (10 mesh /2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

TL-CSR-MS-VA	Soil	ICPMS Tl in Soil by CSR SALM	BCMELP CSR SALM Method 8

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by either hotplate or block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
VOC7-MET-PT-MS-VA	Soil	BTEX by MeOH with Purge and Trap GCMS	EPA 8260B & 524.2

Volatile Organic Compounds (VOC) are extracted from sediment or soil with methanol, following a procedure from the British Columbia Ministry of Water Land and Air Protection (BCWLAP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999). Aliquots of the extract are analyzed by Purge and Trap by gas hromatography with mass spectrometric detection (GC/MS), using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260B, published by the United States Environmental Protection Agency (EPA). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
XYLENES-CALC-VA	Soil	CSR VOC7 by MeOH with DI GCMS	EPA 8260B & 524.2

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.
The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
N/A - Result not available. Refer to qualifier code and definition for explanation

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CANADA TOLL FREE 1-800-668-9878

www.alsenviro.com

COC # C064996

Page ___ of ___

REPORT TO:
COMPANY: Franz Environmental Inc.com
CONTACT: ~~Fletcher~~ Ryan Fletcher/Tina Rogers
ADDRESS: 329 Churchill Avenue
Ottawa, Ontario
PHONE (613) 721-0555 FAX:

INVOICE TO: SAME AS REPORT ? [✓ YES] / NO
COMPANY:
CONTACT:
ADDRESS:
PHONE: FAX:

REPORT FORMAT / DISTRIBUTION
STANDARD ___ OTHER ___
PDF X EXCEL X CUSTOM ___ FAX ___
EMAIL 1: trogers@franzenvironmental.com
EMAIL 2: rfletcher@franzenvironmental.com

INDICATE BOTTLES: FILTERED / PRESERVED (F/P) → → →

CLIENT / PROJECT INFORMATION:
JOB #: TCA Iqaluit Landfill (IBA)#
PO /AFE: 1584-0801
Legal Site Description:
QUOTE #:

SAMPLER (Initials): TR

SERVICE REQUESTED
☒ REGULAR SERVICE (DEFAULT)
☐ RUSH SERVICE (2-3 DAYS)
☐ PRIORITY SERVICE (1 DAY or ASAP)
☐ EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS

ANALYSIS REQUEST

SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	F1 Btex	F2-F4	PAH	Metals	VoC	PCB Totals	Pesticides OC					HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
A2-TP08-1	Sept 6/08		Soil	X	X		X		X								5
A2-TP08-2	Sept 6/08		Soil	X	X		X										5
A2-SD08-1	″ ″		Sediment				X										1
A2-SD08-2			Sediment				X										1
A2-SD08-3			Sediment	X	X		X		X								5
A2-SD08-4			Sediment	X	X		X		X	X							7

GUIDELINES / REGULATIONS

SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS

Failure to complete all portions of this form may delay analysis. Please fill in this form *LEGIBLY*.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the reverse page of the white report copy.

RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:	TEMPERATURE	SAMPLES RECEIVED IN GOOD CONDITION ? [✓ YES] / NO (If no provide details)
Tina Rogers	Sept 6/08	TR	Sep 10/08 14:40	5	
RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:		

REFER TO BACK PAGE FOR REGIONAL LOCATIONS AND SAMPLING INFORMATION WHITE - REPORT COPY, PINK - FILE COPY, YELLOW - CLIENT COPY GENF14.00

Certificate of Analysis

FRANZ ENVIRONMENTAL INC.
ATTN: TINA RANGER
200 - 329 CHURCHILL AVENUE NORTH
OTTAWA ON K1Z 5B8

Reported On: 26-SEP-08 05:08 PM

Lab Work Order #: **L681400** **Date Received:** **10-SEP-08**

Project P.O. #:
Job Reference: 1584-0801
Legal Site Desc:
CofC Numbers: C064997

Other Information:

Comments:

JANINE WEEKS
Account Manager

	Sample ID	L681400-1	L681400-2	L681400-3	L681400-4	L681400-5
	Description					
	Sampled Date	06-SEP-08	06-SEP-08	06-SEP-08	06-SEP-08	06-SEP-08
	Sampled Time					
	Client ID	A3-TP08-1	A3-TP08-2	A3-TP08-3	A3-TP08-4	A3-TP08-5
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)		47.3	53.7		10.9
	pH (pH)	7.79	5.90	6.00	5.03	6.00
Metals	Antimony (Sb) (mg/kg)	<10	<10	<10	<10	<10
	Arsenic (As) (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Barium (Ba) (mg/kg)	24.8	425	18.6	24.5	33.6
	Beryllium (Be) (mg/kg)	<0.50	0.79	<0.50	<0.50	<0.50
	Cadmium (Cd) (mg/kg)	<0.50	<0.50	<0.50	0.64	<0.50
	Chromium (Cr) (mg/kg)	15.6	8.4	12.0	15.6	24.0
	Cobalt (Co) (mg/kg)	4.0	2.6	2.4	3.2	3.0
	Copper (Cu) (mg/kg)	14.9	18.3	15.1	17.9	5.8
	Lead (Pb) (mg/kg)	<30	<30	<30	52	<30
	Mercury (Hg) (mg/kg)	0.0099	0.0691	0.105	0.0953	<0.0050
	Molybdenum (Mo) (mg/kg)	<4.0	<4.0	<4.0	<4.0	<4.0
	Nickel (Ni) (mg/kg)	5.6	<5.0	<5.0	6.3	<5.0
	Selenium (Se) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Silver (Ag) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Thallium (Tl) (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Tin (Sn) (mg/kg)	<5.0	<5.0	<5.0	8.7	<5.0
	Vanadium (V) (mg/kg)	38.0	13.9	25.9	32.5	53.6
	Zinc (Zn) (mg/kg)	46.9	126	34.3	38.7	28.3
Volatile Organic Compounds	Benzene (mg/kg)		<0.040	<0.040		<0.040
	Bromodichloromethane (mg/kg)					
	Bromoform (mg/kg)					
	Carbon Tetrachloride (mg/kg)					
	Chlorobenzene (mg/kg)					
	Dibromochloromethane (mg/kg)					
	Chloroethane (mg/kg)					
	Chloroform (mg/kg)					
	Chloromethane (mg/kg)					
	1,2-Dichlorobenzene (mg/kg)					
	1,3-Dichlorobenzene (mg/kg)					
	1,4-Dichlorobenzene (mg/kg)					
	1,1-Dichloroethane (mg/kg)					
	1,2-Dichloroethane (mg/kg)					
	1,1-Dichloroethylene (mg/kg)					
	cis-1,2-Dichloroethylene (mg/kg)					
	trans-1,2-Dichloroethylene (mg/kg)					
	Dichloromethane (mg/kg)					

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L681400-6	L681400-7	L681400-8	L681400-9	L681400-10
	Sample ID	L681400-6	L681400-7	L681400-8	L681400-9	L681400-10
	Description					
	Sampled Date	06-SEP-08	06-SEP-08	06-SEP-08	06-SEP-08	06-SEP-08
	Sampled Time					
	Client ID	A3-TP08-6	A3-TP08-7	A3-TP08-8	A3-DUP-1	A3-TP08-10
SOIL						
Physical Tests	% Moisture (%)	20.4	27.7	27.6	9.54	17.3
	pH (pH)	5.31	5.80		6.16	5.98
Metals	Antimony (Sb) (mg/kg)	<10	<10		<10	<10
	Arsenic (As) (mg/kg)	5.3	<5.0		<5.0	<5.0
	Barium (Ba) (mg/kg)	44.3	55.9		36.9	50.3
	Beryllium (Be) (mg/kg)	<0.50	<0.50		<0.50	<0.50
	Cadmium (Cd) (mg/kg)	<0.50	<0.50		<0.50	0.76
	Chromium (Cr) (mg/kg)	23.1	24.0		25.5	23.8
	Cobalt (Co) (mg/kg)	3.2	3.0		3.6	3.7
	Copper (Cu) (mg/kg)	4.7	6.1		5.7	3.9
	Lead (Pb) (mg/kg)	<30	<30		<30	<30
	Mercury (Hg) (mg/kg)	0.0104	0.0104		<0.0050	0.0073
	Molybdenum (Mo) (mg/kg)	4.9	<4.0		<4.0	4.9
	Nickel (Ni) (mg/kg)	5.7	6.1		5.3	<5.0
	Selenium (Se) (mg/kg)	<2.0	<2.0		<2.0	<2.0
	Silver (Ag) (mg/kg)	<2.0	<2.0		<2.0	<2.0
	Thallium (Tl) (mg/kg)	<1.0	<1.0		<1.0	<1.0
	Tin (Sn) (mg/kg)	<5.0	<5.0		<5.0	<5.0
	Vanadium (V) (mg/kg)	56.2	23.4		55.7	55.9
	Zinc (Zn) (mg/kg)	25.8	51.0		30.3	47.3
Volatile Organic Compounds	Benzene (mg/kg)	<0.040	<0.040	<0.040	<0.040	<0.040
	Bromodichloromethane (mg/kg)					<0.050
	Bromoform (mg/kg)					<0.050
	Carbon Tetrachloride (mg/kg)					<0.050
	Chlorobenzene (mg/kg)					<0.050
	Dibromochloromethane (mg/kg)					<0.050
	Chloroethane (mg/kg)					<0.10
	Chloroform (mg/kg)					<0.10
	Chloromethane (mg/kg)					<0.10
	1,2-Dichlorobenzene (mg/kg)					<0.050
	1,3-Dichlorobenzene (mg/kg)					<0.050
	1,4-Dichlorobenzene (mg/kg)					<0.050
	1,1-Dichloroethane (mg/kg)					<0.050
	1,2-Dichloroethane (mg/kg)					<0.050
	1,1-Dichloroethylene (mg/kg)					<0.050
	cis-1,2-Dichloroethylene (mg/kg)					<0.050
	trans-1,2-Dichloroethylene (mg/kg)					<0.050
	Dichloromethane (mg/kg)					<0.60

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L681400-1	L681400-2	L681400-3	L681400-4	L681400-5
	Description					
	Sampled Date	06-SEP-08	06-SEP-08	06-SEP-08	06-SEP-08	06-SEP-08
	Sampled Time					
	Client ID	A3-TP08-1	A3-TP08-2	A3-TP08-3	A3-TP08-4	A3-TP08-5
Grouping	**Analyte**					
SOIL						
Volatile Organic Compounds	1,2-Dichloropropane (mg/kg)					
	cis-1,3-Dichloropropylene (mg/kg)					
	trans-1,3-Dichloropropylene (mg/kg)					
	Ethylbenzene (mg/kg)		<0.050	<0.050		<0.050
	Methyl t-butyl ether (MTBE) (mg/kg)		<0.20	<0.20		<0.20
	Styrene (mg/kg)		<0.050	<0.050		<0.050
	1,1,1,2-Tetrachloroethane (mg/kg)					
	1,1,2,2-Tetrachloroethane (mg/kg)					
	Tetrachloroethylene (mg/kg)					
	Toluene (mg/kg)		<0.050	<0.050		<0.050
	1,1,1-Trichloroethane (mg/kg)					
	1,1,2-Trichloroethane (mg/kg)					
	Trichloroethylene (mg/kg)					
	Trichlorofluoromethane (mg/kg)					
	Vinyl Chloride (mg/kg)					
	ortho-Xylene (mg/kg)		<0.050	<0.050		<0.050
	meta- & para-Xylene (mg/kg)		<0.050	<0.050		<0.050
	Xylenes (mg/kg)		<0.10	<0.10		<0.10
	Surrogate: 4-Bromofluorobenzene (SS) (%)		82	78		89
	Surrogate: Fluorobenzene (SS) (%)		80	80		89
Hydrocarbons	F4G-SG (mg/kg)			<500		
	F2 (C10-C16) (mg/kg)		450	35		<30
	F3 (C16-C34) (mg/kg)		44400	343		<50
	F4 (C34-C50) (mg/kg)		6960	213		<50
	F1-BTEX (mg/kg)		<10	<10		<10
	F1 (C6-C10) (mg/kg)		<10	<10		<10
	Chrom. to baseline at nC50		YES	NO		YES
	Surrogate: 2,4-Dichlorotoluene (SS) (%)		57	85		93
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)					<0.040
	Acenaphthylene (mg/kg)					<0.050
	Anthracene (mg/kg)					<0.050
	Benz(a)anthracene (mg/kg)					<0.050
	Benzo(a)pyrene (mg/kg)					<0.050
	Benzo(b)fluoranthene (mg/kg)					<0.050
	Benzo(g,h,i)perylene (mg/kg)					<0.050
	Benzo(k)fluoranthene (mg/kg)					<0.050
	Chrysene (mg/kg)					<0.050

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte					
	Sample ID	L681400-6	L681400-7	L681400-8	L681400-9	L681400-10
	Description					
	Sampled Date	06-SEP-08	06-SEP-08	06-SEP-08	06-SEP-08	06-SEP-08
	Sampled Time					
	Client ID	A3-TP08-6	A3-TP08-7	A3-TP08-8	A3-DUP-1	A3-TP08-10
SOIL						
Volatile Organic Compounds	1,2-Dichloropropane (mg/kg)					<0.050
	cis-1,3-Dichloropropylene (mg/kg)					<0.050
	trans-1,3-Dichloropropylene (mg/kg)					<0.050
	Ethylbenzene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Styrene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	1,1,1,2-Tetrachloroethane (mg/kg)					<0.050
	1,1,2,2-Tetrachloroethane (mg/kg)					<0.050
	Tetrachloroethylene (mg/kg)					<0.050
	Toluene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	1,1,1-Trichloroethane (mg/kg)					<0.050
	1,1,2-Trichloroethane (mg/kg)					<0.050
	Trichloroethylene (mg/kg)					<0.015
	Trichlorofluoromethane (mg/kg)					<0.10
	Vinyl Chloride (mg/kg)					<0.10
	ortho-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	meta- & para-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Xylenes (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Surrogate: 4-Bromofluorobenzene (SS) (%)	84	78	94	92	62
	Surrogate: Fluorobenzene (SS) (%)	91	82	87	91	58
Hydrocarbons	F4G-SG (mg/kg)					
	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
	F3 (C16-C34) (mg/kg)	<50	<50	<50	<50	<50
	F4 (C34-C50) (mg/kg)	<50	<50	<50	<50	<50
	F1-BTEX (mg/kg)	<10	<10	<10	<10	<10
	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10
	Chrom. to baseline at nC50	YES	YES	YES	YES	YES
	Surrogate: 2,4-Dichlorotoluene (SS) (%)	96	99	93	91	96
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)		<0.040			<0.040
	Acenaphthylene (mg/kg)		<0.050			<0.050
	Anthracene (mg/kg)		<0.050			<0.050
	Benz(a)anthracene (mg/kg)		<0.050			<0.050
	Benzo(a)pyrene (mg/kg)		<0.050			<0.050
	Benzo(b)fluoranthene (mg/kg)		<0.050			<0.050
	Benzo(g,h,i)perylene (mg/kg)		<0.050			<0.050
	Benzo(k)fluoranthene (mg/kg)		<0.050			<0.050
	Chrysene (mg/kg)		<0.050			<0.050

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID **Description** **Sampled Date** **Sampled Time** **Client ID**	L681400-1 06-SEP-08 A3-TP08-1	L681400-2 06-SEP-08 A3-TP08-2	L681400-3 06-SEP-08 A3-TP08-3	L681400-4 06-SEP-08 A3-TP08-4	L681400-5 06-SEP-08 A3-TP08-5
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Dibenz(a,h)anthracene (mg/kg)					<0.050
	Fluoranthene (mg/kg)					<0.050
	Fluorene (mg/kg)					<0.050
	Indeno(1,2,3-c,d)pyrene (mg/kg)					<0.050
	2-Methylnaphthalene (mg/kg)					<0.050
	Naphthalene (mg/kg)					<0.050
	Phenanthrene (mg/kg)					<0.050
	Pyrene (mg/kg)					<0.050
	Surrogate: d10-Acenaphthene (SS) (%)					86
	Surrogate: d12-Chrysene (SS) (%)					99
	Surrogate: d8-Naphthalene (SS) (%)					86
	Surrogate: d10-Phenanthrene (SS) (%)					87
Polychlorinated Biphenyls	PCB-1016 (mg/kg)		<1.5			<0.050
	PCB-1221 (mg/kg)		<1.5			<0.050
	PCB-1232 (mg/kg)		<1.5			<0.050
	PCB-1242 (mg/kg)		<1.5			<0.050
	PCB-1248 (mg/kg)		<1.5			<0.050
	PCB-1254 (mg/kg)		<1.5			<0.050
	PCB-1260 (mg/kg)		17.1			<0.050
	PCB-1262 (mg/kg)		<1.5			<0.050
	PCB-1268 (mg/kg)		<1.5			<0.050
	Total Polychlorinated Biphenyls (mg/kg)		17.1			<0.050
Organochlorine Pesticides	Aldrin (mg/kg)					
	alpha-BHC (mg/kg)					
	beta-BHC (mg/kg)					
	Lindane (gamma - BHC) (mg/kg)					
	delta-BHC (mg/kg)					
	cis-Chlordane (alpha) (mg/kg)					
	trans-Chlordane (gamma) (mg/kg)					
	2,4’-DDD (mg/kg)					
	4,4’-DDD (mg/kg)					
	2,4’-DDE (mg/kg)					
	4,4’-DDE (mg/kg)					
	2,4’-DDT (mg/kg)					
	4,4’-DDT (mg/kg)					
	Dieldrin (mg/kg)					
	Endosulfan I (mg/kg)					

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L681400-6	L681400-7	L681400-8	L681400-9	L681400-10
	Description					
	Sampled Date	06-SEP-08	06-SEP-08	06-SEP-08	06-SEP-08	06-SEP-08
	Sampled Time					
	Client ID	A3-TP08-6	A3-TP08-7	A3-TP08-8	A3-DUP-1	A3-TP08-10
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Dibenz(a,h)anthracene (mg/kg)		<0.050			<0.050
	Fluoranthene (mg/kg)		<0.050			<0.050
	Fluorene (mg/kg)		<0.050			<0.050
	Indeno(1,2,3-c,d)pyrene (mg/kg)		<0.050			<0.050
	2-Methylnaphthalene (mg/kg)		<0.050			<0.050
	Naphthalene (mg/kg)		<0.050			<0.050
	Phenanthrene (mg/kg)		<0.050			<0.050
	Pyrene (mg/kg)		<0.050			<0.050
	Surrogate: d10-Acenaphthene (SS) (%)		91			89
	Surrogate: d12-Chrysene (SS) (%)		100			97
	Surrogate: d8-Naphthalene (SS) (%)		92			90
	Surrogate: d10-Phenanthrene (SS) (%)		90			90
Polychlorinated Biphenyls	PCB-1016 (mg/kg)	<0.050	<0.060			<0.050
	PCB-1221 (mg/kg)	<0.050	<0.060			<0.050
	PCB-1232 (mg/kg)	<0.050	<0.060			<0.050
	PCB-1242 (mg/kg)	<0.050	<0.060			<0.050
	PCB-1248 (mg/kg)	<0.050	<0.060			<0.050
	PCB-1254 (mg/kg)	<0.050	<0.060			<0.050
	PCB-1260 (mg/kg)	<0.050	<0.060			<0.050
	PCB-1262 (mg/kg)	<0.050	<0.060			<0.050
	PCB-1268 (mg/kg)	<0.050	<0.060			<0.050
	Total Polychlorinated Biphenyls (mg/kg)	<0.050	<0.060			<0.060
Organochlorine Pesticides	Aldrin (mg/kg)					<0.0015
	alpha-BHC (mg/kg)					<0.0015
	beta-BHC (mg/kg)					<0.0020
	Lindane (gamma - BHC) (mg/kg)					<0.0015
	delta-BHC (mg/kg)					<0.0015
	cis-Chlordane (alpha) (mg/kg)					<0.0015
	trans-Chlordane (gamma) (mg/kg)					<0.0015
	2,4’-DDD (mg/kg)					<0.0015
	4,4’-DDD (mg/kg)					<0.0015
	2,4’-DDE (mg/kg)					<0.0015
	4,4’-DDE (mg/kg)					<0.0015
	2,4’-DDT (mg/kg)					<0.0020
	4,4’-DDT (mg/kg)					<0.0020
	Dieldrin (mg/kg)					<0.0015
	Endosulfan I (mg/kg)					<0.0015

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L681400-1	L681400-2	L681400-3	L681400-4	L681400-5
	Description					
	Sampled Date	06-SEP-08	06-SEP-08	06-SEP-08	06-SEP-08	06-SEP-08
	Sampled Time					
	Client ID	A3-TP08-1	A3-TP08-2	A3-TP08-3	A3-TP08-4	A3-TP08-5
Grouping	**Analyte**					
SOIL						
Organochlorine Pesticides	Endosulfan II (mg/kg)					
	Endosulfan Sulfate (mg/kg)					
	Endrin (mg/kg)					
	Heptachlor (mg/kg)					
	Heptachlor Epoxide (mg/kg)					
	Methoxychlor (mg/kg)					
	Mirex (mg/kg)					
	cis-Nonachlor (mg/kg)					
	trans-Nonachlor (mg/kg)					
	Oxychlordane (mg/kg)					

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L681400-6	L681400-7	L681400-8	L681400-9	L681400-10
	Description					
	Sampled Date	06-SEP-08	06-SEP-08	06-SEP-08	06-SEP-08	06-SEP-08
	Sampled Time					
	Client ID	A3-TP08-6	A3-TP08-7	A3-TP08-8	A3-DUP-1	A3-TP08-10
Grouping	**Analyte**					
SOIL						
Organochlorine Pesticides	Endosulfan II (mg/kg)					<0.0015
	Endosulfan Sulfate (mg/kg)					<0.0015
	Endrin (mg/kg)					<0.0050
	Heptachlor (mg/kg)					<0.0020
	Heptachlor Epoxide (mg/kg)					<0.0015
	Methoxychlor (mg/kg)					<0.0050
	Mirex (mg/kg)					<0.0015
	cis-Nonachlor (mg/kg)					<0.0015
	trans-Nonachlor (mg/kg)					<0.0015
	Oxychlordane (mg/kg)					<0.0015

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
F1-BTX-CALC-VA	Soil	F1-Total BTX	CCME CWS PHC TIER 1 (2001)

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10) and F1-BTEX, a subsample of the sediment/soil is extracted with methanol and analysed by purge & trap GC/FID. The F1-BTEX result is then calculated as follows:

F1-BTEX: F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).

F1-MET-PT-FID-VA	Soil	CCME by Purge and Trap with GCMS	EPA 8260B & 524.2

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10), a subsample of the sediment/soil is extracted with methanol and analysed by purge & trap GC/FID.

Notes:
1. F1 (C6-C10): Sum of all hydrocarbons that elute between nC6 and nC10.
2. Reported results are expressed as milligrams per dry kilogram.
3. This method is validated for use.
4. Data from analysis of quality control samples is available upon request.

F2F4-TUMB-H/A-FID-VA	Soil	Petroleum Hydrocarbon by Tumbler GCFID	CCME

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For C10 to C50 hydrocarbons (F2, F3, F4) and gravimetric heavy hydrocarbons (F4G-sg), a subsample of the sediment/soil is extracted with 1:1 hexane:acetone using a rotary extractor. The extract undergoes a silica-gel clean-up to remove polar compounds. F2, F3 & F4 are analyzed by on-column GC/FID, and F4G-sg is analyzed gravimetrically.

Notes:
1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where F4 (C34-C50) and F4G-sg results are reported for a sample, the larger of the reported values is used for comparison against the relevant CCME standard for F4.
7. The gravimetric heavy hydrocarbon results (F4G-sg), cannot be added to the C6 to C50 hydrocarbon results.
8. This method is validated for use.
9. Data from analysis of quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram.

HG-CCME-CVAFS-VA	Soil	CVAFS Hg in Soil (CCME)	CCME

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry (EPA Method 7000 series).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

MET-CSR-FULL-ICP-VA	Soil	Metals in Soil by ICPOES (CSR SALM)	BCMELP CSR SALM METHOD 8

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

mobile in the environment.

MOISTURE-VA	Soil	Moisture content	ASTM METHOD D2794-00

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

MOISTURE-VA	Soil		ASTM METHOD D2794-00

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

OCP1-SOX-ECD-VA	Soil	OCP-1 in Soil by Soxhlet GCECD	EPA METHODS 3540, 3545, 3610, 3630, 3660

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3540, 3545, 3610, 3630, 3660 & 8081, published by the United States Environmental Protection Agency (EPA). The procedure uses an automated system (Accelerated Solvent Extractor - ASE) at high temperature and pressure or a Soxhlet system to extract a subsample of the sediment/soil with dichloromethane. The extract is then solvent exchanged to hexane followed by one or more of the following clean-up procedures (if required): alumina clean-up, silica gel clean-up and/or sulphur clean-up. The final extract is analysed by dual capillary column gas chromatography with electron capture detection (GC/ECD).

OGG-F4G-TUMB-SG-VA	Soil	CWS F4G with Silica Gel	CCME

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For gravimetric heavy hydrocarbons (F4G-sg), a subsample of the sediment/soil is extracted with 1:1 hexane:acetone using a rotary extractor. The extract undergoes a silica-gel clean-up to remove polar compounds prior to gravimetric analysis.

Notes:
1. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
3. Where F4 (C34-C50) and F4G-sg results are reported for a sample, the larger of the reported values is used for comparison against the relevant CCME standard for F4.
4. The gravimetric heavy hydrocarbon (F4G-sg) result cannot be added to the C6 to C50 hydrocarbons results.
5. This method is validated for use.
6. Data from analysis of quality control samples is available upon request.
7. Reported results are expressed as milligrams per dry kilogram.

PAH-TUMB-H/A-MS-VA	Soil	PAH by Tumbler HEX/ACE with GCMS	EPA METHODS 3570 & 8270.

Polycyclic Aromatic Hydrocarbons in Sediment/Soil
This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3570 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a mechanical shaking technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

PCB-SE-ECD-VA	Soil	PCB by Extraction with GCECD	EPA 3630/8082 GCECD

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3500, 3620, 3630, 3660, 3665 & 8082, published by the United States Environmental Protection Agency (EPA). The procedure involves a solid-liquid extraction of a subsample of the sediment/soil using a mixture of hexane and acetone. Water is added to the extract and the resulting hexane extract undergoes one or more of the following clean-up procedures (if required): florisil clean-up, silica gel clean-up, sulphur clean-up and/or sulphuric acid clean-up. The final extract is analysed by capillary column gas chromatography with electron capture detection (GC/ECD).

PH-1:2-VA	Soil	CSR pH by 1:2 Water Leach	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (10 mesh /2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

TL-CSR-MS-VA	Soil	ICPMS Tl in Soil by CSR SALM	BCMELP CSR SALM Method 8

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by either hotplate or block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

VOC-MET-PT-MS-VA	Soil	VOC by MeOH with Purge and Trap GCMS	EPA 8260B & 524.2

Volatile Organic Compounds (VOC) are extracted from sediment or soil with methanol, following a procedure from the British Columbia Ministry of Water Land and Air Protection (BCWLAP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999). Aliquots of the extract are analyzed by direct injection capillary column gas chromatography with mass spectrometric detection (GC/MS), using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260B, published by the United States Environmental Protection Agency (EPA). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

VOC7-MET-PT-MS-VA	Soil	BTEX by MeOH with Purge and Trap GCMS	EPA 8260B & 524.2

Volatile Organic Compounds (VOC) are extracted from sediment or soil with methanol, following a procedure from the British Columbia Ministry of Water Land and Air Protection (BCWLAP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999). Aliquots of the extract are analyzed by Purge and Trap by gas hromatography with mass spectrometric detection (GC/MS), using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260B, published by the United States Environmental Protection Agency (EPA). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

XYLENES-CALC-VA	Soil	CSR VOC7 by MeOH with DI GCMS	EPA 8260B & 524.2

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.
The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
N/A - Result not available. Refer to qualifier code and definition for explanation

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CANADA TOLL FREE 1-800-668-9878
www.alsenviro.com

COC # C064997

Page ____ of ____

REPORT TO:
COMPANY: Franz Environmental Inc
CONTACT: Ryan Fletcher / Tina Ranger
ADDRESS: 329 Churchill Ave
Ottawa, Ontario
PHONE: (613) 721-0555 FAX:

INVOICE TO: SAME AS REPORT ? [✓ YES] / NO
COMPANY: ditto
CONTACT:
ADDRESS:
PHONE: FAX:

REPORT FORMAT / DISTRIBUTION
STANDARD ____ OTHER ____
PDF X EXCEL X CUSTOM ____ FAX ____
EMAIL 1: tranger@
EMAIL 2:

INDICATE BOTTLES: FILTERED / PRESERVED (F/P) → → →

CLIENT / PROJECT INFORMATION: 1584-0801
JOB #: ~~[illegible] Landfill (TBA#)~~
PO /AFE:
Legal Site Description:
QUOTE #:

SAMPLER (Initials):

SERVICE REQUESTED
X REGULAR SERVICE (DEFAULT)
RUSH SERVICE (2-3 DAYS)
PRIORITY SERVICE (1 DAY or ASAP)
EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS

Lab Work Order # (lab use only): L681400

ANALYSIS REQUEST

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	F1-Btex	F2-F4	PAH	Metals	PCB total	Voc	Pesticides (OC)					HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
	A3-TP08-1	Sept 6/08		Soil				X										1
	A3-TP08-2				X	X		X	X									5
	A3-TP08-3				X	X		X										4
	A3-TP08-4							X										1
	A3-TP08-5				X	X	X	X	X									7
	A3-TP08-6				X	X		X	X									6
	A3-TP08-7				X	X	X	X	X									7
	A3-TP08-8				X	X												5
	A3-Dup 1				X	X		X										5
	A3-TP08-10				X	X	X	X	X	X	X							7

GUIDELINES / REGULATIONS

SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS
Hold sample A3-TP08-8 for metal analysis

Failure to complete all portions of this form may delay analysis. Please fill in this form *LEGIBLY*.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the reverse page of the white report copy.

RELINQUISHED BY: Tina Ranger	DATE & TIME: Sept 6/08	RECEIVED BY: ZQ	DATE & TIME: SEP 6 08 12:03	**SAMPLE CONDITION** (lab use only)
RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:	TEMPERATURE: 5
				SAMPLES RECEIVED IN GOOD CONDITION ? [✓ YES] / NO (If no provide details)

REFER TO BACK PAGE FOR REGIONAL LOCATIONS AND SAMPLING INFORMATION

WHITE - REPORT COPY, PINK - FILE COPY, YELLOW - CLIENT COPY

GENF14.00

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Certificate of Analysis

FRANZ ENVIRONMENTAL INC.
ATTN: TINA RANGER
200 - 329 CHURCHILL AVENUE NORTH

OTTAWA ON K1Z 5B8

Reported On: 08-OCT-08 12:33 PM

Lab Work Order #: **L682317**

Date Received: **15-SEP-08**

Project P.O. #:
Job Reference: 1584-0801
Legal Site Desc:
CofC Numbers: C064682

Other Information:

Comments:

JANINE WEEKS
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L682317-1	L682317-2	L682317-3	L682317-4	L682317-5
	Description					
	Sampled Date	08-SEP-08	08-SEP-08	08-SEP-08	08-SEP-08	08-SEP-08
	Sampled Time					
	Client ID	A4-SD08-1	A4-SD08-2	A4-SD08-3	A4-SD08-4	A4-SD08-5
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	29.6	19.4	19.0	18.9	22.0
	pH (pH)	7.11	7.95	7.47	8.33	7.66
Metals	Antimony (Sb) (mg/kg)	<10	<10	<10	<10	<10
	Arsenic (As) (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Barium (Ba) (mg/kg)	37.7	19.7	15.7	17.1	13.2
	Beryllium (Be) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Cadmium (Cd) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Chromium (Cr) (mg/kg)	17.4	15.5	9.3	14.0	10.2
	Cobalt (Co) (mg/kg)	4.7	2.9	2.3	3.3	2.6
	Copper (Cu) (mg/kg)	8.1	5.4	6.7	4.9	4.6
	Lead (Pb) (mg/kg)	<30	<30	<30	<30	<30
	Mercury (Hg) (mg/kg)	0.0067	<0.0050	0.0091	<0.0050	<0.0050
	Molybdenum (Mo) (mg/kg)	<4.0	<4.0	<4.0	<4.0	<4.0
	Nickel (Ni) (mg/kg)	6.8	<5.0	<5.0	<5.0	<5.0
	Selenium (Se) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Silver (Ag) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Thallium (Tl) (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Tin (Sn) (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Vanadium (V) (mg/kg)	39.6	37.2	23.2	41.8	33.2
	Zinc (Zn) (mg/kg)	52.9	26.8	49.4	21.8	23.2
Volatile Organic Compounds	Benzene (mg/kg)	<0.040	<0.040	<0.040		
	Bromodichloromethane (mg/kg)		<0.050	<0.050		
	Bromoform (mg/kg)		<0.050	<0.050		
	Carbon Tetrachloride (mg/kg)		<0.050	<0.050		
	Chlorobenzene (mg/kg)		<0.050	<0.050		
	Dibromochloromethane (mg/kg)		<0.050	<0.050		
	Chloroethane (mg/kg)		<0.10	<0.10		
	Chloroform (mg/kg)		<0.10	<0.10		
	Chloromethane (mg/kg)		<0.10	<0.10		
	1,2-Dichlorobenzene (mg/kg)		<0.050	<0.050		
	1,3-Dichlorobenzene (mg/kg)		<0.050	<0.050		
	1,4-Dichlorobenzene (mg/kg)		<0.050	<0.050		
	1,1-Dichloroethane (mg/kg)		<0.050	<0.050		
	1,2-Dichloroethane (mg/kg)		<0.050	<0.050		
	1,1-Dichloroethylene (mg/kg)		<0.050	<0.050		
	cis-1,2-Dichloroethylene (mg/kg)		<0.050	<0.050		
	trans-1,2-Dichloroethylene (mg/kg)		<0.050	<0.050		
	Dichloromethane (mg/kg)		<0.30	<0.30		

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L682317-6	L682317-7			
	Description					
	Sampled Date	08-SEP-08	08-SEP-08			
	Sampled Time					
	Client ID	A4-SD08-6	A4-SD08-8			
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	20.7	25.9			
	pH (pH)	8.31	8.04			
Metals	Antimony (Sb) (mg/kg)	<10	<10			
	Arsenic (As) (mg/kg)	<5.0	<5.0			
	Barium (Ba) (mg/kg)	17.5	25.9			
	Beryllium (Be) (mg/kg)	<0.50	<0.50			
	Cadmium (Cd) (mg/kg)	<0.50	<0.50			
	Chromium (Cr) (mg/kg)	11.4	10.4			
	Cobalt (Co) (mg/kg)	3.1	3.0			
	Copper (Cu) (mg/kg)	4.9	5.0			
	Lead (Pb) (mg/kg)	<30	<30			
	Mercury (Hg) (mg/kg)	<0.0050	<0.0050			
	Molybdenum (Mo) (mg/kg)	<4.0	<4.0			
	Nickel (Ni) (mg/kg)	<5.0	<5.0			
	Selenium (Se) (mg/kg)	<2.0	<2.0			
	Silver (Ag) (mg/kg)	<2.0	<2.0			
	Thallium (Tl) (mg/kg)	<1.0	<1.0			
	Tin (Sn) (mg/kg)	<5.0	<5.0			
	Vanadium (V) (mg/kg)	28.6	24.1			
	Zinc (Zn) (mg/kg)	23.3	36.1			
Volatile Organic Compounds	Benzene (mg/kg)					
	Bromodichloromethane (mg/kg)					
	Bromoform (mg/kg)					
	Carbon Tetrachloride (mg/kg)					
	Chlorobenzene (mg/kg)					
	Dibromochloromethane (mg/kg)					
	Chloroethane (mg/kg)					
	Chloroform (mg/kg)					
	Chloromethane (mg/kg)					
	1,2-Dichlorobenzene (mg/kg)					
	1,3-Dichlorobenzene (mg/kg)					
	1,4-Dichlorobenzene (mg/kg)					
	1,1-Dichloroethane (mg/kg)					
	1,2-Dichloroethane (mg/kg)					
	1,1-Dichloroethylene (mg/kg)					
	cis-1,2-Dichloroethylene (mg/kg)					
	trans-1,2-Dichloroethylene (mg/kg)					
	Dichloromethane (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L682317-1	L682317-2	L682317-3	L682317-4	L682317-5
	Description					
	Sampled Date	08-SEP-08	08-SEP-08	08-SEP-08	08-SEP-08	08-SEP-08
	Sampled Time					
	Client ID	A4-SD08-1	A4-SD08-2	A4-SD08-3	A4-SD08-4	A4-SD08-5
Grouping	**Analyte**					
SOIL						
Volatile Organic Compounds	1,2-Dichloropropane (mg/kg)		<0.050	<0.050		
	cis-1,3-Dichloropropylene (mg/kg)		<0.050	<0.050		
	trans-1,3-Dichloropropylene (mg/kg)		<0.050	<0.050		
	Ethylbenzene (mg/kg)	<0.050	<0.050	<0.050		
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20	<0.20	<0.20		
	Styrene (mg/kg)	<0.050	<0.050	<0.050		
	1,1,1,2-Tetrachloroethane (mg/kg)		<0.050	<0.050		
	1,1,2,2-Tetrachloroethane (mg/kg)		<0.050	<0.050		
	Tetrachloroethylene (mg/kg)		<0.050	<0.050		
	Toluene (mg/kg)	<0.050	<0.050	<0.050		
	1,1,1-Trichloroethane (mg/kg)		<0.050	<0.050		
	1,1,2-Trichloroethane (mg/kg)		<0.050	<0.050		
	Trichloroethylene (mg/kg)		<0.040	<0.015		
	Trichlorofluoromethane (mg/kg)		<0.10	<0.10		
	Vinyl Chloride (mg/kg)		<0.10	<0.10		
	ortho-Xylene (mg/kg)	<0.050	<0.050	<0.050		
	meta- & para-Xylene (mg/kg)	<0.050	<0.050	<0.050		
	Xylenes (mg/kg)	<0.10	<0.10	<0.10		
	Surrogate: 4-Bromofluorobenzene (SS) (%)	95	104	90		
	Surrogate: Fluorobenzene (SS) (%)	99	107	91		
Hydrocarbons	F2 (C10-C16) (mg/kg)	<30	<40	<30		
	F3 (C16-C34) (mg/kg)	<50	<50	<50		
	F4 (C34-C50) (mg/kg)	<50	<50	<50		
	F1-BTEX (mg/kg)	<10	<10	<10		
	F1 (C6-C10) (mg/kg)	<10	<10	<10		
	Chrom. to baseline at nC50	YES	YES	YES		
	Surrogate: 2,4-Dichlorotoluene (SS) (%)	120	Not Reportable	114		
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)		<0.040	<0.040		
	Acenaphthylene (mg/kg)		<0.050	<0.050		
	Anthracene (mg/kg)		<0.050	<0.050		
	Benz(a)anthracene (mg/kg)		<0.050	<0.050		
	Benzo(a)pyrene (mg/kg)		<0.050	<0.050		
	Benzo(b)fluoranthene (mg/kg)		<0.050	<0.050		
	Benzo(g,h,i)perylene (mg/kg)		<0.050	<0.050		
	Benzo(k)fluoranthene (mg/kg)		<0.050	<0.050		
	Chrysene (mg/kg)		<0.050	<0.050		
	Dibenz(a,h)anthracene (mg/kg)		<0.050	<0.050		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

	Sample ID	L682317-6	L682317-7			
	Description					
	Sampled Date	08-SEP-08	08-SEP-08			
	Sampled Time					
	Client ID	A4-SD08-6	A4-SD08-8			
Grouping	**Analyte**					
SOIL						
Volatile Organic Compounds	1,2-Dichloropropane (mg/kg)					
	cis-1,3-Dichloropropylene (mg/kg)					
	trans-1,3-Dichloropropylene (mg/kg)					
	Ethylbenzene (mg/kg)					
	Methyl t-butyl ether (MTBE) (mg/kg)					
	Styrene (mg/kg)					
	1,1,1,2-Tetrachloroethane (mg/kg)					
	1,1,2,2-Tetrachloroethane (mg/kg)					
	Tetrachloroethylene (mg/kg)					
	Toluene (mg/kg)					
	1,1,1-Trichloroethane (mg/kg)					
	1,1,2-Trichloroethane (mg/kg)					
	Trichloroethylene (mg/kg)					
	Trichlorofluoromethane (mg/kg)					
	Vinyl Chloride (mg/kg)					
	ortho-Xylene (mg/kg)					
	meta- & para-Xylene (mg/kg)					
	Xylenes (mg/kg)					
	Surrogate: 4-Bromofluorobenzene (SS) (%)					
	Surrogate: Fluorobenzene (SS) (%)					
Hydrocarbons	F2 (C10-C16) (mg/kg)					
	F3 (C16-C34) (mg/kg)					
	F4 (C34-C50) (mg/kg)					
	F1-BTEX (mg/kg)					
	F1 (C6-C10) (mg/kg)					
	Chrom. to baseline at nC50					
	Surrogate: 2,4-Dichlorotoluene (SS) (%)					
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)					
	Acenaphthylene (mg/kg)					
	Anthracene (mg/kg)					
	Benz(a)anthracene (mg/kg)					
	Benzo(a)pyrene (mg/kg)					
	Benzo(b)fluoranthene (mg/kg)					
	Benzo(g,h,i)perylene (mg/kg)					
	Benzo(k)fluoranthene (mg/kg)					
	Chrysene (mg/kg)					
	Dibenz(a,h)anthracene (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L682317-1 08-SEP-08 A4-SD08-1	L682317-2 08-SEP-08 A4-SD08-2	L682317-3 08-SEP-08 A4-SD08-3	L682317-4 08-SEP-08 A4-SD08-4	L682317-5 08-SEP-08 A4-SD08-5
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Fluoranthene (mg/kg)		<0.050	<0.050		
	Fluorene (mg/kg)		<0.050	<0.050		
	Indeno(1,2,3-c,d)pyrene (mg/kg)		<0.050	<0.050		
	2-Methylnaphthalene (mg/kg)		<0.050	<0.050		
	Naphthalene (mg/kg)		<0.050	<0.050		
	Phenanthrene (mg/kg)		<0.050	<0.050		
	Pyrene (mg/kg)		<0.050	<0.050		
	Surrogate: d10-Acenaphthene (SS) (%)		104	97		
	Surrogate: d12-Chrysene (SS) (%)		111	103		
	Surrogate: d8-Naphthalene (SS) (%)		102	98		
	Surrogate: d10-Phenanthrene (SS) (%)		102	97		
Polychlorinated Biphenyls	PCB-1016 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1221 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1232 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1242 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1248 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1254 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1260 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1262 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1268 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Total Polychlorinated Biphenyls (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
Organochlorine Pesticides	Aldrin (mg/kg)		<0.0010	<0.0010		
	alpha-BHC (mg/kg)		<0.0010	<0.0010		
	beta-BHC (mg/kg)		<0.0020	<0.0020		
	Lindane (gamma - BHC) (mg/kg)		<0.0010	<0.0010		
	delta-BHC (mg/kg)		<0.0010	<0.0010		
	cis-Chlordane (alpha) (mg/kg)		<0.0010	<0.0010		
	trans-Chlordane (gamma) (mg/kg)		<0.0010	<0.0010		
	2,4’-DDD (mg/kg)		<0.0010	<0.0010		
	4,4’-DDD (mg/kg)		<0.0010	<0.0010		
	2,4’-DDE (mg/kg)		<0.0010	<0.0010		
	4,4’-DDE (mg/kg)		<0.0010	<0.0010		
	2,4’-DDT (mg/kg)		<0.0020	<0.0020		
	4,4’-DDT (mg/kg)		<0.0020	<0.0020		
	Dieldrin (mg/kg)		<0.0010	<0.0010		
	Endosulfan I (mg/kg)		<0.0010	<0.0010		
	Endosulfan II (mg/kg)		<0.0010	<0.0010		

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L682317-6	L682317-7			
	Sample ID	L682317-6	L682317-7			
	Description					
	Sampled Date	08-SEP-08	08-SEP-08			
	Sampled Time					
	Client ID	A4-SD08-6	A4-SD08-8			
SOIL						
Polycyclic Aromatic Hydrocarbons	Fluoranthene (mg/kg)					
	Fluorene (mg/kg)					
	Indeno(1,2,3-c,d)pyrene (mg/kg)					
	2-Methylnaphthalene (mg/kg)					
	Naphthalene (mg/kg)					
	Phenanthrene (mg/kg)					
	Pyrene (mg/kg)					
	Surrogate: d10-Acenaphthene (SS) (%)					
	Surrogate: d12-Chrysene (SS) (%)					
	Surrogate: d8-Naphthalene (SS) (%)					
	Surrogate: d10-Phenanthrene (SS) (%)					
Polychlorinated Biphenyls	PCB-1016 (mg/kg)	<0.050	<0.050			
	PCB-1221 (mg/kg)	<0.050	<0.050			
	PCB-1232 (mg/kg)	<0.050	<0.050			
	PCB-1242 (mg/kg)	<0.050	<0.050			
	PCB-1248 (mg/kg)	<0.050	<0.050			
	PCB-1254 (mg/kg)	<0.050	<0.050			
	PCB-1260 (mg/kg)	<0.050	<0.050			
	PCB-1262 (mg/kg)	<0.050	<0.050			
	PCB-1268 (mg/kg)	<0.050	<0.050			
	Total Polychlorinated Biphenyls (mg/kg)	<0.050	<0.050			
Organochlorine Pesticides	Aldrin (mg/kg)					
	alpha-BHC (mg/kg)					
	beta-BHC (mg/kg)					
	Lindane (gamma - BHC) (mg/kg)					
	delta-BHC (mg/kg)					
	cis-Chlordane (alpha) (mg/kg)					
	trans-Chlordane (gamma) (mg/kg)					
	2,4’-DDD (mg/kg)					
	4,4’-DDD (mg/kg)					
	2,4’-DDE (mg/kg)					
	4,4’-DDE (mg/kg)					
	2,4’-DDT (mg/kg)					
	4,4’-DDT (mg/kg)					
	Dieldrin (mg/kg)					
	Endosulfan I (mg/kg)					
	Endosulfan II (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L682317-1	L682317-2	L682317-3	L682317-4	L682317-5
	Description					
	Sampled Date	08-SEP-08	08-SEP-08	08-SEP-08	08-SEP-08	08-SEP-08
	Sampled Time					
	Client ID	A4-SD08-1	A4-SD08-2	A4-SD08-3	A4-SD08-4	A4-SD08-5
Grouping	**Analyte**					
SOIL						
Organochlorine Pesticides	Endosulfan Sulfate (mg/kg)		<0.0010	<0.0010		
	Endrin (mg/kg)		<0.0050	<0.0050		
	Heptachlor (mg/kg)		<0.0020	<0.0020		
	Heptachlor Epoxide (mg/kg)		<0.0010	<0.0010		
	Methoxychlor (mg/kg)		<0.0050	<0.0050		
	Mirex (mg/kg)		<0.0010	<0.0010		
	cis-Nonachlor (mg/kg)		<0.0010	<0.0010		
	trans-Nonachlor (mg/kg)		<0.0010	<0.0010		
	Oxychlordane (mg/kg)		<0.0010	<0.0010		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L682317-6 08-SEP-08 A4-SD08-6	L682317-7 08-SEP-08 A4-SD08-8			
Grouping	**Analyte**					
SOIL						
Organochlorine Pesticides	Endosulfan Sulfate (mg/kg)					
	Endrin (mg/kg)					
	Heptachlor (mg/kg)					
	Heptachlor Epoxide (mg/kg)					
	Methoxychlor (mg/kg)					
	Mirex (mg/kg)					
	cis-Nonachlor (mg/kg)					
	trans-Nonachlor (mg/kg)					
	Oxychlordane (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comment

Qualifiers for Sample Submission Listed:

Qualifier	Description
NR:NR	No Result: Sample Not Received At Laboratory - sample # SD-DUP 2 not received.

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
F1-BTX-CALC-VA	Soil	F1-Total BTX	CCME CWS PHC TIER 1 (2001)

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10) and F1-BTEX, a subsample of the sediment/soil is extracted with methanol and analysed by purge & trap GC/FID. The F1-BTEX result is then calculated as follows:

F1-BTEX: F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).

F1-MET-PT-FID-VA	Soil	CCME by Purge and Trap with GCMS	EPA 8260B & 524.2

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10), a subsample of the sediment/soil is extracted with methanol and analysed by purge & trap GC/FID.

Notes:
1. F1 (C6-C10): Sum of all hydrocarbons that elute between nC6 and nC10.
2. Reported results are expressed as milligrams per dry kilogram.
3. This method is validated for use.
4. Data from analysis of quality control samples is available upon request.

F2F4-TUMB-H/A-FID-VA	Soil	Petroleum Hydrocarbon by Tumbler GCFID	CCME

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For C10 to C50 hydrocarbons (F2, F3, F4) and gravimetric heavy hydrocarbons (F4G-sg), a subsample of the sediment/soil is extracted with 1:1 hexane:acetone using a rotary extractor. The extract undergoes a silica-gel clean-up to remove polar compounds. F2, F3 & F4 are analyzed by on-column GC/FID, and F4G-sg is analyzed gravimetrically.

Notes:
1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where F4 (C34-C50) and F4G-sg results are reported for a sample, the larger of the reported values is used for comparison against the relevant CCME standard for F4.
7. The gravimetric heavy hydrocarbon results (F4G-sg), cannot be added to the C6 to C50 hydrocarbon results.
8. This method is validated for use.
9. Data from analysis of quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram.

HG-CCME-CVAFS-VA	Soil	CVAFS Hg in Soil (CCME)	CCME

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry (EPA Method 7000 series).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

MET-CSR-FULL-ICP-VA	Soil	Metals in Soil by ICPOES (CSR SALM)	BCMELP CSR SALM METHOD 8

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

MOISTURE-VA	Soil	Moisture content	ASTM METHOD D2794-00

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

MOISTURE-VA	Soil		ASTM METHOD D2794-00

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

OCP1-SOX-ECD-VA	Soil	OCP-1 in Soil by Soxhlet GCECD	EPA METHODS 3540, 3545, 3610, 3630, 3660

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3540, 3545, 3610, 3630, 3660 & 8081, published by the United States Environmental Protection Agency (EPA). The procedure uses an automated system (Accelerated Solvent Extractor - ASE) at high temperature and pressure or a Soxhlet system to extract a subsample of the sediment/soil with dichloromethane. The extract is then solvent exchanged to hexane followed by one or more of the following clean-up procedures (if required): alumina clean-up, silica gel clean-up and/or sulphur clean-up. The final extract is analysed by dual capillary column gas chromatography with electron capture detection (GC/ECD).

PAH-TUMB-H/A-MS-VA	Soil	PAH by Tumbler HEX/ACE with GCMS	EPA METHODS 3570 & 8270.

Polycyclic Aromatic Hydrocarbons in Sediment/Soil
This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3570 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a mechanical shaking technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

PCB-SE-ECD-VA	Soil	PCB by Extraction with GCECD	EPA 3630/8082 GCECD

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3500, 3620, 3630, 3660, 3665 & 8082, published by the United States Environmental Protection Agency (EPA). The procedure involves a solid-liquid extraction of a subsample of the sediment/soil using a mixture of hexane and acetone. Water is added to the extract and the resulting hexane extract undergoes one or more of the following clean-up procedures (if required): florisil clean-up, silica gel clean-up, sulphur clean-up and/or sulphuric acid clean-up. The final extract is analysed by capillary column gas chromatography with electron capture detection (GC/ECD).

PH-1:2-VA	Soil	CSR pH by 1:2 Water Leach	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (10 mesh /2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

TL-CSR-MS-VA	Soil	ICPMS Tl in Soil by CSR SALM	BCMELP CSR SALM Method 8

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by either hotplate or block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

VOC-MET-PT-MS-VA	Soil	VOC by MeOH with Purge and Trap GCMS	EPA 8260B & 524.2

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

Volatile Organic Compounds (VOC) are extracted from sediment or soil with methanol, following a procedure from the British Columbia Ministry of Water Land and Air Protection (BCWLAP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999). Aliquots of the extract are analyzed by direct injection capillary column gas chromatography with mass spectrometric detection (GC/MS), using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260B, published by the United States Environmental Protection Agency (EPA). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

VOC7-MET-PT-MS-VA	Soil	BTEX by MeOH with Purge and Trap GCMS	EPA 8260B & 524.2

Volatile Organic Compounds (VOC) are extracted from sediment or soil with methanol, following a procedure from the British Columbia Ministry of Water Land and Air Protection (BCWLAP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999). Aliquots of the extract are analyzed by Purge and Trap by gas hromatography with mass spectrometric detection (GC/MS), using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260B, published by the United States Environmental Protection Agency (EPA). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

XYLENES-CALC-VA	Soil	CSR VOC7 by MeOH with DI GCMS	EPA 8260B & 524.2

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.
The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
N/A - Result not available. Refer to qualifier code and definition for explanation

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CANADA TOLL FREE 1-800-668-9878

www.alsenviro.com

COC # C064682

Page 1 of 1

REPORT TO:
COMPANY: Franz Environmental
CONTACT: Tina Ranger / Ryan Fletcher
ADDRESS: 329 Churchill Avenue
PHONE: (613) 721-0555 FAX:

INVOICE TO: SAME AS REPORT ? [✓ YES] / NO
COMPANY:
CONTACT:
ADDRESS:
PHONE: FAX:

REPORT FORMAT / DISTRIBUTION
STANDARD ____ OTHER ____
PDF ✓ EXCEL ✓ CUSTOM ____ FAX ____
EMAIL 1: tranger@franzenvironmental.ca
EMAIL 2: rfletcher@franzenvironmental.ca

INDICATE BOTTLES: FILTERED / PRESERVED (F/P) → → →

CLIENT / PROJECT INFORMATION:
JOB #: 1584-Pol
PO /AFE:
Legal Site Description.
QUOTE #:

SERVICE REQUESTED
[✓ REGULAR SERVICE (DEFAULT)]
RUSH SERVICE (2-3 DAYS)
PRIORITY SERVICE (1 DAY or ASAP)
EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS

Lab Work Order # (lab use only): L682317

SAMPLER (Initials):

ANALYSIS REQUEST

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	F1 Btex	F2-F4	Metal	PAH	OC Pesticide	PCB Total	VOC					HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
	A4-S008-1	Sept 8/08		Sediment	X	X	X			X								5
	A4-S008-2	Sept 8/08		Sediment	X	X	X	X	X	X	X							9
	A4-S008-3	Sept 8/08		Sediment	X	X	X	X	X	X	X							9
	SD-Dup 2	Sept 8/08		Sediment				~~X~~		X	~~X~~							5
	A4-S008-4						X			X								4
	A4-S008-5						X			X								4
	A4-S008-6						X			X								4
	~~A4-S008-7~~						~~X~~			~~X~~								
	A4-S008-8						X			X								4

GUIDELINES / REGULATIONS

SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS

Failure to complete all portions of this form may delay analysis. Please fill in this form *LEGIBLY*.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the reverse page of the white report copy.

RELINQUISHED BY: Tina Range	DATE & TIME: Sept 8/2008	RECEIVED BY: ZH	DATE & TIME: Sept 12, 08 11:56
RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:

SAMPLE CONDITION (lab use only)
TEMPERATURE: 12
SAMPLES RECEIVED IN GOOD CONDITION ? [✓ YES] / NO
(If no provide details)

REFER TO BACK PAGE FOR REGIONAL LOCATIONS AND SAMPLING INFORMATION

WHITE - REPORT COPY, PINK - FILE COPY, YELLOW - CLIENT COPY

GENF14.00

Certificate of Analysis

FRANZ ENVIRONMENTAL INC.

ATTN: TINA RANGER

200 - 329 CHURCHILL AVENUE NORTH

OTTAWA ON K1Z 5B8

Reported On: 29-SEP-08 05:48 PM

Lab Work Order #: **L682329**

Date Received: **12-SEP-08**

Project P.O. #:
Job Reference: 1584-0801
Legal Site Desc:
CofC Numbers: C064684

Other Information:

Comments:

JANINE WEEKS
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L682329-1	L682329-2	L682329-3	L682329-4	L682329-5
	Description					
	Sampled Date	08-SEP-08	08-SEP-08	08-SEP-08	08-SEP-08	08-SEP-08
	Sampled Time					
	Client ID	A1-SW08-1	A4-SW08-3	A4-SW08-6	A4-SW08-7	A4-SW08-8
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	91.6	105	23.6	22.5	27.2
Total Metals	Aluminum (Al)-Total (mg/L)	0.0144	0.018	0.0327	0.0256	0.0275
	Antimony (Sb)-Total (mg/L)	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050
	Arsenic (As)-Total (mg/L)	<0.00050	<0.0020	<0.00050	<0.00050	<0.00050
	Barium (Ba)-Total (mg/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Beryllium (Be)-Total (mg/L)	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010
	Boron (B)-Total (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Cadmium (Cd)-Total (mg/L)	<0.000017	0.000146	<0.000017	0.000082	<0.000017
	Calcium (Ca)-Total (mg/L)	24.7	14.4	4.67	4.58	4.72
	Chromium (Cr)-Total (mg/L)	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010
	Cobalt (Co)-Total (mg/L)	<0.00030	<0.00060	<0.00030	<0.00030	<0.00030
	Copper (Cu)-Total (mg/L)	0.0013	0.0057	<0.0010	<0.0010	<0.0010
	Iron (Fe)-Total (mg/L)	0.086	0.482	0.038	0.040	0.043
	Lead (Pb)-Total (mg/L)	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050
	Lithium (Li)-Total (mg/L)	<0.0050	<0.010	<0.0050	<0.0050	<0.0050
	Magnesium (Mg)-Total (mg/L)	7.25	16.9	2.90	2.68	3.75
	Manganese (Mn)-Total (mg/L)	0.0198	0.0138	0.00100	0.00116	0.00107
	Mercury (Hg)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Molybdenum (Mo)-Total (mg/L)	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010
	Nickel (Ni)-Total (mg/L)	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010
	Potassium (K)-Total (mg/L)	3.1	6.8	<2.0	<2.0	<2.0
	Selenium (Se)-Total (mg/L)	<0.0010	<0.0040	<0.0010	<0.0010	<0.0010
	Silver (Ag)-Total (mg/L)	<0.000020	<0.000040	<0.000020	<0.000020	<0.000020
	Sodium (Na)-Total (mg/L)	16.9	153	23.6	22.0	37.9
	Thallium (Tl)-Total (mg/L)	<0.00020	<0.00040	<0.00020	<0.00020	<0.00020
	Tin (Sn)-Total (mg/L)	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	<0.00020	<0.00040	<0.00020	<0.00020	<0.00020
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	<0.0050	0.0061	<0.0050	<0.0050	<0.0050
Volatile Organic Compounds	Benzene (mg/L)		<0.00050			
	Bromodichloromethane (mg/L)		<0.0010			
	Bromoform (mg/L)		<0.0010			
	Carbon Tetrachloride (mg/L)		<0.0010			
	Chlorobenzene (mg/L)		<0.0010			
	Dibromochloromethane (mg/L)		<0.0010			
	Chloroethane (mg/L)		<0.0010			
	Chloroform (mg/L)		<0.0010			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L682329-1	L682329-2	L682329-3	L682329-4	L682329-5
	Description					
	Sampled Date	08-SEP-08	08-SEP-08	08-SEP-08	08-SEP-08	08-SEP-08
	Sampled Time					
	Client ID	A1-SW08-1	A4-SW08-3	A4-SW08-6	A4-SW08-7	A4-SW08-8
Grouping	**Analyte**					
WATER						
Volatile Organic Compounds	Chloromethane (mg/L)		<0.0010			
	1,2-Dichlorobenzene (mg/L)		<0.0010			
	1,3-Dichlorobenzene (mg/L)		<0.0010			
	1,4-Dichlorobenzene (mg/L)		<0.0010			
	1,1-Dichloroethane (mg/L)		<0.0010			
	1,2-Dichloroethane (mg/L)		<0.0010			
	1,1-Dichloroethylene (mg/L)		<0.0010			
	cis-1,2-Dichloroethylene (mg/L)		<0.0010			
	trans-1,2-Dichloroethylene (mg/L)		<0.0010			
	Dichloromethane (mg/L)		<0.0050			
	1,2-Dichloropropane (mg/L)		<0.0010			
	cis-1,3-Dichloropropylene (mg/L)		<0.0010			
	trans-1,3-Dichloropropylene (mg/L)		<0.0010			
	Ethylbenzene (mg/L)		<0.00050			
	Methyl t-butyl ether (MTBE) (mg/L)		<0.0010			
	Styrene (mg/L)		<0.00050			
	1,1,1,2-Tetrachloroethane (mg/L)		<0.0010			
	1,1,2,2-Tetrachloroethane (mg/L)		<0.0010			
	Tetrachloroethylene (mg/L)		<0.0010			
	Toluene (mg/L)		<0.0010			
	1,1,1-Trichloroethane (mg/L)		<0.0010			
	1,1,2-Trichloroethane (mg/L)		<0.0010			
	Trichloroethylene (mg/L)		<0.0010			
	Trichlorofluoromethane (mg/L)		<0.0010			
	Vinyl Chloride (mg/L)		<0.0010			
	ortho-Xylene (mg/L)		<0.00050			
	meta- & para-Xylene (mg/L)		<0.00050			
	Xylenes (mg/L)		<0.0010			
	Surrogate: 4-Bromofluorobenzene (SS) (%)		104			
	Surrogate: Fluorobenzene (SS) (%)		102			
Hydrocarbons	F2 (C10-C16) (mg/L)		<0.30			
	F3 (C16-C34) (mg/L)		<0.30			
	F1-BTEX (mg/L)		<0.10			
	F1 (C6-C10) (mg/L)		<0.10			
	Surrogate: 2,4-Dichlorotoluene (SS) (%)		103			
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)		<0.000050			
	Acenaphthylene (mg/L)		<0.000050			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

	Sample ID	L682329-1	L682329-2	L682329-3	L682329-4	L682329-5
	Description					
	Sampled Date	08-SEP-08	08-SEP-08	08-SEP-08	08-SEP-08	08-SEP-08
	Sampled Time					
	Client ID	A1-SW08-1	A4-SW08-3	A4-SW08-6	A4-SW08-7	A4-SW08-8
Grouping	**Analyte**					
WATER						
Polycyclic Aromatic Hydrocarbons	Acridine (mg/L)		<0.000050			
	Anthracene (mg/L)		<0.000050			
	Benz(a)anthracene (mg/L)		<0.000050			
	Benzo(a)pyrene (mg/L)		<0.000010			
	Benzo(b)fluoranthene (mg/L)		<0.000050			
	Benzo(g,h,i)perylene (mg/L)		<0.000050			
	Benzo(k)fluoranthene (mg/L)		<0.000050			
	Chrysene (mg/L)		<0.000050			
	Dibenz(a,h)anthracene (mg/L)		<0.000050			
	Fluoranthene (mg/L)		<0.000050			
	Fluorene (mg/L)		<0.000050			
	Indeno(1,2,3-c,d)pyrene (mg/L)		<0.000050			
	Naphthalene (mg/L)		<0.000050			
	Phenanthrene (mg/L)		<0.000050			
	Pyrene (mg/L)		<0.000050			
	Quinoline (mg/L)		<0.000050			
	Surrogate: d10-Acenaphthene (SS) (%)		93			
	Surrogate: d9-Acridine (SS) (%)		89			
	Surrogate: d12-Chrysene (SS) (%)		82			
	Surrogate: d8-Naphthalene (SS) (%)		95			
	Surrogate: d10-Phenanthrene (SS) (%)		94			
Polychlorinated Biphenyls	PCB-1016 (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1221 (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1232 (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1242 (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1248 (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1254 (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1260 (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1262 (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1268 (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010
	Total Polychlorinated Biphenyls (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010
Organochlorine Pesticides	Aldrin (mg/L)		<0.000050			
	alpha-BHC (mg/L)		<0.000050			
	beta-BHC (mg/L)		<0.00010			
	Lindane (gamma - BHC) (mg/L)		<0.000050			
	delta-BHC (mg/L)		<0.000050			
	cis-Chlordane (alpha) (mg/L)		<0.000050			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L682329-1 08-SEP-08 A1-SW08-1	L682329-2 08-SEP-08 A4-SW08-3	L682329-3 08-SEP-08 A4-SW08-6	L682329-4 08-SEP-08 A4-SW08-7	L682329-5 08-SEP-08 A4-SW08-8
Grouping	**Analyte**					
WATER						
Organochlorine Pesticides	trans-Chlordane (gamma) (mg/L)		<0.000050			
	2,4'-DDD (mg/L)		<0.00010			
	4,4'-DDD (mg/L)		<0.000050			
	2,4'-DDE (mg/L)		<0.00010			
	4,4'-DDE (mg/L)		<0.000050			
	2,4'-DDT (mg/L)		<0.00010			
	4,4'-DDT (mg/L)		<0.00010			
	Dieldrin (mg/L)		<0.000050			
	Endosulfan I (mg/L)		<0.000050			
	Endosulfan II (mg/L)		<0.000050			
	Endosulfan Sulfate (mg/L)		<0.000050			
	Endrin (mg/L)		<0.00020			
	Heptachlor (mg/L)		<0.00010			
	Heptachlor Epoxide (mg/L)		<0.000050			
	Methoxychlor (mg/L)		<0.00020			
	Mirex (mg/L)		<0.000050			
	cis-Nonachlor (mg/L)		<0.000050			
	trans-Nonachlor (mg/L)		<0.000050			
	Oxychlordane (mg/L)		<0.000050			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments

Qualifiers for Sample Submission Listed:

Qualifier	Description
SPL	Sample was Preserved at the laboratory - samples #1-5 - Total Metals

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
F1-BTX-CALC-VA	Water	F1-Total BTX	CCME CWS PHC TIER 1 (2001)

This analysis is based on the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10), the sample undergoes a purge and trap extraction prior to analysis by GC/FID. The F1-BTEX result is calculated as follows:

F1-BTEX: F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).

F1-PT-FID-VA	Water	CCME F1 By P&T with GCFID	EPA SW-846, METHOD 8260

This analysis is based on the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10), the sample undergoes a purge and trap extraction prior to analysis by GC/FID.

F1 (C6-C10): Sum of all hydrocarbons that elute between nC6 and nC10.

F2-F3-SF-FID-VA	Water	Extractable Hydrocanbons in water GCFID	CWS (CCME)

Petroleum Hydrocarbons (F2-F3) in Water

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, published by the United States Environmental Protection Agency (EPA) and the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." The procedure involves a liquid-liquid extraction of the entire water sample using dichloromethane prior to capillary column gas chromatography with flame ionization detection (GC/FID).

A silica gel cleanup procedure is applied before GC analysis, which is intended to selectively remove most naturally occurring organics.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-TOT-CCME-CVAFS-VA	Water	Total Mercury in Water by CVAFS (CCME)	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-TOT-CCME-ICP-VA	Water	Total Metals in Water by ICPOES (CCME)	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-CCME-MS-VA	Water	Total Metals in Water by ICPMS (CCME)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

OCP1-SF-ECD-VA	Water	OCP-1 in Water by GCECD	EPA METHODS 3510, 3610, 3630, 3660, 8081

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3510, 3610, 3630, 3660 & 8081, published by the United States Environmental Protection Agency (EPA). The procedure involves extraction of the entire water sample with dichloromethane. The extract is then solvent exchanged to hexane followed by one or more of the following clean-up procedures (if required): alumina clean-up, silica gel clean-up and/or sulphur clean-up. The final extract is analysed by dual capillary column gas chromatography with electron capture detection (GC/ECD) and/or mass spectrometric detection (GC/MS).

PAH-SF-MS-VA	Water	PAH in Water by GCMS	EPA Methods 3510, 3630 & 8270

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3510, 3630 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure involves extraction of the entire water sample with dichloromethane. The extract is then solvent exchanged to toluene prior to analysis by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

PCB-SF-ECD-VA	Water	PCB by Extraction with GCECD	EPA 3510/8082 Liq-Liq GCECD

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3510, 3620, 3660, 3665 & 8082, published by the United States Environmental Protection Agency (EPA). The procedure involves a liquid-liquid extraction of the entire water sample using dichloromethane. The extract is then solvent exchanged to hexane followed by one or more of the following clean-up procedures (if required): florisil clean-up, sulphur clean-up and/or sulphuric acid clean-up. The final extract is analysed by capillary column gas chromatography with electron capture detection (GC/ECD).

VOC-PT-MS-VA	Water	VOC by Purge Trap GCMS	EPA 8260B, BCMELP CSR METHOD

This procedure involves the purge and trap extraction of the sample prior to analysis for specific Volatile Organic Compounds (VOC) by capillary column gas chromatography with mass spectrometric detection (GC/MS). The VOC analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260, published by the United States Environmental Protection Agency (EPA). Note: For chlorinated waters certain conditions may cause the formation of trihalomethanes after sample collection. Appropriate chemical treatment of chlorinated waters will prevent trihalomethane formation in the samples. Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

VOC7-PT-MS-VA	Water	BTEX by Purge Trap GCMS	EPA 8260b, BCMELP CSR Method

This procedure involves the purge and trap extraction of the sample prior to analysis for specific Volatile Organic Compounds (VOC) by capillary column gas chromatography with mass spectrometric detection (GC/MS). The VOC analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260, published by the United States Environmental Protection Agency (EPA). Note: For chlorinated waters certain conditions may cause the formation of trihalomethanes after sample collection. Appropriate chemical treatment of chlorinated waters will prevent trihalomethane formation in the samples. Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

XYLENES-CALC-VA	Water	CSR VOC7 by MeOH with DI GCMS	CALCULATION

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.
The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
N/A - Result not available. Refer to qualifier code and definition for explanation

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

L682329
Attachment
26-Sep-08

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample ID	L682329-1	BLK
Description		QC
Client ID	A1-SW08-1	
Class in Matrix (units)	Water	
Analyte	F4(mg/L)	
Parameter 1	<0.30	<0.3
Surrogate 1 (%)	88	91

Unit of Measurement =
blue highlight = raised detection limit due to interference
green highlight = surrogate recovery (%)

Notes:

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CANADA TOLL FREE 1-800-668-9878
www.alsenviro.com

COC # C064684

Page 1 of 1

REPORT TO:
COMPANY: Franz Environmental.com
CONTACT: 329 Churchill Ave
ADDRESS: Ottawa Ontario
Tina Ranger / Ryan Fletcher
PHONE: (613) 721-0555 FAX:

INVOICE TO: SAME AS REPORT ? [✓ YES] NO
COMPANY:
CONTACT:
ADDRESS:
PHONE: FAX:

REPORT FORMAT / DISTRIBUTION
STANDARD ____ OTHER ____
PDF ✓ EXCEL ✓ CUSTOM ____ FAX ____
EMAIL 1: frances@~~ga~~franzenvironmental.com
EMAIL 2: rfletcher@franzenvironmental.com

INDICATE BOTTLES: FILTERED / PRESERVED (F/P) → → →

CLIENT / PROJECT INFORMATION:
JOB #: 1584-0801
PO /AFE:
Legal Site Description:
QUOTE #:

SERVICE REQUESTED
✓ REGULAR SERVICE (DEFAULT)
RUSH SERVICE (2-3 DAYS)
PRIORITY SERVICE (1 DAY or ASAP)
EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS

Lab Work Order # (lab use only): L682329

SAMPLER (Initials):

ANALYSIS REQUEST

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE		F1 Btex	F2-F4	Metals	PCB total	OC Pesticides	PAH	VOC				HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
	A1-SW08-1	Sept 8/08		Surface water				X										1
	A4-SW08-3					X	X	X	X	X	X	X						12
	A4-SW08-6							X	X									5
	A4-SW08-7							X	X									5
	A4-SW08-8							X	X									5

GUIDELINES / REGULATIONS

SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS

Failure to complete all portions of this form may delay analysis. Please fill in this form *LEGIBLY*.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the reverse page of the white report copy.

RELINQUISHED BY: Tina Ranger	DATE & TIME: Sept 8/2008	RECEIVED BY: ZM	DATE & TIME: Sept 8,08 11:59	TEMPERATURE 7	SAMPLES RECEIVED IN GOOD CONDITION YES NO (If no provide details)
RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:		

SAMPLE CONDITION (lab use only)

REFER TO BACK PAGE FOR REGIONAL LOCATIONS AND SAMPLING INFORMATION

WHITE - REPORT COPY, PINK - FILE COPY, YELLOW - CLIENT COPY

GENF14.00

Certificate of Analysis

FRANZ ENVIRONMENTAL INC.
ATTN: TINA RANGER
200 - 329 CHURCHILL AVENUE NORTH
OTTAWA ON K1Z 5B8

Reported On: 08-OCT-08 12:25 PM

Lab Work Order #: **L682335** **Date Received:** **12-SEP-08**

Project P.O. #:
Job Reference: 1584-0801
Legal Site Desc:
CofC Numbers: C064681

Other Information:

Comments:

JANINE WEEKS
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID **Description** **Sampled Date** **Sampled Time** **Client ID**	L682335-1 08-SEP-08 A1-TP08-1	L682335-2 08-SEP-08 A1-TP08-2	L682335-3 08-SEP-08 A1-TP08-3	L682335-4 08-SEP-08 A1-DUP 3	L682335-5 08-SEP-08 A4-TP08-1
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)			4.94		13.1
	pH (pH)	6.82	6.66	6.70	6.72	6.13
Metals	Antimony (Sb) (mg/kg)	<10	<10	<10	<10	<10
	Arsenic (As) (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Barium (Ba) (mg/kg)	40.7	23.0	21.6	26.2	30.7
	Beryllium (Be) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Cadmium (Cd) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Chromium (Cr) (mg/kg)	20.4	10.0	12.0	12.2	14.2
	Cobalt (Co) (mg/kg)	5.9	3.9	3.4	4.1	3.0
	Copper (Cu) (mg/kg)	103	8.7	6.3	9.2	6.1
	Lead (Pb) (mg/kg)	190	<30	<30	<30	<30
	Mercury (Hg) (mg/kg)	0.0054	<0.0050	<0.0050	<0.0050	0.0061
	Molybdenum (Mo) (mg/kg)	<4.0	<4.0	<4.0	<4.0	<4.0
	Nickel (Ni) (mg/kg)	8.0	5.1	<5.0	5.5	<5.0
	Selenium (Se) (mg/kg)	<2.0	<2.0	<3.0	<2.0	<2.0
	Silver (Ag) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Thallium (Tl) (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Tin (Sn) (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Vanadium (V) (mg/kg)	44.2	32.3	35.5	33.4	39.9
	Zinc (Zn) (mg/kg)	122	36.8	24.8	37.6	33.6
Volatile Organic Compounds	Benzene (mg/kg)			<0.040		<0.040
	Ethylbenzene (mg/kg)			<0.050		<0.050
	Methyl t-butyl ether (MTBE) (mg/kg)			<0.20		<0.20
	Styrene (mg/kg)			<0.050		<0.050
	Toluene (mg/kg)			<0.050		<0.050
	ortho-Xylene (mg/kg)			<0.050		<0.050
	meta- & para-Xylene (mg/kg)			<0.050		<0.050
	Xylenes (mg/kg)			<0.10		<0.10
	Surrogate: 4-Bromofluorobenzene (SS) (%)			112		99
	Surrogate: Fluorobenzene (SS) (%)			113		101
Hydrocarbons	F2 (C10-C16) (mg/kg)			<30		<30
	F3 (C16-C34) (mg/kg)			<50		<50
	F4 (C34-C50) (mg/kg)			<50		<50
	F1-BTEX (mg/kg)			<10		<10
	F1 (C6-C10) (mg/kg)			<10		<10
	Chrom. to baseline at nC50			YES		YES
	Surrogate: 2,4-Dichlorotoluene (SS) (%)			Not Reportable		120
Polychlorinated Biphenyls	PCB-1016 (mg/kg)			<0.050		<0.050

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L682335-6				
	Description					
	Sampled Date	08-SEP-08				
	Sampled Time					
	Client ID	A4-TP08-2				
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	28.8				
	pH (pH)	5.15				
Metals	Antimony (Sb) (mg/kg)	<10				
	Arsenic (As) (mg/kg)	<5.0				
	Barium (Ba) (mg/kg)	35.0				
	Beryllium (Be) (mg/kg)	<0.50				
	Cadmium (Cd) (mg/kg)	<0.50				
	Chromium (Cr) (mg/kg)	18.3				
	Cobalt (Co) (mg/kg)	3.6				
	Copper (Cu) (mg/kg)	7.5				
	Lead (Pb) (mg/kg)	<30				
	Mercury (Hg) (mg/kg)	<0.0050				
	Molybdenum (Mo) (mg/kg)	<4.0				
	Nickel (Ni) (mg/kg)	6.8				
	Selenium (Se) (mg/kg)	<2.0				
	Silver (Ag) (mg/kg)	<2.0				
	Thallium (Tl) (mg/kg)	<1.0				
	Tin (Sn) (mg/kg)	<5.0				
	Vanadium (V) (mg/kg)	39.1				
	Zinc (Zn) (mg/kg)	35.7				
Volatile Organic Compounds	Benzene (mg/kg)	<0.040				
	Ethylbenzene (mg/kg)	<0.050				
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20				
	Styrene (mg/kg)	<0.050				
	Toluene (mg/kg)	<0.050				
	ortho-Xylene (mg/kg)	<0.050				
	meta- & para-Xylene (mg/kg)	<0.050				
	Xylenes (mg/kg)	<0.10				
	Surrogate: 4-Bromofluorobenzene (SS) (%)	98				
	Surrogate: Fluorobenzene (SS) (%)	102				
Hydrocarbons	F2 (C10-C16) (mg/kg)	<40				
	F3 (C16-C34) (mg/kg)	<50				
	F4 (C34-C50) (mg/kg)	<50				
	F1-BTEX (mg/kg)	<10				
	F1 (C6-C10) (mg/kg)	<10				
	Chrom. to baseline at nC50	YES				
	Surrogate: 2,4-Dichlorotoluene (SS) (%)	127				
Polychlorinated Biphenyls	PCB-1016 (mg/kg)	<0.050				

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L682335-1	L682335-2	L682335-3	L682335-4	L682335-5
	Description					
	Sampled Date	08-SEP-08	08-SEP-08	08-SEP-08	08-SEP-08	08-SEP-08
	Sampled Time					
	Client ID	A1-TP08-1	A1-TP08-2	A1-TP08-3	A1-DUP 3	A4-TP08-1
Grouping	**Analyte**					
SOIL						
Polychlorinated Biphenyls	PCB-1221 (mg/kg)			<0.050		<0.050
	PCB-1232 (mg/kg)			<0.050		<0.050
	PCB-1242 (mg/kg)			<0.050		<0.050
	PCB-1248 (mg/kg)			<0.050		<0.050
	PCB-1254 (mg/kg)			<0.050		<0.050
	PCB-1260 (mg/kg)			<0.050		<0.050
	PCB-1262 (mg/kg)			<0.050		<0.050
	PCB-1268 (mg/kg)			<0.050		<0.050
	Total Polychlorinated Biphenyls (mg/kg)			<0.050		<0.050
Organochlorine Pesticides	Aldrin (mg/kg)			<0.0010		
	alpha-BHC (mg/kg)			<0.0010		
	beta-BHC (mg/kg)			<0.0020		
	Lindane (gamma - BHC) (mg/kg)			<0.0010		
	delta-BHC (mg/kg)			<0.0010		
	cis-Chlordane (alpha) (mg/kg)			<0.0010		
	trans-Chlordane (gamma) (mg/kg)			<0.0010		
	2,4’-DDD (mg/kg)			<0.0010		
	4,4’-DDD (mg/kg)			0.0037		
	2,4’-DDE (mg/kg)			<0.0010		
	4,4’-DDE (mg/kg)			<0.0010		
	2,4’-DDT (mg/kg)			0.0062		
	4,4’-DDT (mg/kg)			0.0275		
	Dieldrin (mg/kg)			<0.0010		
	Endosulfan I (mg/kg)			<0.0010		
	Endosulfan II (mg/kg)			<0.0010		
	Endosulfan Sulfate (mg/kg)			<0.0010		
	Endrin (mg/kg)			<0.0050		
	Heptachlor (mg/kg)			<0.0020		
	Heptachlor Epoxide (mg/kg)			<0.0010		
	Methoxychlor (mg/kg)			<0.0050		
	Mirex (mg/kg)			<0.0010		
	cis-Nonachlor (mg/kg)			<0.0010		
	trans-Nonachlor (mg/kg)			<0.0010		
	Oxychlordane (mg/kg)			<0.0010		

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L682335-6				
	Description					
	Sampled Date	08-SEP-08				
	Sampled Time					
	Client ID	A4-TP08-2				
Grouping	**Analyte**					
SOIL						
Polychlorinated Biphenyls	PCB-1221 (mg/kg)	<0.050				
	PCB-1232 (mg/kg)	<0.050				
	PCB-1242 (mg/kg)	<0.050				
	PCB-1248 (mg/kg)	<0.050				
	PCB-1254 (mg/kg)	<0.050				
	PCB-1260 (mg/kg)	<0.050				
	PCB-1262 (mg/kg)	<0.050				
	PCB-1268 (mg/kg)	<0.050				
	Total Polychlorinated Biphenyls (mg/kg)	<0.050				
Organochlorine Pesticides	Aldrin (mg/kg)					
	alpha-BHC (mg/kg)					
	beta-BHC (mg/kg)					
	Lindane (gamma - BHC) (mg/kg)					
	delta-BHC (mg/kg)					
	cis-Chlordane (alpha) (mg/kg)					
	trans-Chlordane (gamma) (mg/kg)					
	2,4’-DDD (mg/kg)					
	4,4’-DDD (mg/kg)					
	2,4’-DDE (mg/kg)					
	4,4’-DDE (mg/kg)					
	2,4’-DDT (mg/kg)					
	4,4’-DDT (mg/kg)					
	Dieldrin (mg/kg)					
	Endosulfan I (mg/kg)					
	Endosulfan II (mg/kg)					
	Endosulfan Sulfate (mg/kg)					
	Endrin (mg/kg)					
	Heptachlor (mg/kg)					
	Heptachlor Epoxide (mg/kg)					
	Methoxychlor (mg/kg)					
	Mirex (mg/kg)					
	cis-Nonachlor (mg/kg)					
	trans-Nonachlor (mg/kg)					
	Oxychlordane (mg/kg)					

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
F1-BTX-CALC-VA	Soil	F1-Total BTX	CCME CWS PHC TIER 1 (2001)

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10) and F1-BTEX, a subsample of the sediment/soil is extracted with methanol and analysed by purge & trap GC/FID. The F1-BTEX result is then calculated as follows:

F1-BTEX: F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).

F1-MET-PT-FID-VA	Soil	CCME by Purge and Trap with GCMS	EPA 8260B & 524.2

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10), a subsample of the sediment/soil is extracted with methanol and analysed by purge & trap GC/FID.

Notes:
1. F1 (C6-C10): Sum of all hydrocarbons that elute between nC6 and nC10.
2. Reported results are expressed as milligrams per dry kilogram.
3. This method is validated for use.
4. Data from analysis of quality control samples is available upon request.

F2F4-TUMB-H/A-FID-VA	Soil	Petroleum Hydrocarbon by Tumbler GCFID	CCME

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For C10 to C50 hydrocarbons (F2, F3, F4) and gravimetric heavy hydrocarbons (F4G-sg), a subsample of the sediment/soil is extracted with 1:1 hexane:acetone using a rotary extractor. The extract undergoes a silica-gel clean-up to remove polar compounds. F2, F3 & F4 are analyzed by on-column GC/FID, and F4G-sg is analyzed gravimetrically.

Notes:
1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where F4 (C34-C50) and F4G-sg results are reported for a sample, the larger of the reported values is used for comparison against the relevant CCME standard for F4.
7. The gravimetric heavy hydrocarbon results (F4G-sg), cannot be added to the C6 to C50 hydrocarbon results.
8. This method is validated for use.
9. Data from analysis of quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram.

HG-CCME-CVAFS-VA	Soil	CVAFS Hg in Soil (CCME)	CCME

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry (EPA Method 7000 series).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

MET-CSR-FULL-ICP-VA	Soil	Metals in Soil by ICPOES (CSR SALM)	BCMELP CSR SALM METHOD 8

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually

Reference Information

Methods Listed (if applicable):

ALS Test Code Matrix Test Description Analytical Method Reference(Based On)

mobile in the environment.

MOISTURE-VA Soil Moisture content ASTM METHOD D2794-00

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

MOISTURE-VA Soil ASTM METHOD D2794-00

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

OCP1-SOX-ECD-VA Soil OCP-1 in Soil by Soxhlet GCECD EPA METHODS 3540, 3545, 3610, 3630, 3660

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3540, 3545, 3610, 3630, 3660 & 8081, published by the United States Environmental Protection Agency (EPA). The procedure uses an automated system (Accelerated Solvent Extractor - ASE) at high temperature and pressure or a Soxhlet system to extract a subsample of the sediment/soil with dichloromethane. The extract is then solvent exchanged to hexane followed by one or more of the following clean-up procedures (if required): alumina clean-up, silica gel clean-up and/or sulphur clean-up. The final extract is analysed by dual capillary column gas chromatography with electron capture detection (GC/ECD).

PCB-SE-ECD-VA Soil PCB by Extraction with GCECD EPA 3630/8082 GCECD

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3500, 3620, 3630, 3660, 3665 & 8082, published by the United States Environmental Protection Agency (EPA). The procedure involves a solid-liquid extraction of a subsample of the sediment/soil using a mixture of hexane and acetone. Water is added to the extract and the resulting hexane extract undergoes one or more of the following clean-up procedures (if required): florisil clean-up, silica gel clean-up, sulphur clean-up and/or sulphuric acid clean-up. The final extract is analysed by capillary column gas chromatography with electron capture detection (GC/ECD).

PH-1:2-VA Soil CSR pH by 1:2 Water Leach BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (10 mesh /2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

TL-CSR-MS-VA Soil ICPMS Tl in Soil by CSR SALM BCMELP CSR SALM Method 8

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by either hotplate or block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

VOC7-MET-PT-MS-VA Soil BTEX by MeOH with Purge and Trap GCMS EPA 8260B & 524.2

Volatile Organic Compounds (VOC) are extracted from sediment or soil with methanol, following a procedure from the British Columbia Ministry of Water Land and Air Protection (BCWLAP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999). Aliquots of the extract are analyzed by Purge and Trap by gas hromatography with mass spectrometric detection (GC/MS), using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260B, published by the United States Environmental Protection Agency (EPA). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

XYLENES-CALC-VA Soil CSR VOC7 by MeOH with DI GCMS EPA 8260B & 524.2

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.
The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
N/A - Result not available. Refer to qualifier code and definition for explanation

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CANADA TOLL FREE 1-800-668-9878
www.alsenviro.com

COC # C064681

Page ____ of ____

REPORT TO:
COMPANY: Franz Environmental inc.
CONTACT: Tina Ranger / Ryan Fletcher
ADDRESS: 329 Churchill Avenue
Ottawa, Ontario
PHONE: (613) 721-0555 FAX:

INVOICE TO: SAME AS REPORT ? [✓ YES] NO
COMPANY:
CONTACT:
ADDRESS:
PHONE: FAX:

Lab Work Order # (lab use only) L682335

REPORT FORMAT / DISTRIBUTION
STANDARD ____ OTHER ____
PDF ✓ EXCEL ✓ CUSTOM ____ FAX ____
EMAIL 1: tranger@franzenvironmental.com
EMAIL 2: trangia@franzenvironmental.com

INDICATE BOTTLES: FILTERED / PRESERVED (F/P) → → →

CLIENT / PROJECT INFORMATION:
JOB #: 1594-0801
PO /AFE:
Legal Site Description:
QUOTE #:

SAMPLER (Initials):

SERVICE REQUESTED
✓ REGULAR SERVICE (DEFAULT)
RUSH SERVICE (2-3 DAYS)
PRIORITY SERVICE (1 DAY or ASAP)
EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS

ANALYSIS REQUEST

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	F1 Btex	F2-F4	Metals	PAH	OC Pesticides	VOC	PCB total					HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
	A1-TP08-1	Sept 9/07		Soil			X											1
	A1-TP08-2						X											1
	A1-TP08-3				X	X	X		X		X							5
	A1-Dup 3						X											1
	A4-TP08-1				X	X	X				X							6
	A4-TP08-2				X	X	X				X							6

GUIDELINES / REGULATIONS

SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS

Failure to complete all portions of this form may delay analysis. Please fill in this form *LEGIBLY*.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the reverse page of the white report copy.

RELINQUISHED BY:
DATE & TIME:
RECEIVED BY: ZU
DATE & TIME: SEPT 12/08 12:00

RELINQUISHED BY:
DATE & TIME:
RECEIVED BY:
DATE & TIME:

SAMPLE CONDITION (lab use only)
TEMPERATURE 10
SAMPLES RECEIVED IN GOOD CONDITION ? [✓ YES] / NO
(If no provide details)

REFER TO BACK PAGE FOR REGIONAL LOCATIONS AND SAMPLING INFORMATION

WHITE - REPORT COPY, PINK - FILE COPY, YELLOW - CLIENT COPY

GENF14.00

Certificate of Analysis

FRANZ ENVIRONMENTAL INC.
ATTN: TINA RANGER
200 - 329 CHURCHILL AVENUE NORTH
OTTAWA ON K1Z 5B8

Reported On: 29-SEP-08 05:49 PM

Lab Work Order #: **L682349** **Date Received:** **12-SEP-08**

Project P.O. #:
Job Reference: 1584-0801
Legal Site Desc:
CofC Numbers: C064995

Other Information:

Comments:

JANINE WEEKS
Account Manager

	Sample ID	L682349-1	L682349-2	L682349-3	L682349-4	
	Description					
	Sampled Date	08-SEP-08	08-SEP-08	08-SEP-08	08-SEP-08	
	Sampled Time					
	Client ID	A4- SW08-1	A4- SW08-2	A4- SW08-4	A4- SW08-5	
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	471	1080	14.6	480	
Total Metals	Aluminum (Al)-Total (mg/L)	0.050	<0.10	0.0222	<0.10	
	Antimony (Sb)-Total (mg/L)	<0.0050	<0.010	<0.00050	<0.010	
	Arsenic (As)-Total (mg/L)	<0.0050	<0.010	<0.00050	<0.010	
	Barium (Ba)-Total (mg/L)	<0.020	<0.040	<0.020	<0.020	
	Beryllium (Be)-Total (mg/L)	<0.010	<0.020	<0.0010	<0.020	
	Boron (B)-Total (mg/L)	0.34	0.64	<0.10	0.49	
	Cadmium (Cd)-Total (mg/L)	<0.00017	<0.00034	0.000044	<0.00034	
	Calcium (Ca)-Total (mg/L)	35.0	117	4.18	33.3	
	Chromium (Cr)-Total (mg/L)	<0.010	<0.020	<0.0010	<0.020	
	Cobalt (Co)-Total (mg/L)	<0.0030	<0.0060	<0.00030	<0.0060	
	Copper (Cu)-Total (mg/L)	<0.010	<0.020	<0.0010	<0.020	
	Iron (Fe)-Total (mg/L)	0.263	1.50	<0.030	0.219	
	Lead (Pb)-Total (mg/L)	<0.0050	<0.010	<0.00050	<0.010	
	Lithium (Li)-Total (mg/L)	<0.050	<0.10	<0.0050	<0.10	
	Magnesium (Mg)-Total (mg/L)	93.1	190	1.00	96.3	
	Manganese (Mn)-Total (mg/L)	0.0157	0.381	0.00075	0.0095	
	Mercury (Hg)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	
	Molybdenum (Mo)-Total (mg/L)	<0.010	<0.020	<0.0010	<0.020	
	Nickel (Ni)-Total (mg/L)	<0.010	<0.020	<0.0010	<0.020	
	Potassium (K)-Total (mg/L)	27.4	50.4	<2.0	35.0	
	Selenium (Se)-Total (mg/L)	<0.010	<0.020	<0.0010	<0.020	
	Silver (Ag)-Total (mg/L)	<0.00020	<0.00040	<0.000020	<0.00040	
	Sodium (Na)-Total (mg/L)	861	1090	6.9	1020	
	Thallium (Tl)-Total (mg/L)	<0.0020	<0.0040	<0.00020	<0.0040	
	Tin (Sn)-Total (mg/L)	<0.0050	<0.010	<0.00050	<0.010	
	Titanium (Ti)-Total (mg/L)	<0.010	<0.020	<0.010	<0.010	
	Uranium (U)-Total (mg/L)	<0.0020	<0.0040	<0.00020	<0.0040	
	Vanadium (V)-Total (mg/L)	<0.010	<0.020	<0.0010	<0.020	
	Zinc (Zn)-Total (mg/L)	<0.0050	<0.010	<0.0050	<0.0050	
Volatile Organic Compounds	Benzene (mg/L)	<0.00050	<0.00050			
	Bromodichloromethane (mg/L)		<0.0010			
	Bromoform (mg/L)		<0.0010			
	Carbon Tetrachloride (mg/L)		<0.0010			
	Chlorobenzene (mg/L)		<0.0010			
	Dibromochloromethane (mg/L)		<0.0010			
	Chloroethane (mg/L)		<0.0010			
	Chloroform (mg/L)		<0.0010			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

	Sample ID	L682349-1	L682349-2	L682349-3	L682349-4	
	Description					
	Sampled Date	08-SEP-08	08-SEP-08	08-SEP-08	08-SEP-08	
	Sampled Time					
	Client ID	A4- SW08-1	A4- SW08-2	A4- SW08-4	A4- SW08-5	
Grouping	**Analyte**					
WATER						
Volatile Organic Compounds	Chloromethane (mg/L)		<0.0010			
	1,2-Dichlorobenzene (mg/L)		<0.0010			
	1,3-Dichlorobenzene (mg/L)		<0.0010			
	1,4-Dichlorobenzene (mg/L)		<0.0010			
	1,1-Dichloroethane (mg/L)		<0.0010			
	1,2-Dichloroethane (mg/L)		<0.0010			
	1,1-Dichloroethylene (mg/L)		<0.0010			
	cis-1,2-Dichloroethylene (mg/L)		0.0040			
	trans-1,2-Dichloroethylene (mg/L)		<0.0010			
	Dichloromethane (mg/L)		<0.0050			
	1,2-Dichloropropane (mg/L)		<0.0010			
	cis-1,3-Dichloropropylene (mg/L)		<0.0010			
	trans-1,3-Dichloropropylene (mg/L)		<0.0010			
	Ethylbenzene (mg/L)	<0.00050	<0.00050			
	Methyl t-butyl ether (MTBE) (mg/L)	<0.0010	<0.0010			
	Styrene (mg/L)	<0.00050	<0.00050			
	1,1,1,2-Tetrachloroethane (mg/L)		<0.0010			
	1,1,2,2-Tetrachloroethane (mg/L)		<0.0010			
	Tetrachloroethylene (mg/L)		0.0411			
	Toluene (mg/L)	<0.0010	<0.0010			
	1,1,1-Trichloroethane (mg/L)		<0.0010			
	1,1,2-Trichloroethane (mg/L)		<0.0010			
	Trichloroethylene (mg/L)		0.0226			
	Trichlorofluoromethane (mg/L)		<0.0010			
	Vinyl Chloride (mg/L)		<0.0010			
	ortho-Xylene (mg/L)	<0.00050	<0.00050			
	meta- & para-Xylene (mg/L)	<0.00050	<0.00050			
	Xylenes (mg/L)	<0.0010	<0.0010			
	Surrogate: 4-Bromofluorobenzene (SS) (%)	94	96			
	Surrogate: Fluorobenzene (SS) (%)	101	104			
Hydrocarbons	F2 (C10-C16) (mg/L)	<0.30	<0.30			
	F3 (C16-C34) (mg/L)	<0.30	<0.30			
	F1-BTEX (mg/L)	<0.10	<0.10			
	F1 (C6-C10) (mg/L)	<0.10	<0.10			
	Surrogate: 2,4-Dichlorotoluene (SS) (%)	97	102			
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)		<0.000050			
	Acenaphthylene (mg/L)		<0.000050			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L682349-1	L682349-2	L682349-3	L682349-4	
	Description					
	Sampled Date	08-SEP-08	08-SEP-08	08-SEP-08	08-SEP-08	
	Sampled Time					
	Client ID	A4- SW08-1	A4- SW08-2	A4- SW08-4	A4- SW08-5	
Grouping	**Analyte**					
WATER						
Polycyclic Aromatic Hydrocarbons	Acridine (mg/L)		<0.000050			
	Anthracene (mg/L)		<0.000050			
	Benz(a)anthracene (mg/L)		<0.000050			
	Benzo(a)pyrene (mg/L)		<0.000010			
	Benzo(b)fluoranthene (mg/L)		<0.000050			
	Benzo(g,h,i)perylene (mg/L)		<0.000050			
	Benzo(k)fluoranthene (mg/L)		<0.000050			
	Chrysene (mg/L)		<0.000050			
	Dibenz(a,h)anthracene (mg/L)		<0.000050			
	Fluoranthene (mg/L)		<0.000050			
	Fluorene (mg/L)		<0.000050			
	Indeno(1,2,3-c,d)pyrene (mg/L)		<0.000050			
	Naphthalene (mg/L)		<0.000050			
	Phenanthrene (mg/L)		<0.000050			
	Pyrene (mg/L)		<0.000050			
	Quinoline (mg/L)		<0.000050			
	Surrogate: d10-Acenaphthene (SS) (%)		98			
	Surrogate: d9-Acridine (SS) (%)		91			
	Surrogate: d12-Chrysene (SS) (%)		83			
	Surrogate: d8-Naphthalene (SS) (%)		98			
	Surrogate: d10-Phenanthrene (SS) (%)		97			
Polychlorinated Biphenyls	PCB-1016 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	PCB-1221 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	PCB-1232 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	PCB-1242 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	PCB-1248 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	PCB-1254 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	PCB-1260 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	PCB-1262 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	PCB-1268 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Total Polychlorinated Biphenyls (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
Organochlorine Pesticides	Aldrin (mg/L)		<0.000050			
	alpha-BHC (mg/L)		<0.000050			
	beta-BHC (mg/L)		<0.00010			
	Lindane (gamma - BHC) (mg/L)		<0.000050			
	delta-BHC (mg/L)		<0.000050			
	cis-Chlordane (alpha) (mg/L)		<0.000050			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L682349-1	L682349-2	L682349-3	L682349-4	
	Description					
	Sampled Date	08-SEP-08	08-SEP-08	08-SEP-08	08-SEP-08	
	Sampled Time					
	Client ID	A4- SW08-1	A4- SW08-2	A4- SW08-4	A4- SW08-5	
Grouping	**Analyte**					
WATER						
Organochlorine Pesticides	trans-Chlordane (gamma) (mg/L)		<0.000050			
	2,4’-DDD (mg/L)		<0.00010			
	4,4’-DDD (mg/L)		<0.000050			
	2,4’-DDE (mg/L)		<0.00010			
	4,4’-DDE (mg/L)		<0.000050			
	2,4’-DDT (mg/L)		<0.00010			
	4,4’-DDT (mg/L)		<0.00010			
	Dieldrin (mg/L)		<0.000050			
	Endosulfan I (mg/L)		<0.000050			
	Endosulfan II (mg/L)		<0.000050			
	Endosulfan Sulfate (mg/L)		<0.000050			
	Endrin (mg/L)		<0.00020			
	Heptachlor (mg/L)		<0.00010			
	Heptachlor Epoxide (mg/L)		<0.000050			
	Methoxychlor (mg/L)		<0.00020			
	Mirex (mg/L)		<0.000050			
	cis-Nonachlor (mg/L)		<0.000050			
	trans-Nonachlor (mg/L)		<0.000050			
	Oxychlordane (mg/L)		<0.000050			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comment

Qualifiers for Sample Submission Listed:

Qualifier	Description
SPL	Sample was Preserved at the laboratory - samples #1-4 - Total Metals

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
F1-BTX-CALC-VA	Water	F1-Total BTX	CCME CWS PHC TIER 1 (2001)

This analysis is based on the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10), the sample undergoes a purge and trap extraction prior to analysis by GC/FID. The F1-BTEX result is calculated as follows:

F1-BTEX: F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).

F1-PT-FID-VA	Water	CCME F1 By P&T with GCFID	EPA SW-846, METHOD 8260

This analysis is based on the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10), the sample undergoes a purge and trap extraction prior to analysis by GC/FID.

F1 (C6-C10): Sum of all hydrocarbons that elute between nC6 and nC10.

F2-F3-SF-FID-VA	Water	Extractable Hydrocanbons in water GCFID	CWS (CCME)

Petroleum Hydrocarbons (F2-F3) in Water

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, published by the United States Environmental Protection Agency (EPA) and the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." The procedure involves a liquid-liquid extraction of the entire water sample using dichloromethane prior to capillary column gas chromatography with flame ionization detection (GC/FID).

A silica gel cleanup procedure is applied before GC analysis, which is intended to selectively remove most naturally occurring organics.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-TOT-CCME-CVAFS-VA	Water	Total Mercury in Water by CVAFS (CCME)	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-TOT-CCME-ICP-VA	Water	Total Metals in Water by ICPOES (CCME)	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-CCME-MS-VA	Water	Total Metals in Water by ICPMS (CCME)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

OCP1-SF-ECD-VA	Water	OCP-1 in Water by GCECD	EPA METHODS 3510, 3610, 3630, 3660, 8081

Reference Information

Methods Listed (if applicable):

ALS Test Code | Matrix | Test Description | Analytical Method Reference(Based On)

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3510, 3610, 3630, 3660 & 8081, published by the United States Environmental Protection Agency (EPA). The procedure involves extraction of the entire water sample with dichloromethane. The extract is then solvent exchanged to hexane followed by one or more of the following clean-up procedures (if required): alumina clean-up, silica gel clean-up and/or sulphur clean-up. The final extract is analysed by dual capillary column gas chromatography with electron capture detection (GC/ECD) and/or mass spectrometric detection (GC/MS).

PAH-SF-MS-VA | Water | PAH in Water by GCMS | EPA Methods 3510, 3630 & 8270

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3510, 3630 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure involves extraction of the entire water sample with dichloromethane. The extract is then solvent exchanged to toluene prior to analysis by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

PCB-SF-ECD-VA | Water | PCB by Extraction with GCECD | EPA 3510/8082 Liq-Liq GCECD

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3510, 3620, 3660, 3665 & 8082, published by the United States Environmental Protection Agency (EPA). The procedure involves a liquid-liquid extraction of the entire water sample using dichloromethane. The extract is then solvent exchanged to hexane followed by one or more of the following clean-up procedures (if required): florisil clean-up, sulphur clean-up and/or sulphuric acid clean-up. The final extract is analysed by capillary column gas chromatography with electron capture detection (GC/ECD).

VOC-PT-MS-VA | Water | VOC by Purge Trap GCMS | EPA 8260B, BCMELP CSR METHOD

This procedure involves the purge and trap extraction of the sample prior to analysis for specific Volatile Organic Compounds (VOC) by capillary column gas chromatography with mass spectrometric detection (GC/MS). The VOC analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260, published by the United States Environmental Protection Agency (EPA). Note: For chlorinated waters certain conditions may cause the formation of trihalomethanes after sample collection. Appropriate chemical treatment of chlorinated waters will prevent trihalomethane formation in the samples. Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

VOC7-PT-MS-VA | Water | BTEX by Purge Trap GCMS | EPA 8260b, BCMELP CSR Method

This procedure involves the purge and trap extraction of the sample prior to analysis for specific Volatile Organic Compounds (VOC) by capillary column gas chromatography with mass spectrometric detection (GC/MS). The VOC analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260, published by the United States Environmental Protection Agency (EPA). Note: For chlorinated waters certain conditions may cause the formation of trihalomethanes after sample collection. Appropriate chemical treatment of chlorinated waters will prevent trihalomethane formation in the samples. Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

XYLENES-CALC-VA | Water | CSR VOC7 by MeOH with DI GCMS | CALCULATION

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.
The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
N/A - Result not available. Refer to qualifier code and definition for explanation

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

L682349
Attachment
26-Sep-08

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample ID	L682349-1	L682349-2	BLK
Description			QC
Client ID	A4-SW08-1	A4-SW08-2	
Class in Matrix (units)	Water	Water	
Analyte	F4(mg/L)	F4(mg/L)	
Parameter 1	<0.30	<0.30	<0.3
Surrogate 1 (%)	96	91	91

Unit of Measurement =
blue highlight = raised detection limit due to interference
green highlight = surrogate recovery (%)

Notes:

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

ALS

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CANADA TOLL FREE 1-800-668-9878
www.alsenviro.com

COC # C064995

Page 1 of 1

REPORT TO:
COMPANY: Franz Environmental
CONTACT: Tina Ranger / Ryan Fletcher
ADDRESS: 329 Churchill Ave
PHONE: (613) 721-0555 FAX:

INVOICE TO: SAME AS REPORT ? [✓ YES] / NO
COMPANY:
CONTACT:
ADDRESS:
PHONE: FAX:

REPORT FORMAT / DISTRIBUTION
STANDARD ____ OTHER ____
PDF ✓ EXCEL ✓ CUSTOM ____ FAX ____
EMAIL 1: tranger@franzenvironmental.com
EMAIL 2: rfletcher@franzenvironmental.com

INDICATE BOTTLES: FILTERED / PRESERVED (F/P) → → →

CLIENT / PROJECT INFORMATION:
JOB #: 1584-0801
PO /AFE:
Legal Site Description:
QUOTE #:

SERVICE REQUESTED
✓ REGULAR SERVICE (DEFAULT)
RUSH SERVICE (2-3 DAYS)
PRIORITY SERVICE (1 DAY or ASAP)
EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS

Lab Work Order # (lab use only): L682349

SAMPLER (Initials):

ANALYSIS REQUEST

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	F1 Btex	F2 F4	Metals	PAH	PCB total	VOC	OC Pesticides					HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
	A4- SW08-1	Sept 8, 2008		GW	X	X	X		X									7
	A4 - SW08-2	Sept 8, 2008		GW	X	X	X	X	X	X	X							11
	A4 - SW08-4	Sept 8, 2008		GW			X		X									5
	A4 - SW08-5	Sept 8, 2008		GW			X		X									5

GUIDELINES / REGULATIONS

SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS

Failure to complete all portions of this form may delay analysis. Please fill in this form *LEGIBLY*.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the reverse page of the white report copy.

RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:
Tina Ranger	Sept 8/2008	ZW	Sept 12, 08 11:57
RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:

SAMPLE CONDITION (lab use only)
TEMPERATURE: 11
SAMPLES RECEIVED IN GOOD CONDITION ? [✓ YES] / NO
(If no provide details)

REFER TO BACK PAGE FOR REGIONAL LOCATIONS AND SAMPLING INFORMATION

WHITE - REPORT COPY, PINK - FILE COPY, YELLOW - CLIENT COPY

GENF14.00

Certificate of Analysis

FRANZ ENVIRONMENTAL INC.
ATTN: TINA RANGER
200 - 329 CHURCHILL AVENUE NORTH
OTTAWA ON K1Z 5B8

Reported On: 14-OCT-08 05:34 PM

Lab Work Order #: **L682370** **Date Received:** **12-SEP-08**

Project P.O. #:
Job Reference: 1584-0801
Legal Site Desc: TC IQALUIT LANDFILL
CofC Numbers: C064685, C064686, C064687, C064688

Other Information:

Comments:

JANINE WEEKS
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L682370-11	L682370-12	L682370-14	L682370-15	L682370-20
	Description					
	Sampled Date	09-SEP-08	09-SEP-08	09-SEP-08	09-SEP-08	09-SEP-08
	Sampled Time					
	Client ID	TP-BK-1	SD-BK-1	TP-BK-2	SD-BK-2	A2-TP08-1
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)					15.8
	pH (pH)	6.93	7.56	6.28	7.31	
Particle Size	% Gravel (>2mm) (%)					
	% Sand (2.0mm - 0.063mm) (%)					
	% Silt (0.063mm - 4um) (%)					
	% Clay (<4um) (%)					
Metals	Antimony (Sb) (mg/kg)	<10	<10	<10	<10	
	Arsenic (As) (mg/kg)	<5.0	<5.0	<5.0	<5.0	
	Barium (Ba) (mg/kg)	29.8	16.7	31.5	23.5	
	Beryllium (Be) (mg/kg)	<0.50	<0.50	<0.50	<0.50	
	Cadmium (Cd) (mg/kg)	<0.50	<0.50	<0.50	<0.50	
	Chromium (Cr) (mg/kg)	21.8	13.7	22.5	10.2	
	Cobalt (Co) (mg/kg)	5.2	3.5	3.9	3.2	
	Copper (Cu) (mg/kg)	8.8	5.0	5.9	5.2	
	Lead (Pb) (mg/kg)	<30	<30	<30	<30	
	Mercury (Hg) (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	
	Molybdenum (Mo) (mg/kg)	<4.0	<4.0	<4.0	<4.0	
	Nickel (Ni) (mg/kg)	6.2	<5.0	5.3	<5.0	
	Selenium (Se) (mg/kg)	<2.0	<2.0	<2.0	<2.0	
	Silver (Ag) (mg/kg)	<2.0	<2.0	<2.0	<2.0	
	Thallium (Tl) (mg/kg)	<1.0	<1.0	<1.0	<1.0	
	Tin (Sn) (mg/kg)	<5.0	<5.0	<5.0	<5.0	
	Vanadium (V) (mg/kg)	55.0	36.9	56.9	24.2	
	Zinc (Zn) (mg/kg)	35.6	22.0	27.2	21.1	
Volatile Organic Compounds	Benzene (mg/kg)					<0.040
	Bromodichloromethane (mg/kg)					<0.050
	Bromoform (mg/kg)					<0.050
	Carbon Tetrachloride (mg/kg)					<0.050
	Chlorobenzene (mg/kg)					<0.050
	Dibromochloromethane (mg/kg)					<0.050
	Chloroethane (mg/kg)					<0.10
	Chloroform (mg/kg)					<0.10
	Chloromethane (mg/kg)					<0.10
	1,2-Dichlorobenzene (mg/kg)					<0.050
	1,3-Dichlorobenzene (mg/kg)					<0.050
	1,4-Dichlorobenzene (mg/kg)					<0.050
	1,1-Dichloroethane (mg/kg)					<0.050
	1,2-Dichloroethane (mg/kg)					<0.050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L682370-21	L682370-22	L682370-23	L682370-24	L682370-25
	Description					
	Sampled Date	09-SEP-08	09-SEP-08	09-SEP-08	09-SEP-08	09-SEP-08
	Sampled Time					
	Client ID	A2-TP08-2	A2-SD08-4	GS-1	GS-2	GS-3
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	22.0	38.9			
	pH (pH)					
Particle Size	% Gravel (>2mm) (%)			17	13	1
	% Sand (2.0mm - 0.063mm) (%)			68	75	70
	% Silt (0.063mm - 4um) (%)			12	1	16
	% Clay (<4um) (%)			2	11	13
Metals	Antimony (Sb) (mg/kg)					
	Arsenic (As) (mg/kg)					
	Barium (Ba) (mg/kg)					
	Beryllium (Be) (mg/kg)					
	Cadmium (Cd) (mg/kg)					
	Chromium (Cr) (mg/kg)					
	Cobalt (Co) (mg/kg)					
	Copper (Cu) (mg/kg)					
	Lead (Pb) (mg/kg)					
	Mercury (Hg) (mg/kg)					
	Molybdenum (Mo) (mg/kg)					
	Nickel (Ni) (mg/kg)					
	Selenium (Se) (mg/kg)					
	Silver (Ag) (mg/kg)					
	Thallium (Tl) (mg/kg)					
	Tin (Sn) (mg/kg)					
	Vanadium (V) (mg/kg)					
	Zinc (Zn) (mg/kg)					
Volatile Organic Compounds	Benzene (mg/kg)	<0.040	<0.040			
	Bromodichloromethane (mg/kg)	<0.050	<0.050			
	Bromoform (mg/kg)	<0.050	<0.050			
	Carbon Tetrachloride (mg/kg)	<0.050	<0.050			
	Chlorobenzene (mg/kg)	<0.050	<0.050			
	Dibromochloromethane (mg/kg)	<0.050	<0.050			
	Chloroethane (mg/kg)	<0.10	<0.10			
	Chloroform (mg/kg)	<0.10	<0.10			
	Chloromethane (mg/kg)	<0.10	<0.10			
	1,2-Dichlorobenzene (mg/kg)	<0.050	<0.050			
	1,3-Dichlorobenzene (mg/kg)	<0.050	<0.050			
	1,4-Dichlorobenzene (mg/kg)	<0.050	<0.050			
	1,1-Dichloroethane (mg/kg)	<0.050	<0.050			
	1,2-Dichloroethane (mg/kg)	<0.050	<0.050			

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L682370-26 09-SEP-08 GS-4	L682370-27 09-SEP-08 GS-5	L682370-28 09-SEP-08 GS-SD-1	L682370-29 09-SEP-08 GS-SD-2	
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)					
	pH (pH)					
Particle Size	% Gravel (>2mm) (%)	4	6	2	4	
	% Sand (2.0mm - 0.063mm) (%)	63	55	84	55	
	% Silt (0.063mm - 4um) (%)	19	35	13	33	
	% Clay (<4um) (%)	13	4	2	8	
Metals	Antimony (Sb) (mg/kg)					
	Arsenic (As) (mg/kg)					
	Barium (Ba) (mg/kg)					
	Beryllium (Be) (mg/kg)					
	Cadmium (Cd) (mg/kg)					
	Chromium (Cr) (mg/kg)					
	Cobalt (Co) (mg/kg)					
	Copper (Cu) (mg/kg)					
	Lead (Pb) (mg/kg)					
	Mercury (Hg) (mg/kg)					
	Molybdenum (Mo) (mg/kg)					
	Nickel (Ni) (mg/kg)					
	Selenium (Se) (mg/kg)					
	Silver (Ag) (mg/kg)					
	Thallium (Tl) (mg/kg)					
	Tin (Sn) (mg/kg)					
	Vanadium (V) (mg/kg)					
	Zinc (Zn) (mg/kg)					
Volatile Organic Compounds	Benzene (mg/kg)					
	Bromodichloromethane (mg/kg)					
	Bromoform (mg/kg)					
	Carbon Tetrachloride (mg/kg)					
	Chlorobenzene (mg/kg)					
	Dibromochloromethane (mg/kg)					
	Chloroethane (mg/kg)					
	Chloroform (mg/kg)					
	Chloromethane (mg/kg)					
	1,2-Dichlorobenzene (mg/kg)					
	1,3-Dichlorobenzene (mg/kg)					
	1,4-Dichlorobenzene (mg/kg)					
	1,1-Dichloroethane (mg/kg)					
	1,2-Dichloroethane (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L682370-11 09-SEP-08 TP-BK-1	L682370-12 09-SEP-08 SD-BK-1	L682370-14 09-SEP-08 TP-BK-2	L682370-15 09-SEP-08 SD-BK-2	L682370-20 09-SEP-08 A2-TP08-1
Grouping	**Analyte**					
SOIL						
Volatile Organic Compounds	1,1-Dichloroethylene (mg/kg)					<0.050
	cis-1,2-Dichloroethylene (mg/kg)					<0.050
	trans-1,2-Dichloroethylene (mg/kg)					<0.050
	Dichloromethane (mg/kg)					<0.30
	1,2-Dichloropropane (mg/kg)					<0.050
	cis-1,3-Dichloropropylene (mg/kg)					<0.050
	trans-1,3-Dichloropropylene (mg/kg)					<0.050
	Ethylbenzene (mg/kg)					<0.050
	Methyl t-butyl ether (MTBE) (mg/kg)					<0.20
	Styrene (mg/kg)					<0.050
	1,1,1,2-Tetrachloroethane (mg/kg)					<0.050
	1,1,2,2-Tetrachloroethane (mg/kg)					<0.050
	Tetrachloroethylene (mg/kg)					<0.050
	Toluene (mg/kg)					<0.050
	1,1,1-Trichloroethane (mg/kg)					<0.050
	1,1,2-Trichloroethane (mg/kg)					<0.050
	Trichloroethylene (mg/kg)					<0.015
	Trichlorofluoromethane (mg/kg)					<0.10
	Vinyl Chloride (mg/kg)					<0.10
	ortho-Xylene (mg/kg)					<0.050
	meta- & para-Xylene (mg/kg)					<0.050
	Xylenes (mg/kg)					<0.10
	Surrogate: 4-Bromofluorobenzene (SS) (%)					101
	Surrogate: Fluorobenzene (SS) (%)					100
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)					<0.040
	Acenaphthylene (mg/kg)					<0.050
	Anthracene (mg/kg)					<0.050
	Benz(a)anthracene (mg/kg)					<0.050
	Benzo(a)pyrene (mg/kg)					<0.050
	Benzo(b)fluoranthene (mg/kg)					<0.050
	Benzo(g,h,i)perylene (mg/kg)					<0.050
	Benzo(k)fluoranthene (mg/kg)					<0.050
	Chrysene (mg/kg)					<0.050
	Dibenz(a,h)anthracene (mg/kg)					<0.050
	Fluoranthene (mg/kg)					0.067
	Fluorene (mg/kg)					<0.050
	Indeno(1,2,3-c,d)pyrene (mg/kg)					<0.050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID **Description** **Sampled Date** **Sampled Time** **Client ID**	L682370-21 09-SEP-08 A2-TP08-2	L682370-22 09-SEP-08 A2-SD08-4	L682370-23 09-SEP-08 GS-1	L682370-24 09-SEP-08 GS-2	L682370-25 09-SEP-08 GS-3
Grouping	**Analyte**					
SOIL						
Volatile Organic Compounds	1,1-Dichloroethylene (mg/kg)	<0.050	<0.050			
	cis-1,2-Dichloroethylene (mg/kg)	<0.050	<0.050			
	trans-1,2-Dichloroethylene (mg/kg)	<0.050	<0.050			
	Dichloromethane (mg/kg)	<0.80	<0.60			
	1,2-Dichloropropane (mg/kg)	<0.050	<0.050			
	cis-1,3-Dichloropropylene (mg/kg)	<0.050	<0.050			
	trans-1,3-Dichloropropylene (mg/kg)	<0.050	<0.050			
	Ethylbenzene (mg/kg)	<0.050	<0.050			
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20	<0.20			
	Styrene (mg/kg)	<0.050	<0.050			
	1,1,1,2-Tetrachloroethane (mg/kg)	<0.050	<0.050			
	1,1,2,2-Tetrachloroethane (mg/kg)	<0.050	<0.050			
	Tetrachloroethylene (mg/kg)	<0.050	<0.050			
	Toluene (mg/kg)	0.116	0.120			
	1,1,1-Trichloroethane (mg/kg)	<0.050	<0.050			
	1,1,2-Trichloroethane (mg/kg)	<0.050	<0.050			
	Trichloroethylene (mg/kg)	<0.015	<0.015			
	Trichlorofluoromethane (mg/kg)	<0.10	<0.10			
	Vinyl Chloride (mg/kg)	<0.10	<0.10			
	ortho-Xylene (mg/kg)	<0.050	<0.050			
	meta- & para-Xylene (mg/kg)	<0.050	<0.050			
	Xylenes (mg/kg)	<0.10	<0.10			
	Surrogate: 4-Bromofluorobenzene (SS) (%)	104	90			
	Surrogate: Fluorobenzene (SS) (%)	79	70			
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.040	<0.040			
	Acenaphthylene (mg/kg)	<0.050	<0.050			
	Anthracene (mg/kg)	<0.050	<0.050			
	Benz(a)anthracene (mg/kg)	0.068	<0.050			
	Benzo(a)pyrene (mg/kg)	0.072	<0.050			
	Benzo(b)fluoranthene (mg/kg)	0.130	0.061			
	Benzo(g,h,i)perylene (mg/kg)	0.054	<0.050			
	Benzo(k)fluoranthene (mg/kg)	<0.050	<0.050			
	Chrysene (mg/kg)	0.086	<0.050			
	Dibenz(a,h)anthracene (mg/kg)	<0.050	<0.050			
	Fluoranthene (mg/kg)	0.129	0.050			
	Fluorene (mg/kg)	<0.050	<0.050			
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.080	<0.050			

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L682370-26	L682370-27	L682370-28	L682370-29	
	Description					
	Sampled Date	09-SEP-08	09-SEP-08	09-SEP-08	09-SEP-08	
	Sampled Time					
	Client ID	GS-4	GS-5	GS-SD-1	GS-SD-2	
Grouping	**Analyte**					
SOIL						
Volatile Organic Compounds	1,1-Dichloroethylene (mg/kg)					
	cis-1,2-Dichloroethylene (mg/kg)					
	trans-1,2-Dichloroethylene (mg/kg)					
	Dichloromethane (mg/kg)					
	1,2-Dichloropropane (mg/kg)					
	cis-1,3-Dichloropropylene (mg/kg)					
	trans-1,3-Dichloropropylene (mg/kg)					
	Ethylbenzene (mg/kg)					
	Methyl t-butyl ether (MTBE) (mg/kg)					
	Styrene (mg/kg)					
	1,1,1,2-Tetrachloroethane (mg/kg)					
	1,1,2,2-Tetrachloroethane (mg/kg)					
	Tetrachloroethylene (mg/kg)					
	Toluene (mg/kg)					
	1,1,1-Trichloroethane (mg/kg)					
	1,1,2-Trichloroethane (mg/kg)					
	Trichloroethylene (mg/kg)					
	Trichlorofluoromethane (mg/kg)					
	Vinyl Chloride (mg/kg)					
	ortho-Xylene (mg/kg)					
	meta- & para-Xylene (mg/kg)					
	Xylenes (mg/kg)					
	Surrogate: 4-Bromofluorobenzene (SS) (%)					
	Surrogate: Fluorobenzene (SS) (%)					
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)					
	Acenaphthylene (mg/kg)					
	Anthracene (mg/kg)					
	Benz(a)anthracene (mg/kg)					
	Benzo(a)pyrene (mg/kg)					
	Benzo(b)fluoranthene (mg/kg)					
	Benzo(g,h,i)perylene (mg/kg)					
	Benzo(k)fluoranthene (mg/kg)					
	Chrysene (mg/kg)					
	Dibenz(a,h)anthracene (mg/kg)					
	Fluoranthene (mg/kg)					
	Fluorene (mg/kg)					
	Indeno(1,2,3-c,d)pyrene (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte					
	Sample ID	L682370-11	L682370-12	L682370-14	L682370-15	L682370-20
	Description					
	Sampled Date	09-SEP-08	09-SEP-08	09-SEP-08	09-SEP-08	09-SEP-08
	Sampled Time					
	Client ID	TP-BK-1	SD-BK-1	TP-BK-2	SD-BK-2	A2-TP08-1
SOIL						
Polycyclic Aromatic Hydrocarbons	2-Methylnaphthalene (mg/kg)					<0.050
	Naphthalene (mg/kg)					<0.050
	Phenanthrene (mg/kg)					<0.050
	Pyrene (mg/kg)					0.055
	Surrogate: d10-Acenaphthene (SS) (%)					95
	Surrogate: d12-Chrysene (SS) (%)					99
	Surrogate: d8-Naphthalene (SS) (%)					94
	Surrogate: d10-Phenanthrene (SS) (%)					94
Organochlorine Pesticides	Aldrin (mg/kg)					<0.0010
	alpha-BHC (mg/kg)					<0.0010
	beta-BHC (mg/kg)					<0.0020
	Lindane (gamma - BHC) (mg/kg)					<0.0010
	delta-BHC (mg/kg)					<0.0010
	cis-Chlordane (alpha) (mg/kg)					<0.0010
	trans-Chlordane (gamma) (mg/kg)					<0.0010
	2,4'-DDD (mg/kg)					<0.0010
	4,4'-DDD (mg/kg)					0.0440
	2,4'-DDE (mg/kg)					<0.0010
	4,4'-DDE (mg/kg)					<0.0010
	2,4'-DDT (mg/kg)					0.0586
	4,4'-DDT (mg/kg)					0.247
	Dieldrin (mg/kg)					<0.0010
	Endosulfan I (mg/kg)					<0.0010
	Endosulfan II (mg/kg)					<0.0010
	Endosulfan Sulfate (mg/kg)					<0.0010
	Endrin (mg/kg)					<0.0050
	Heptachlor (mg/kg)					<0.0020
	Heptachlor Epoxide (mg/kg)					<0.0010
	Methoxychlor (mg/kg)					<0.0050
	Mirex (mg/kg)					<0.0010
	cis-Nonachlor (mg/kg)					<0.020
	trans-Nonachlor (mg/kg)					<0.0010
	Oxychlordane (mg/kg)					<0.0010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Grouping	Analyte	L682370-21	L682370-22	L682370-23	L682370-24	L682370-25
	Sample ID	L682370-21	L682370-22	L682370-23	L682370-24	L682370-25
	Description					
	Sampled Date	09-SEP-08	09-SEP-08	09-SEP-08	09-SEP-08	09-SEP-08
	Sampled Time					
	Client ID	A2-TP08-2	A2-SD08-4	GS-1	GS-2	GS-3
SOIL						
Polycyclic Aromatic Hydrocarbons	2-Methylnaphthalene (mg/kg)	<0.050	<0.050			
	Naphthalene (mg/kg)	<0.050	<0.050			
	Phenanthrene (mg/kg)	0.091	<0.050			
	Pyrene (mg/kg)	0.105	<0.050			
	Surrogate: d10-Acenaphthene (SS) (%)	94	92			
	Surrogate: d12-Chrysene (SS) (%)	101	97			
	Surrogate: d8-Naphthalene (SS) (%)	93	93			
	Surrogate: d10-Phenanthrene (SS) (%)	95	92			
Organochlorine Pesticides	Aldrin (mg/kg)	<0.0010				
	alpha-BHC (mg/kg)	<0.0010				
	beta-BHC (mg/kg)	<0.0020				
	Lindane (gamma - BHC) (mg/kg)	<0.0010				
	delta-BHC (mg/kg)	<0.0010				
	cis-Chlordane (alpha) (mg/kg)	<0.0010				
	trans-Chlordane (gamma) (mg/kg)	<0.0010				
	2,4’-DDD (mg/kg)	<0.0010				
	4,4’-DDD (mg/kg)	0.0045				
	2,4’-DDE (mg/kg)	<0.0010				
	4,4’-DDE (mg/kg)	0.0049				
	2,4’-DDT (mg/kg)	0.0053				
	4,4’-DDT (mg/kg)	0.0307				
	Dieldrin (mg/kg)	<0.0010				
	Endosulfan I (mg/kg)	<0.0010				
	Endosulfan II (mg/kg)	<0.0010				
	Endosulfan Sulfate (mg/kg)	<0.0010				
	Endrin (mg/kg)	<0.0050				
	Heptachlor (mg/kg)	<0.0020				
	Heptachlor Epoxide (mg/kg)	<0.0010				
	Methoxychlor (mg/kg)	<0.0050				
	Mirex (mg/kg)	<0.0010				
	cis-Nonachlor (mg/kg)	<0.0010				
	trans-Nonachlor (mg/kg)	<0.0010				
	Oxychlordane (mg/kg)	<0.0010				

	Sample ID	L682370-26	L682370-27	L682370-28	L682370-29	
	Description					
	Sampled Date	09-SEP-08	09-SEP-08	09-SEP-08	09-SEP-08	
	Sampled Time					
	Client ID	GS-4	GS-5	GS-SD-1	GS-SD-2	
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	2-Methylnaphthalene (mg/kg)					
	Naphthalene (mg/kg)					
	Phenanthrene (mg/kg)					
	Pyrene (mg/kg)					
	Surrogate: d10-Acenaphthene (SS) (%)					
	Surrogate: d12-Chrysene (SS) (%)					
	Surrogate: d8-Naphthalene (SS) (%)					
	Surrogate: d10-Phenanthrene (SS) (%)					
Organochlorine Pesticides	Aldrin (mg/kg)					
	alpha-BHC (mg/kg)					
	beta-BHC (mg/kg)					
	Lindane (gamma - BHC) (mg/kg)					
	delta-BHC (mg/kg)					
	cis-Chlordane (alpha) (mg/kg)					
	trans-Chlordane (gamma) (mg/kg)					
	2,4’-DDD (mg/kg)					
	4,4’-DDD (mg/kg)					
	2,4’-DDE (mg/kg)					
	4,4’-DDE (mg/kg)					
	2,4’-DDT (mg/kg)					
	4,4’-DDT (mg/kg)					
	Dieldrin (mg/kg)					
	Endosulfan I (mg/kg)					
	Endosulfan II (mg/kg)					
	Endosulfan Sulfate (mg/kg)					
	Endrin (mg/kg)					
	Heptachlor (mg/kg)					
	Heptachlor Epoxide (mg/kg)					
	Methoxychlor (mg/kg)					
	Mirex (mg/kg)					
	cis-Nonachlor (mg/kg)					
	trans-Nonachlor (mg/kg)					
	Oxychlordane (mg/kg)					

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L682370-1	L682370-2	L682370-3	L682370-4	L682370-5
	Sample ID	L682370-1	L682370-2	L682370-3	L682370-4	L682370-5
	Description					
	Sampled Date	09-SEP-08	09-SEP-08	09-SEP-08	09-SEP-08	09-SEP-08
	Sampled Time					
	Client ID	VEG-1	VEG-2	VEG-3	VEG-4	VEG-5
TISSUE						
Physical Tests	% Moisture (%)	59.8	69.5	67.8	56.5	68.4
Metals	Aluminum (Al)-Total (mg/kg wwt)	31.0	36.1	45.7	88.4	24.0
	Antimony (Sb)-Total (mg/kg wwt)	<0.010	0.013	<0.010	<0.010	0.023
	Arsenic (As)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	0.013	0.012
	Barium (Ba)-Total (mg/kg wwt)	9.07	7.88	13.2	26.4	36.2
	Beryllium (Be)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Bismuth (Bi)-Total (mg/kg wwt)	<0.030	<0.030	<0.030	<0.030	<0.030
	Cadmium (Cd)-Total (mg/kg wwt)	0.467	0.140	0.118	0.495	0.0206
	Calcium (Ca)-Total (mg/kg wwt)	3750	2000	1590	3390	7300
	Chromium (Cr)-Total (mg/kg wwt)	0.11	<0.10	0.10	0.20	0.12
	Cobalt (Co)-Total (mg/kg wwt)	0.027	0.105	0.040	0.062	<0.020
	Copper (Cu)-Total (mg/kg wwt)	2.52	1.38	1.70	3.40	2.89
	Iron (Fe)-Total (mg/kg wwt)	28.3	35.6	38.2	133	47.6
	Lead (Pb)-Total (mg/kg wwt)	0.095	0.283	0.200	0.358	1.45
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	0.11	0.13
	Magnesium (Mg)-Total (mg/kg wwt)	817	463	484	1030	343
	Manganese (Mn)-Total (mg/kg wwt)	25.9	31.7	90.4	261	4.02
	Molybdenum (Mo)-Total (mg/kg wwt)	0.120	0.258	0.066	0.094	1.09
	Nickel (Ni)-Total (mg/kg wwt)	0.18	0.16	0.27	0.34	0.30
	Phosphorus (P)-Total (mg/kg wwt)	245	350	397	365	520
	Potassium (K)-Total (mg/kg wwt)	2340	1780	2170	3210	1690
	Selenium (Se)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Sodium (Na)-Total (mg/kg wwt)	62	53	36	55	21
	Strontium (Sr)-Total (mg/kg wwt)	16.4	6.51	4.37	7.75	26.7
	Thallium (Tl)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	<0.010
	Tin (Sn)-Total (mg/kg wwt)	<0.050	<0.050	<0.050	<0.050	<0.050
	Titanium (Ti)-Total (mg/kg wwt)	0.91	1.60	1.77	4.70	2.62
	Uranium (U)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	0.0040	<0.0020
	Vanadium (V)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	0.13	<0.10
	Zinc (Zn)-Total (mg/kg wwt)	46.5	19.1	14.1	29.8	22.3
Polychlorinated Biphenyls	PCB-1016 (mg/kg wwt)	<0.50	<0.10	<0.10	<0.25	<0.050
	PCB-1221 (mg/kg wwt)	<0.50	<0.10	<0.10	<0.25	<0.050
	PCB-1232 (mg/kg wwt)	<0.50	<0.10	<0.10	<0.25	<0.050
	PCB-1242 (mg/kg wwt)	<0.50	<0.10	<0.10	<0.25	<0.050
	PCB-1248 (mg/kg wwt)	<0.50	<0.10	<0.10	<0.25	<0.050
	PCB-1254 (mg/kg wwt)	<0.50	<0.10	<0.10	<0.25	<0.050
	PCB-1260 (mg/kg wwt)	<0.50	<0.10	<0.10	<0.25	<0.050
	PCB-1262 (mg/kg wwt)	<0.50	<0.10	<0.10	<0.25	<0.050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

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	Sample ID	L682370-6	L682370-7	L682370-8	L682370-9	L682370-10
	Description					
	Sampled Date	09-SEP-08	10-SEP-08	10-SEP-08	10-SEP-08	10-SEP-08
	Sampled Time					
	Client ID	VEG-6	A4-VEG-1	A4-VEG-2	A4-VEG-3	VEG-DUP
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	62.4	78.8	71.8	71.7	77.3
Metals	Aluminum (Al)-Total (mg/kg wwt)	108	271	199	255	303
	Antimony (Sb)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	<0.010
	Arsenic (As)-Total (mg/kg wwt)	<0.010	0.428	0.074	0.426	0.428
	Barium (Ba)-Total (mg/kg wwt)	34.8	2.17	1.40	1.96	2.15
	Beryllium (Be)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Bismuth (Bi)-Total (mg/kg wwt)	<0.030	<0.030	<0.030	<0.030	<0.030
	Cadmium (Cd)-Total (mg/kg wwt)	0.241	0.0072	0.0087	0.0131	0.0076
	Calcium (Ca)-Total (mg/kg wwt)	2070	458	1940	899	530
	Chromium (Cr)-Total (mg/kg wwt)	0.19	0.90	0.72	0.80	1.06
	Cobalt (Co)-Total (mg/kg wwt)	0.065	0.236	0.405	0.209	0.259
	Copper (Cu)-Total (mg/kg wwt)	2.43	0.663	0.797	1.21	0.663
	Iron (Fe)-Total (mg/kg wwt)	106	7880	627	853	7320
	Lead (Pb)-Total (mg/kg wwt)	0.287	0.233	0.170	0.315	0.223
	Lithium (Li)-Total (mg/kg wwt)	<0.10	0.37	0.36	0.41	0.38
	Magnesium (Mg)-Total (mg/kg wwt)	734	621	2070	1410	731
	Manganese (Mn)-Total (mg/kg wwt)	93.1	41.3	122	32.9	42.7
	Molybdenum (Mo)-Total (mg/kg wwt)	0.071	0.440	0.184	0.392	0.522
	Nickel (Ni)-Total (mg/kg wwt)	0.61	0.39	0.58	0.44	0.41
	Phosphorus (P)-Total (mg/kg wwt)	465	248	167	292	324
	Potassium (K)-Total (mg/kg wwt)	1730	1710	6390	3450	2050
	Selenium (Se)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Sodium (Na)-Total (mg/kg wwt)	34	2660	6790	6180	3300
	Strontium (Sr)-Total (mg/kg wwt)	4.67	6.46	15.6	10.8	6.78
	Thallium (Tl)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	<0.010
	Tin (Sn)-Total (mg/kg wwt)	<0.050	<0.050	<0.050	<0.050	0.054
	Titanium (Ti)-Total (mg/kg wwt)	4.35	26.8	26.8	21.5	33.2
	Uranium (U)-Total (mg/kg wwt)	0.0023	0.106	0.0414	0.0792	0.0917
	Vanadium (V)-Total (mg/kg wwt)	0.16	2.04	1.25	1.84	2.50
	Zinc (Zn)-Total (mg/kg wwt)	17.8	4.24	19.5	8.13	4.66
Polychlorinated Biphenyls	PCB-1016 (mg/kg wwt)	<0.20	<0.050	<0.050	<0.050	<0.050
	PCB-1221 (mg/kg wwt)	<0.20	<0.050	<0.050	<0.050	<0.050
	PCB-1232 (mg/kg wwt)	<0.20	<0.050	<0.050	<0.050	<0.050
	PCB-1242 (mg/kg wwt)	<0.20	<0.050	<0.050	<0.050	<0.050
	PCB-1248 (mg/kg wwt)	<0.20	<0.050	<0.050	<0.050	<0.050
	PCB-1254 (mg/kg wwt)	<0.20	<0.050	<0.050	<0.050	<0.050
	PCB-1260 (mg/kg wwt)	<0.20	<0.050	<0.050	<0.050	<0.050
	PCB-1262 (mg/kg wwt)	<0.20	<0.050	<0.050	<0.050	<0.050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

	Sample ID	L682370-17	L682370-18			
	Description					
	Sampled Date	09-SEP-08	09-SEP-08			
	Sampled Time					
	Client ID	VEG-BK-1	VEG-BK-2			
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	74.0	76.1			
Metals	Aluminum (Al)-Total (mg/kg wwt)	34.7	10.5			
	Antimony (Sb)-Total (mg/kg wwt)	<0.010	<0.010			
	Arsenic (As)-Total (mg/kg wwt)	0.016	<0.010			
	Barium (Ba)-Total (mg/kg wwt)	11.6	5.73			
	Beryllium (Be)-Total (mg/kg wwt)	<0.10	<0.10			
	Bismuth (Bi)-Total (mg/kg wwt)	<0.030	<0.030			
	Cadmium (Cd)-Total (mg/kg wwt)	0.0967	0.0171			
	Calcium (Ca)-Total (mg/kg wwt)	1320	918			
	Chromium (Cr)-Total (mg/kg wwt)	0.11	<0.10			
	Cobalt (Co)-Total (mg/kg wwt)	0.023	0.036			
	Copper (Cu)-Total (mg/kg wwt)	1.10	0.726			
	Iron (Fe)-Total (mg/kg wwt)	21.7	8.90			
	Lead (Pb)-Total (mg/kg wwt)	0.053	<0.020			
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10			
	Magnesium (Mg)-Total (mg/kg wwt)	395	212			
	Manganese (Mn)-Total (mg/kg wwt)	56.7	10.8			
	Molybdenum (Mo)-Total (mg/kg wwt)	0.022	<0.010			
	Nickel (Ni)-Total (mg/kg wwt)	0.18	0.47			
	Phosphorus (P)-Total (mg/kg wwt)	241	177			
	Potassium (K)-Total (mg/kg wwt)	1560	1710			
	Selenium (Se)-Total (mg/kg wwt)	<0.20	<0.20			
	Sodium (Na)-Total (mg/kg wwt)	32	<20			
	Strontium (Sr)-Total (mg/kg wwt)	1.78	1.70			
	Thallium (Tl)-Total (mg/kg wwt)	<0.010	<0.010			
	Tin (Sn)-Total (mg/kg wwt)	<0.050	0.084			
	Titanium (Ti)-Total (mg/kg wwt)	1.08	0.20			
	Uranium (U)-Total (mg/kg wwt)	<0.0020	<0.0020			
	Vanadium (V)-Total (mg/kg wwt)	<0.10	<0.10			
	Zinc (Zn)-Total (mg/kg wwt)	11.3	10.2			
Polychlorinated Biphenyls	PCB-1016 (mg/kg wwt)					
	PCB-1221 (mg/kg wwt)					
	PCB-1232 (mg/kg wwt)					
	PCB-1242 (mg/kg wwt)					
	PCB-1248 (mg/kg wwt)					
	PCB-1254 (mg/kg wwt)					
	PCB-1260 (mg/kg wwt)					
	PCB-1262 (mg/kg wwt)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

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	Sample ID Description Sampled Date Sampled Time Client ID	L682370-1 09-SEP-08 VEG-1	L682370-2 09-SEP-08 VEG-2	L682370-3 09-SEP-08 VEG-3	L682370-4 09-SEP-08 VEG-4	L682370-5 09-SEP-08 VEG-5
Grouping	**Analyte**					
TISSUE						
Polychlorinated Biphenyls	PCB-1268 (mg/kg wwt)	<0.50	<0.10	<0.10	<0.25	<0.050
	Total Polychlorinated Biphenyls (mg/kg wwt)	<0.50	<0.10	<0.10	<0.25	<0.050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L682370-6	L682370-7	L682370-8	L682370-9	L682370-10
		09-SEP-08	10-SEP-08	10-SEP-08	10-SEP-08	10-SEP-08
		VEG-6	A4-VEG-1	A4-VEG-2	A4-VEG-3	VEG-DUP
Grouping	**Analyte**					
TISSUE						
Polychlorinated Biphenyls	PCB-1268 (mg/kg wwt)	<0.20	<0.050	<0.050	<0.050	<0.050
	Total Polychlorinated Biphenyls (mg/kg wwt)	<0.20	<0.050	<0.050	<0.050	<0.050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

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	Sample ID Description Sampled Date Sampled Time Client ID	L682370-17 09-SEP-08 VEG-BK-1	L682370-18 09-SEP-08 VEG-BK-2			
Grouping	**Analyte**					
TISSUE						
Polychlorinated Biphenyls	PCB-1268 (mg/kg wwt)					
	Total Polychlorinated Biphenyls (mg/kg wwt)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

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Grouping	Analyte					
	Sample ID	L682370-13	L682370-16	L682370-19		
	Description					
	Sampled Date	09-SEP-08	09-SEP-08	09-SEP-08		
	Sampled Time					
	Client ID	SW-BK-1	SW-BK-2	A1-SW08-1		
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	31.9	15.9			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0246	0.0261			
	Antimony (Sb)-Total (mg/L)	<0.00050	<0.00050			
	Arsenic (As)-Total (mg/L)	<0.00050	<0.00050			
	Barium (Ba)-Total (mg/L)	<0.020	<0.020			
	Beryllium (Be)-Total (mg/L)	<0.0010	<0.0010			
	Boron (B)-Total (mg/L)	<0.10	<0.10			
	Cadmium (Cd)-Total (mg/L)	<0.000017	<0.000017			
	Calcium (Ca)-Total (mg/L)	9.75	5.03			
	Chromium (Cr)-Total (mg/L)	<0.0010	<0.0010			
	Cobalt (Co)-Total (mg/L)	<0.00030	<0.00030			
	Copper (Cu)-Total (mg/L)	<0.0010	<0.0010			
	Iron (Fe)-Total (mg/L)	0.054	0.037			
	Lead (Pb)-Total (mg/L)	<0.00050	<0.00050			
	Lithium (Li)-Total (mg/L)	<0.0050	<0.0050			
	Magnesium (Mg)-Total (mg/L)	1.84	0.81			
	Manganese (Mn)-Total (mg/L)	0.00212	0.00099			
	Mercury (Hg)-Total (mg/L)	<0.000020	<0.000020			
	Molybdenum (Mo)-Total (mg/L)	<0.0010	<0.0010			
	Nickel (Ni)-Total (mg/L)	<0.0010	<0.0010			
	Potassium (K)-Total (mg/L)	<2.0	<2.0			
	Selenium (Se)-Total (mg/L)	<0.0010	<0.0010			
	Silver (Ag)-Total (mg/L)	<0.000020	<0.000020			
	Sodium (Na)-Total (mg/L)	5.5	<2.0			
	Thallium (Tl)-Total (mg/L)	<0.00020	<0.00020			
	Tin (Sn)-Total (mg/L)	<0.00050	<0.00050			
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	<0.00020	<0.00020			
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010			
	Zinc (Zn)-Total (mg/L)	<0.0050	<0.0050			
Polychlorinated Biphenyls	PCB-1016 (mg/L)			<0.0010		
	PCB-1221 (mg/L)			<0.0010		
	PCB-1232 (mg/L)			<0.0010		
	PCB-1242 (mg/L)			<0.0010		
	PCB-1248 (mg/L)			<0.0010		
	PCB-1254 (mg/L)			<0.0010		
	PCB-1260 (mg/L)			<0.0010		
	PCB-1262 (mg/L)			<0.0010		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L682370-13	L682370-16	L682370-19		
	Description					
	Sampled Date	09-SEP-08	09-SEP-08	09-SEP-08		
	Sampled Time					
	Client ID	SW-BK-1	SW-BK-2	A1-SW08-1		
Grouping	**Analyte**					
WATER						
Polychlorinated Biphenyls	PCB-1268 (mg/L)			<0.0010		
	Total Polychlorinated Biphenyls (mg/L)			<0.0010		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments

Qualifiers for Sample Submission Listed:

Qualifier	Description
SPL	Sample was Preserved at the laboratory - samples # 13,16 - Total Metals

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

HARDNESS-CALC-VA | Water | Hardness | APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-CCME-CVAFS-VA | Soil | CVAFS Hg in Soil (CCME) | CCME

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry (EPA Method 7000 series).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

HG-TOT-CCME-CVAFS-VA | Water | Total Mercury in Water by CVAFS (CCME) | EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-CSR-FULL-ICP-VA | Soil | Metals in Soil by ICPOES (CSR SALM) | BCMELP CSR SALM METHOD 8

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

MET-TOT-CCME-ICP-VA | Water | Total Metals in Water by ICPOES (CCME) | EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-CCME-MS-VA | Water | Total Metals in Water by ICPMS (CCME) | EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-WET-ICP-VA | Tissue | Metals in Tissue by ICPOES | PUGET SOUND PROTOCOLS, EPA 6010B

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

Tissue samples are homogenized either mechanically or manually prior to digestion. The hotplate or block digestion involves the use of nitric acid followed by repeated additions of hydrogen peroxide. Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-WET-MS-VA	Tissue	Metals in Tissue by ICPMS	PUGET SOUND PROTOCOLS, EPA 6020A

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. Tissue samples are homogenized either mechanically or manually prior to digestion. The hotplate or block digestion involves the use of nitric acid followed by repeated additions of hydrogen peroxide. Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM METHOD D2794-00

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

MOISTURE-VA	Soil	Moisture content	ASTM METHOD D2794-00

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

MOISTURE-VA	Soil		ASTM METHOD D2794-00

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

OCP1-SOX-ECD-VA	Soil	OCP-1 in Soil by Soxhlet GCECD	EPA METHODS 3540, 3545, 3610, 3630, 3660

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3540, 3545, 3610, 3630, 3660 & 8081, published by the United States Environmental Protection Agency (EPA). The procedure uses an automated system (Accelerated Solvent Extractor - ASE) at high temperature and pressure or a Soxhlet system to extract a subsample of the sediment/soil with dichloromethane. The extract is then solvent exchanged to hexane followed by one or more of the following clean-up procedures (if required): alumina clean-up, silica gel clean-up and/or sulphur clean-up. The final extract is analysed by dual capillary column gas chromatography with electron capture detection (GC/ECD).

PAH-TUMB-H/A-MS-VA	Soil	PAH by Tumbler HEX/ACE with GCMS	EPA METHODS 3570 & 8270.

Polycyclic Aromatic Hydrocarbons in Sediment/Soil
This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3570 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a mechanical shaking technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

PCB-SF-ECD-VA	Water	PCB by Extraction with GCECD	EPA 3510/8082 Liq-Liq GCECD

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3510, 3620, 3660, 3665 & 8082, published by the United States Environmental Protection Agency (EPA). The procedure involves a liquid-liquid extraction of the entire water sample using dichloromethane. The extract is then solvent exchanged to hexane followed by one or more of the following clean-up procedures (if required): florisil clean-up, sulphur clean-up and/or sulphuric acid clean-up. The final extract is analysed by capillary column gas chromatography with electron capture detection (GC/ECD).

PCB-T-WET-SOX-ECD-VA	Tissue	PCB in Tissue by Soxhlet GCECD	EPA METHODS 3540, 3600, & 8082

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3540, 3600, & 8082 published by the United States Environmental Protection Agency (EPA). The procedure involves a dichloromethane Soxhlet extraction of a subsample of the homogenized tissue which has been dried with anhydrous sodium sulphate. The extract then undergoes a reverse phase C18 clean-up to remove fats and oils. The final extract is analysed by capillary column gas chromatography with electron capture detection (GC/ECD).

PH-1:2-VA	Soil	CSR pH by 1:2 Water Leach	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (10 mesh /2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a

Reference Information

Methods Listed (if applicable):

ALS Test Code | Matrix | Test Description | Analytical Method Reference(Based On)

standard pH probe.

PSA-PIPET+GRAVEL-SK | Soil | Particle size - Sieve and Pipette | FORESTRY CANADA (1991) P. 46-48 MOD

Particle size analysis involves the measurement of the proportions of the various primary soil particle sizes (ie. clay < 0.004 mm, silt 0.004-0.063 mm, sand 0.063-2.0 mm and gravel > 2.0 mm). In this method, the gravel and sand portions are determined by sieving, while the clay portion is determined by sedimentation using Stokes Law, which relates the radius of the particles to the velocity of the sedimentation in water. Silt is calculated as 100% - (sand% + clay%)
Pretreatment of the soil with Calgon (sodium hexametaphosphate) is used to ensure the complete dispersion of the primary soil particles. Additional pretreatment may be necessary to remove cementing materials such as CaCO3 and organic matter.

Reference
Y.P. Kalra, and D.G. Maynard, 1991. Methods Manual For Forest Soil and Plant Analysis,Northwest Region. Forestry Canada (modified sand, silt and clay size ranges)

TL-CSR-MS-VA | Soil | ICPMS Tl in Soil by CSR SALM | BCMELP CSR SALM Method 8

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by either hotplate or block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

VOC-MET-PT-MS-VA | Soil | VOC by MeOH with Purge and Trap GCMS | EPA 8260B & 524.2

Volatile Organic Compounds (VOC) are extracted from sediment or soil with methanol, following a procedure from the British Columbia Ministry of Water Land and Air Protection (BCWLAP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999). Aliquots of the extract are analyzed by direct injection capillary column gas chromatography with mass spectrometric detection (GC/MS), using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260B, published by the United States Environmental Protection Agency (EPA). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

VOC7-MET-PT-MS-VA | Soil | BTEX by MeOH with Purge and Trap GCMS | EPA 8260B & 524.2

Volatile Organic Compounds (VOC) are extracted from sediment or soil with methanol, following a procedure from the British Columbia Ministry of Water Land and Air Protection (BCWLAP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999). Aliquots of the extract are analyzed by Purge and Trap by gas hromatography with mass spectrometric detection (GC/MS), using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260B, published by the United States Environmental Protection Agency (EPA). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

XYLENES-CALC-VA | Soil | CSR VOC7 by MeOH with DI GCMS | EPA 8260B & 524.2

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.
The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
SK	ALS LABORATORY GROUP - SASKATOON, SASKATCHEWAN, CANADA	VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
N/A - Result not available. Refer to qualifier code and definition for explanation

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

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ALS

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REPORT TO: Ryan Fletcher / Tina Ranger
COMPANY: Franz Environmental
CONTACT:
ADDRESS: 329 Churchill Ave. N.
Ottawa, On
PHONE: 613-721-0555 FAX: 613-721-0029

INVOICE TO: SAME AS REPORT ? [✓ YES] / NO
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EMAIL 1: rfletcher@franzenvironmental.com
EMAIL 2: franger@franzenvironmental.com

INDICATE BOTTLES: FILTERED / PRESERVED (F/P) → → →

CLIENT / PROJECT INFORMATION:
JOB #: 1564-0801
PO /AFE:
Legal Site Description: TC Iqaluit Landfill
QUOTE #:

SERVICE REQUESTED
[✓ REGULAR SERVICE (DEFAULT)]
RUSH SERVICE (2-3 DAYS)
PRIORITY SERVICE (1 DAY or ASAP)
EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS

Lab Work Order # (lab use only): L682370

SAMPLER (Initials):

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	Metals	PCBs	HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
	Veg-1	Sept. 9/08		vegetation	x	x			
	Veg-2				x	x			
	Veg-3				x	x			
	Veg-4				x	x			
	Veg-5				x	x			
	Veg-6				x	x			
	A4-veg-1	Sept. 10/08			x	x			
	A4-veg-2				x	x			
	A4-veg-3				x	x			
	Veg-Dup				x	x			

ANALYSIS REQUEST

GUIDELINES / REGULATIONS

SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS

Failure to complete all portions of this form may delay analysis. Please fill in this form *LEGIBLY*.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the reverse page of the white report copy.

RELINQUISHED BY: Ryan Fletcher DATE & TIME: Sept. 10/08 RECEIVED BY: ER DATE & TIME: Sept 12 11:22
RELINQUISHED BY: DATE & TIME: RECEIVED BY: DATE & TIME:

SAMPLE CONDITION (lab use only)
TEMPERATURE: 15
SAMPLES RECEIVED IN GOOD CONDITION? [✓ YES] / NO
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EMAIL 1: rfletcher @ franz environmental.com
EMAIL 2: tranger @ " " "

INDICATE BOTTLES: FILTERED / PRESERVED (F/P) → → →

CLIENT / PROJECT INFORMATION:
JOB #: 1584 - 0801
PO /AFE:
Legal Site Description: TC Iqaluit Landfill
QUOTE #:
SAMPLER (Initials):

SERVICE REQUESTED
[✓ REGULAR SERVICE (DEFAULT)]
RUSH SERVICE (2-3 DAYS)
PRIORITY SERVICE (1 DAY or ASAP)
EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS

ANALYSIS REQUEST

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	Metals	PCBs	HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
	TP-BK-1	Sept. 9/08		Soil	x				1
	SD-BK-1	↓		Sediment	x				1
/	SW-BK-1			Water	x				1
	TP-BK-2			Soil	x				1
	SD-BK-2			Sediment	x				1
/	SW-BK-2			Water	x				1
	Veg-BK-1			Vegetation	x				1
	Veg-BK-2			Vegetation	x				1

GUIDELINES / REGULATIONS

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SAMPLE CONDITION (lab use only)
TEMPERATURE 15
SAMPLES RECEIVED IN GOOD CONDITION ? [✓ YES] NO
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JOB #:
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Legal Site Description:
QUOTE #:

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RUSH SERVICE (2-3 DAYS)
PRIORITY SERVICE (1 DAY or ASAP)
EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS

ANALYSIS REQUEST

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	PCBS	VOC	PAH	Pesticides (OC)								HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
	A1-SW08-1	Sept. 9/08		water	X													2
	A2-TP08-1	↓		soil		X	X	X										3
	A2-TP08-2			soil		X	X	X										3
	A2-SD08-4			sediment		X	X											4

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DATE & TIME: Sept. 10/08
RECEIVED BY: TN
DATE & TIME: Sept 12/08 11:22

RELINQUISHED BY:
DATE & TIME:
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DATE & TIME:

SAMPLE CONDITION (lab use only)
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SAMPLES RECEIVED IN GOOD CONDITION ? [✓ YES] / NO
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ADDRESS: 329 Churchill
Ottawa, Ontario
PHONE: (613) 721-0555 FAX:

INVOICE TO: SAME AS REPORT ? [✓ YES] / NO
COMPANY:
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EMAIL 1: tranger@franzenvironmental.com
EMAIL 2: rfletcher@franzenvironmental.com

INDICATE BOTTLES: FILTERED / PRESERVED (F/P) → → →

CLIENT / PROJECT INFORMATION:
JOB #: 1584-0801
PO /AFE:
Legal Site Description:
QUOTE #:

SAMPLER (Initials):

SERVICE REQUESTED
✓ REGULAR SERVICE (DEFAULT)
RUSH SERVICE (2-3 DAYS)
PRIORITY SERVICE (1 DAY or ASAP)
EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS

ANALYSIS REQUEST

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	Grain Size Sieve											HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
	GS-1	Sept 9/2008		Grain Size	X													
	GS-2				X													
	GS-3				X													
	GS-4				X													
	GS-5				X													
	GS-SO-1				X													
	GS-SO-2				X													

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RELINQUISHED BY: Tina Ranger	DATE & TIME: Sept 9/2008	RECEIVED BY:	DATE & TIME: Sep 12/08 11:22
RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:

SAMPLE CONDITION (lab use only)
TEMPERATURE 15
SAMPLES RECEIVED IN GOOD CONDITION ? [✓ YES] NO
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APPENDIX F
Cost Estimates

Table F-1
Opinion of Probable Costs
Waste Dumps and Metal Debris- Removal of Physical Hazards

Project Title: Waste Dumps and Metal Debris- Removal of Physical Hazards						
Iqaluit Vehicle Dump and Community Landfill - Removal				Option 1	Option 1A	Option 1B
Category	*Quantity*	*Unit price*	*Units*	Removal of Waste	On-Site Landfill	Off-Site Landfill
Estimated Capital Costs						
Landfilling (A)				Common costs options 1A or 1B		
On-Site Landfill Option						
Materials						
Agregate materials (containment cell construction)	1000	$55	cubic metres		$55,000	
geotextile caps- on-site Landfill	2	$60,000	per sheet		$120,000	
Landfill Liners	2	$50,000	per sheet		$100,000	
Shipping of geotextiles	16	$275	per tonne		$4,400	
Shipping Insurance	16	$20	per tonne		$320	
Equipment ,Labour						
Dump truck (2 weeks)	120	$205	hour		$24,600	
Loader (2 weeks)	120	$205	hour		$24,600	
Excavator (2 weeks)	120	$205	hour		$24,600	
Off-Site Disposal (City Landfill)						
Disposal costs (random debris)	1	$211,600	Unit			$211,600
Other debris (large items, appliances etc.)	1	$4,000	Unit			$4,000
Metallic Debris Removal (B)						
Equipment ,Labour, Disposal						
Magnetic crane attachment (purchase)	1	$31,000	lump	$31,000		
Shipping for crane attachment	3	$275	tonne	$825		
10 Kw genset for magnet	360	$50	hour	$18,000		
Crane	360	$350	hour	$126,000		
loader for staging (during crane work)	360	$205	hour	$73,800		
Backhoe for staging and sorting	360	$205	hour	$73,800		
Land Crew during crane work (2 men)	360	$50	hour	$18,000		
Land Crew post crane work (4 men)	120	$100	hour	$12,000		
Backhoe for post crane work	120	$205	hour	$24,600		
Metal Recycling						
transportation to recycling staging ground						
loader with forks	40	$205	hour	$8,200		
Crushing and shipping south	3,000	$100	tonne	$300,000		
Other Debris Removal (C)						
Clam bucket crane attachment (purchase)	1	$35,000	lump	$35,000		
loader	80	$205		$16,400		
Land Crew (4 men)	80	$100	hour	$8,000		
Crane	80	$350	hour	$28,000		
Crane (mob/de-mob)	1	$4,000	lump	$4,000		
winter road construction (on river) (estimated)	1	$50,000	lump	$50,000		
Total Estimated Capital Costs (A+B+C)				**$827,625**	**$353,520**	**$215,600**
Project Supervision and Management (D)						
Project Design and Management	1		lump	$100,000	$100,000	
Project Supervision	1		lump	$150,000	$150,000	
Tendering	1		lump	$100,000	$175,000	
Reporting	1		lump	$80,000	$80,000	
Laboratory	1		lump	$45,000	$45,000	
Disbursement	1		lump	$50,000	$80,000	
Operating Costs (D)				**$525,000**	**$630,000**	
Site Monitoring (E)						
Landfill Monitoring for first 5 years	5	30,000	year		$150,000	
Continued site monitoring	2	30,000	year	$60,000		
Total Estimated Monitoring Costs (E)				**$60,000**	**$150,000**	**$0**
Total *Estimated* Cost (A+B+C+D+E))				**$1,412,625**	**$1,133,520**	**$215,600**

Calculations Notes		**unit**	**m2**	**m3**	**weight/lbs**	**weight/tonnes**
Geotextiles						
1 sheet = 4 tonnes (4 required)						16
shipping = 275 per tonne						
1 sheet covers 1670 m2 - coverage			3340			
estimated disposable waste				6048		
Time - metallic disposal						
Estimated time for debris removal	6	weeks				
assume 6 days/week	36	days				
assume 10 hour days	360	hours				
Land crew during crane work						
sorting crew labour (per person)	25	hour/person				
Vehicle Dump						
area			2150			
vehicles	86	vehicles				
Landfill Estimates						
landfill area			8,250			
Assumed average depth of 2.75 m				22,688		
Estimate 70 % to be metallic	15881.25	m3 of metallic debris				
Estimate non-metallic debris	6,806	m3 of non metallic debris with void space				
Estimate 20 % void space	5445	m3 of non metallic debris with no void space				
appliances (20)	1000	$				
tires - 100	1500	$				
snowmobiles (5)	300	$				
Waste debris (6806 m3 / 9 cubes per truck)	756.25	truckloads				
Plus 40% contingency	1058	truckloads				
Waste debris disposal cost (@ $135/load)	211600	$				
Disposal costs						
appliances	$50	ea				
tires	$15	ea				
batteries	$30	ea				
dump truck load (random waste) (9 cubes)	$200	ea				
snowmobiles	$60	ea				
Recycling						
recycling and shipping south	$100	tonne				
estimate of 3000 tonnes of metallic debris						

Table F-2
Opinion of Probable Costs
Capping

Project Title: Waste Dumps and Metal Debris- Removal of Physical Hazards **Iqaluit Vehicle Dump and Community Landfill - Capping**				**Option 2**
Category	*Quantity*	*Unit price*	*Units*	Capping Current Landfill
Estimated Capital Costs				
Materials(A)				
Capping materials (bottom slope of site) (assume 10 m cap ave.)	65000	$55	cubic metres	$3,575,000
Capping materials (top of site) (1.5 m cap)	8000	$55	cubic metres	$440,000
Equipment ,Labour, Disposal (B)				
Upper Capping				
Transportation of capping material	862	$154	load	$132,748
Excavator use	100	$205	hour	$20,500
Lower Capping (slope stability)				
Transportation of capping material	6,895	$154	load	$1,061,830
Excavator use	200	$205	hour	$41,000
Project Supervision and Management (C)				
Project Design and Management	1	lump	$	$200,000
Project Supervision	1	lump	$	$80,000
Tendering	1	lump	$	$100,000
Reporting	1	lump	$	$120,000
Laboratory	1	lump	$	$45,000
Disbursement	1	lump	$	$80,000
Total Estimated Capital Costs (A+B+C)				**$5,896,078**
Operating Costs (D)				
Monitoring for 5 years	5	30,000	year	$150,000
Total Estimated Operating Costs				**$150,000**
Total *Estimated* Cost (A+B+C+D)				**$6,046,078**

Calculations Notes		**units**	**m2**	**m3**	**$ per hour**
Materials Required					
total area of site (includes sections of vehicle dump)			10343		
1/2 site area			5171.5		
1/2 site requires 1.5 m cap (upper site)				7757.25	
1/2 site requires 12 m cap (slope stability) (lower site)				62058	
Trucking Materials to site					
1 truck can take 9 cubic metres of soil					
round trip approximately 45 minutes					
Truck costs					205
loader costs					205
Excavator costs					205
upper site					
number of truck loads required	861.9167				
45 minutes per trip (minutes)	38786.25	mins.			
number of hours required	646.4375	hrs.			
Total cost for material transport	132519.7	$			
Cost per load	153.75	$			
lower site					
number of truck loads required	6895.333	mins.			
45 minutes per trip (minutes)	310290	hrs.			
number of hours required	5171.5	$			
Total cost for material transport	1060158	$			
Cost per load	153.75				

Table F-3
Opinion of Probable Costs
Surface Water Drainage Systems

Project Title: Surface Water Drainage Systems **Iqaluit Vehicle Dump and Community Landfill**				Option 1	Option 2
Category	*Quantity*	*Unit price*	*Units*	Monitoring	Passive Treatment
Capital Costs - Work Elements					
Materials					
Wetland construction materials	1	$80,000	lump sum	$0	$150,000
Equipment and Labour					
Channel portal drainage and creek	1	$50,000	lump sum	$0	$50,000
Wetland construction - 2 areas	1	$100,000	lump sum	$0	$100,000
Project Supervision and Management					
Project Design and Management	1	lump	$	$50,000	$50,000
Bench Scale Treatment -pilot tesing	1	lump	$		$100,000
Project Supervision	1	lump	$		$100,000
Disbursement	1	lump	$	$50,000	$80,000
Estimated Capital Costs - subtotal A				***$100,000***	***$630,000***
Operating Costs					
Monitoring for 10 years	10	$30,000	year	$300,000	$300,000
Operating Costs -subtotal B				***$300,000***	***$300,000***
Total Estimated Cost (A+B)				***$400,000***	***$930,000***

APPENDIX G
NSC Scoring

CCME National Classification System for Contaminated Sites (2008)

Summary of Site Conditions:

Subject Site:	**Vehicle Dump and Community Landfill**	
Civic Address: *(or other description of location)*	West 40 area on the border of Sylvia Grinnell Park, 1.7 km southwest of the City of Iqaluit. At the far southwestern extent of the old US military runway.	
Site Common Name : *(if applicable)*	Sylvia Grinnell Park Dump (West 40 - Dump Site # 1)	
Site Owner or Custodian: *(Organization and Contact Person)*	Transport Canada	
Legal description *or* metes and bounds:	667 (Lot 16, Group 1087, Plan 58311, CLSR 1216 LTO)	
Approximate Site area:	7.25 Ha (72,500)	
PID(s*)* : *(or Parcel Identification Numbers [PIN] if untitled Crown land)*		
Centre of site: *(provide latitude/longitude or UTM coordinates)*	Latitude: Longitude:	63 degrees 44 min 14.129 secs 68 degrees 33 min 22.739 secs
	UTM Coordinate:	Northing 7067812.69 Easting 521904.94
Site Land Use:	Current:	Landfill and vehicle dump
	Proposed:	None
Site Plan	**To delineate the bounds of the Site a site plan MUST be attached. The plan must be drawn to scale indicating the boundaries in relation to well-defined reference points and/or legal descriptions. Delineation of the contamination should also be indicated on the site plan.**	
Provide a brief description of the Site:	Sylvia Grinnell Park Dump (West 40 - Dump Site # 1) is located in Iqaluit, Nunavut - 1.7 km from the City on the southwestern extent of an ex-military runway. Please refer to attached site plan for location. The site currently contains no buildings (structures). The site contains one military/municipal landfill (partially capped) and a vehicle dump (un-capped). The site borders Sylvia Grinnell Territorial Park and Sylvia Grinnell River. There are several small ponded areas downgradient of the landfill area and vehicle dump.	

CCME National Classification System for Contaminated Sites (2008)

Summary of Site Conditions:

Affected media and Contaminants of Potential Concern (COPC):	Affected media consists of soil, surface water, sediment, and vegetation. Contaminants of concern are Metals, PCBs, VOC, PAHs, pesticides, and PHCs. Metal impacts were found throughout the site and the remaining COCs were found in discrete areas on site.

Please fill in the "letter" that best describes the level of information available for the site being assessed

Site Letter Grade **C**

If letter grade is F, do not continue, you must have a minimum of a Phase I Environmental Site Assessment or equivalent.

Scoring Completed By:	**Ryan Fletcher, C.Tech, CEPIT**
Date Scoring Completed:	**04-Feb-09**

CCME National Classification System (2008)

(I) Contaminant Characteristics

Vehicle Dump and Community Landfill

Definition	**Score**	**Rationale for Score** (document any assumptions, reports, or site-specific information; provide references)	**Method of Evaluation**	**Notes**
1. Residency Media (replaces physical state)				
Which of the following residency media are known (or strongly suspected) to have one or more exceedances of the applicable CCME guidelines? **yes** = has an exceedance or strongly suspected to have an exceedance **no** = does not have an exceedance or strongly suspected not to have an exceedance		Metal parameters (copper, lead, and cadmium), hydrocarbon parameters (F2, F3, and F4), PCBs, and PAHs above the CCME guidelines in soil. Metals parameters (aluminum, cadmium, copper, lead, and zinc) and VOC (trichloroethylene) were identified above the CCME guideline in surface water samples. Metals parameters (arsenic, cadmium, chromium, copper, lead, and zinc), PCBs, and Pesticides were identified above the CCME guidline in sediment samples. Metals parameters (Iron and sodium) were identified in exeedance of MOE guidelnes in vegetation samples collected. Due to the remotness of the site location and presence of bedrock, groundwater sampling was not completed.	The overall score is calculated by adding the individual scores from each residency media (having one or more exceedance of the most conservative media specific and land-use appropriate CCME guideline). Summary tables of the Canadian Environmental Quality Guidelines for soil, water (aquatic life, non-potable groundwater environments, and agricultural water uses) and sediment are available on the CCME website at http://www.ccme.ca/publications/ceqg_rcqe.html?category_id=124 For potable groundwater environments, guidelines for Canadian Drinking Water Quality (for comparison with groundwater monitoring data) are available on the Health Canada website at http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/doc_sup-appui/sum_guide-res_recom/index_e.html	An increasing number of residency media containing chemical exceedances often equates to a greater potential risk due to an increase in the number of potential exposure pathways.
A. Soil	Yes			
Yes No Do Not Know				
B. Groundwater	Do Not Know			
Yes No Do Not Know				
C. Surface water	Yes			
Yes No Do Not Know				
D. Sediment	Yes			
Yes No Do Not Know				
"Known" -score	6			
"Potential" - score	1			
2. Chemical Hazard				
What is the relative degree of chemical hazard of the contaminant in the list of hazard rankings proposed by the Federal Contaminated Sites Action Plan (FCSAP)?	High	PCBs were detected in soil and sediments. PAHs (Benzo(a)anthracene, Benzo(a)pyrene, and Benzo(b)fluoranthene) and Metals (cadmium) were detected in soils. VOC (trichloroethylene) and Metals (cadmium and lead) were detected in surface water. Pesticides (DDT, DDE, DDD) and Metals (arsenic and lead) were detected in sediment. Under the Contaminant Hazard Rankings List, the above mentioned chemicals are rated as "high" chemical hazards.	The relative degree of chemical hazard should be selected based on the most hazardous contaminant known or suspected to be present at the site. The degree of hazard has been defined by the Federal Contaminated Sites Action Plan (FCSAP) and a list of substances with their associated hazard (Low, Medium and High) ha been provided as a separate sheet in this file. *See Attached Reference Material for Contaminant Hazard Rankings.*	Hazard as defined in the revised NCS pertains to the physical properties of a chemical which can cause harm. Properties can include toxic potency, propensity to biomagnify, persistence in the environment, etc. Although there is some overlap between hazard and contaminant exceedance factor below, it will not be possible to derive contaminant exceedance factors for many substances which have a designated chemical hazard designation, but don't have a CCME guideline. The purpose of this category is to avoid missing a measure of toxic potential.
High Medium Low Do Not Know				
"Known" -score	8			
"Potential" - score	---			
3. Contaminant Exceedence Factor				
What is the ratio between the measured contaminant concentration and the applicable CCME guidelines (or other "standards")?	High (>100x)	F3 concentrations were detected at 44,400 ug/g and the lowest applicable CCME - CWS criteria for residential/parkland is 300 ug/g This exceedance is greater than 100X the applicable criteria.	Ranking of contaminant "exceedance" is determined by comparing contaminant concentrations with the *most conservative media-specific and land-use appropriate CCME* environmental quality guidelines. **Ranking should be based on contaminant with greatest exceedance of CCME guidelines.** Ranking of contaminant hazard as high, medium and low is as follows: High = One or more measured contaminant concentration is greater than 100 X appropriate CCME guidelines Medium = One or more measured contaminant concentration is 10 - 99.99 X appropriate CCME guidelines Low = One or more measured contaminant concentration is 1 - 9.99 X appropriate CCME guidelines Mobile NAPL = Contaminant is a non-aqueous phase liquid (i.e., due to its low solubility, it does not dissolve in water, but remains as a separate liquid) and is present at a sufficiently high saturation (i.e., greater than residual NAPL saturation) such that there is significant potential for mobility either downwards or laterally. Other standards may include local background concentration or published toxicity benchmarks. Results of toxicity testing with site samples can be used as an alternative. This approach is only relevant for contaminants that do not biomagnify in the food web, since toxicity tests would not indicate potential effects at higher trophic levels. High = lethality observed. Medium = no lethality, but sub lethal effects observed. Low = neither lethal nor sub lethal effects observed.	In the event that elevated levels of a material with no associated CCME guidelines are present, check provincial and USEPA environmental criteria. Hazard Quotients (sometimes referred to as a screening quotient in risk assessments) refer to the ratio of measured concentration to the concentration believed to be the threshold for toxicity. A similar calculation is used here to determine the contaminant exceedance factor (CEF). Concentrations greater than one times the applicable CCME guideline (i.e., CEF=>1) indicate that risks are possible. Mobile NAPL has the highest associated score (8 because of its highly concentrated nature and potential for increase in the size of the impacted zone.
Mobile NAPL High (>100x) Medium (10x to 100x) Low (1x to 10x) Do Not Know				
"Known" -score	6			
"Potential" - score	---			

CCME National Classification System (2008)

(I) Contaminant Characteristics

Vehicle Dump and Community Landfill

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method of Evaluation	Notes
4. Contaminant Quantity (known or strongly suspected)				
What is the known or strongly suspected quantity of all contaminants? >10 hectare (ha) or 5000 m^3 2 to 10 ha or 1000 to 5000 m^3 <2 ha or 1000 m^3 Do Not Know	2 to 10 ha or 1000 to 5000 m3	Impacts identified throughout the site along drainage pathways. Approximately 5 Ha of impacted area.	Measure or estimate the area or quantity of total contamination (i.e, all contaminants known or strongly suspected to be present on the site). The "Area of Contamination"is defined as the area or volume of contaminated media (soil, sediment, groundwater, surface water) exceeding appropriate environmental criteria.	A larger quantity of a potentially toxic substance can result in a larger frequency of exposure as well as a greater probability of migration, therefore, larger quantities of these substances earn a higher score.
"Known" -score	6			
"Potential" - score	---			
5. Modifying Factors				
Does the chemical fall in the class of persistent chemicals based on its behavior in the environment? Yes No Do Not Know	Yes	Persistent chemicals were identified on site. PCBs and pesticides were identified through chemical analysis of soil and sediments.	Persistent chemicals, e.g., PCBs, chlorinated pesticides etc. either do not degrade or take longer to degrade, and therefore may be available to cause effects for a longer period of time. Canadian Environmental Protection Act (CEPA) classifies a chemical as persistent when it has at least one of the following characteristics: (a) in air, (i) its half-life is equal to or greater than 2 days, or (ii) it is subject to atmospheric transport from its source to a remote area; (b) in water, its half-life is equal to or greater than 182 days; (c) in sediments, its half-life is equal to or greater than 365 days; or (d) in soil, its half-life is equal to or greater than 182 days. This list does not include metals or metalloids, which in their elemental form do not degrad However metals and metalloids form chemical species in the environment, many of which are not readily bioavailable.	*Examples of Persistent Substances are provided in attached Reference Materials*
Are there contaminants present that could cause damage t utilities and infrastructure, either now or in the future, given their location? Yes No Do Not Know	No	This is an abandoned site. There are no utilities and all infrastructures are removed.		Some contaminants may react or absorb into underground utilities and infrastructure. For example, organic solvents may degrade some plastics, and salts could cause corrosion of metal.
How many different contaminant classes have representative CCME guideline exceedances? one two to four five or more Do Not Know	five or more	Metals, PHC, PAH, PCB, Pesticides were identified on site.	For the purposes of the revised NCS ranking system, the following chemicals represent distinct chemical "classes": inorganic substances (including metals), volatile petroleum hydrocarbons, light extractable petroleum hydrocarbons, heavy extractable petroleum hydrocarbons, PAHs, phenolic substances, chlorinated hydrocarbons, halogenated methanes, phthalate esters, pesticides.	*Refer to the Reference Material sheet for a list of example substances that fall under the various chemical classes.*
"Known" - Score	5			
"Potential" - Score	---			

Contaminant Characteristic Total	
Raw Total Scores- "Known"	31
Raw Total Scores- "Potential"	1
Raw Combined Total Scores	32
Total Score (Raw Combined / 40 * 33)	**26.4**

CCME National Classification System (2008)

(II) Migration Potential (Evaluation of contaminant migration pathways)

Vehicle Dump and Community Landfill

Definition	**Score**	**Rationale for Score** (document any assumptions, reports, or site-specific information; provide references)	**Method Of Evaluation**	**Notes**
1. Groundwater Movement				
A. Known COPC exceedances and an operable groundwater pathway within and/or beyond the property boundary.				
i) For **potable groundwater environments**, 1) groundwater concentrations exceed background concentrations and 1X the Guideline for Canadian Drinking Water Quality (GCDWQ) or 2) there is known contact of contaminants with groundwater, based on physical evidence of groundwater contamination. For **non-potable environments** (typically urban environments with municipal services), 1) groundwater concentrations exceed 1X the applicable non potable guidelines or modified generic guidelines (which exclude ingestion of drinking water pathway) or 2) there is known contact of contaminants with groundwater, based on physical evidence of groundwater impacts. ii) Same as (i) except the information is not known but strongly suspected based on indirect observations. iii) Meets GCDWQ for **potable environments**; meets non-potable criteria or modified generic criteria (excludes ingestion of drinking water pathway) for **non-potable environments** **or** Absence of groundwater exposure pathway (i.e., there is no aquifer (see definition at right) at the site or there is an adequate isolating layer between the aquifer and the contamination, and within 5 km of the site there are no aquatic receiving environments and the groundwater does not daylight). Score	12 9 0 9 9	Impacts to surface water are strongly suspected. Evidence of discharge seeps and migration along fractures in bedrock. There is an environmental receptor (Sylvia Grinnell River) > 5 km from the site and the contaminants do "daylight" and groundwater would discharge into shallow ponds and Sylvia Grinnell River. No known potable goundwater sources in the vicinity of the site.	Review chemical data and evaluate groundwater quality. The evaluation method concentrates on 1) a potable or non-potable groundwater environment; 2) the groundwater flow system and its potential to be an exposure pathway to known or potential receptors An aquifer is defined as a geologic unit that yields groundwater in usable quantities and drinking wate quality. The aquifer can currently be used as a potable water supply or could have the potential for u in the future. Non-potable groundwater environments are defined as areas that are serviced with a reliable alternative water supply (most commonly provided in urban areas). The evaluation of a non-potable environment will be based on a site specific basis. Physical evidence includes significant sheens, liquid phase contamination, or contaminant saturated soils. Seeps and springs are considered part of the groundwater pathway. In Arctic environments, the potability and evaluation of the seasonal active layer (above the permafrost) as a groundwater exposure pathway will be considered on a site-specific basis.	The 1992 NCS rationale evaluated the off-site migration as a regulatory issue. The exposure assessment and classification of hazards should be evaluated regardless of the property boundaries. Someone experienced must provide a thorough description of the sources researched to determine the presence/absence of a groundwater supply source in the vicinity of the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps/reports and other resources such as internet links. Note that for potable groundwater that also daylights into a nearby surface water body, the more stringent guidelines for both drinking water and protection of aquatic life should be considered. **Selected References** Potable Environments Guidelines for Canadian Drinking Water Quality www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/doc_sup-appui/sum_guide-res_recom/index_e.html Non-Potable Environments Canadian Water Quality Guidelines for Protection of Aquatic Life. CCME. 1999 www.ccme.ca Compilation and Review of Canadian Remediation Guidelines, Standards and Regulations. Science Applications International Corporation (SAIC Canada), report to Environment Canada, January 4, 2002.
NOTE: If a score is assigned here for Known COPC Exceedances, then you can skip Part B (Potential for groundwater pathway) and go to Section 2 (Surface Water Pathway)				
B. Potential for groundwater pathway.				
a. Relative Mobility High Moderate Low Insignificant Do Not Know Score	Do Not Know 2		Organics Koc (L/kg) / Metals with higher mobility at acidic conditions / Metals with higher mobility at alkaline conditions Koc < 500 (i.e., log Koc < 2.7) / pH < 5 / pH > 8.5 Koc = 500 to 5000 (i.e., log Koc = 2.7 to 3.7) / pH = 5 to 6 / pH = 7.5 to 8.5 Koc = 5,000 to 100,000 (i.e., log Koc = 3.7 to 5) / pH > 6 / pH < 7.5 Koc > 100,000 (i.e., log Koc > 5)	Reference: US EPA Soil Screening Guidance (Part 5 - Table 39) If a score of zero is assigned for relative mobility, it is still recommended that the following sections on potential for groundwater pathway be evaluated and scored. Although the Koc of an individual contaminant may suggest that it will be relatively immobile, it is possible that, with complex mixtures, there could be enhanced mobility due to co-solvent effects. Therefore, the Koc cannot be relied on solely as a measure of mobility. An evaluation of other factors such as containment, thickness of confining layer, hydraulic conductivities and precipitation infiltration rate are still useful in predicting potential for groundwater migration, even if a contaminant is expected to have insignificant mobility based on its chemistry alone.
b. Presence of engineered sub-surface containment? No containment Partial containment Full containment Do Not Know Score	Do Not Know 1.5		Review the existing engineered systems or natural attenuation processes for the site and determine if full or partial containment is achieved. Full containment is defined as an engineered system or natural attenuation processes, monitored as being effective, which provide for full capture and/or treatment of contaminants. All chemicals of concern must be contained for "Full Containment" scoring. Natural attenuation must have sufficient data, and reports cited with monitoring data to support steady state conditions and the attenuation processes. If there is no containment or insufficient natural attenuation process, this category is evaluated as high. If there is less than full containment or if uncertain, then evaluate as medium. In Arctic environments, permafrost will be evaluated, as appropriate, based on detailed evaluations, effectiveness and reliability to contain/control contaminant migration.	Someone experienced must provide a thorough description of the sources researched to determine the containment of the source at the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps, geotechnical reports or natural attenuation studies and other resources such as internet links. **Selected Resources:** United States Environmental Protection Agency (USEPA) 1998. Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater. EPA/600/R-98/128. Environment Canada – Ontario Region – Natural Attenuation Technical Assistance Bulletins (TABS) Number 19 –21.
c. Thickness of confining layer over aquifer of concern or groundwate exposure pathway 3 m or less including no confining layer or discontinuous confining layer 3 to 10 m > 10 m Do Not Know Score	Do Not Know 0.5		The term "confining layer" refers to geologic material with little or no permeability or hydraulic conductivity (such as unfractured clay); water does not pass through this layer or the rate of movement is extremely slow. Measure the thickness and extent of materials that will impede the migration of contaminants to the groundwater exposure pathway. The evaluation of this category is based on: 1) The presence and thickness of saturated subsurface materials that impede the vertical migration of contaminants to lower aquifer units which can or are used as drinking water sources or 2) The presence and thickness of unsaturated subsurface materials that impede the vertical migration of contaminants from the source location to the saturated zone (e.g., water table aquifer, first hydrostratigraphic unit or other groundwater pathway).	
d. Hydraulic conductivity of confining layer $>10^{-4}$ cm/s or no confining layer 10^{-4} to 10^{-6} cm/s $<10^{-6}$ cm/s Do Not Know Score	Do Not Know 0.5		Determine the nature of geologic materials and estimate hydraulic conductivity from published material (or use "Range of Values of Hydraulic Conductivity and Permeability" figure in the Reference Material sheet). Unfractured clays should be scored low. Silts should be scored medium. Sand, gravel should be scored high. The evaluation of this category is based on: 1) The presence and hydraulic conductivity ("K") of saturated subsurface materials that impede the vertical migration of contaminants to lower aquifer units which can or are used as a drinking water source, groundwater exposure pathway or 2) The presence and permeability ("k") of unsaturated subsurface materials that impede the vertical migration of contaminants from the source location to the saturated water table aquifer, first hydrostratigraphic unit or other groundwater pathway.	

CCME National Classification System (2008)

(II) Migration Potential (Evaluation of contaminant migration pathways)

Vehicle Dump and Community Landfill

Definition	**Score**	**Rationale for Score** (document any assumptions, reports, or site-specific information; provide references)	**Method Of Evaluation**	**Notes**
B. Potential for groundwater pathway.				
e. Precipitation infiltration rate (Annual precipitation factor x surface soil relative permeability factor) High Moderate Low Very Low None Do Not Know Score	Do Not Know 0.4		Precipitation Refer to Environment Canada precipitation records for relevant areas. Divide annual precipitation by 1000 and round to nearest tenth (e.g., 667 mm = 0.7 score). Permeability For surface soil relative permeability (i.e., infiltration) assume: gravel (1), sand (0.6), loam (0.3) and pavement or clay (0). Multiply the surface soil relative permeability factor with precipitation factor to obtain the score for precipitation infiltration rate.	
f. Hydraulic conductivity of aquifer $>10^{-2}$ cm/s 10^{-2} to 10^{-4} cm/s $<10^{-4}$ cm/s Do Not Know Score	Do Not Know 1		Determine the nature of geologic materials and estimate hydraulic conductivity of all aquifers of concern from published material (refer to "Range of Values of Hydraulic Conductivity and Permeability" in the Reference Material sheet).	
Potential groundwater pathway total	5.9			
Allowed Potential score	---	Note: If a "known" score is provided, the "potential" score is disallowed.		
Groundwater pathway total	**9**			
2. Surface Water Movement				
A. Demonstrated migration of COPC in surface water above background conditions				
Known concentrations of surface water: i) Concentrations exceed background concentrations and exceed CCM CWQG for protection of aquatic life, irrigation, livestock water, and/or recreation (whichever uses are applicable at the site) by >1 X; or There is known contact of contaminants with surface water based on site observations. or In the absence of CWQG, chemicals have been proven to be toxic based on site specific testing (e.g. toxicity testing; or other indicator testing of exposure).	12	Metals (aluminum, cadmium, copper, lead, and zinc) and VOC (trichloroethylene) were detected above background and CCME guidelines (protection of aquatic life) in surface water on site. Surface water drainage on site is expelled into Sylvia Grinnell River (Fish rearing habitat).	Collect all available information on quality of surface water near to site. Evaluate available data agai Canadian Water Quality Guidelines (select appropriate guidelines based on local water use, e.g., recreation, irrigation, aquatic life, livestock watering, etc.). The evaluation method concentrates on the surface water flow system and its potential to be an exposure pathway. Contamination is present on the surface (above ground) and has the potential to impact surface water bodies. Surface water is defined as a water body that supports one of the following uses: recreation, irrigatio livestock watering, aquatic life.	General Notes: Someone experienced must provide a thorough description of the sources researched to classify the surface water body in the vicinity of the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps/reports and other resource such as internet links. Selected References: CCME. 1999. Canadian Water Quality Guidelines for the Protection of Aquatic Life www.ccme.ca CCME. 1999. Canadian Water Quality Guidelines for the Protection of Agricultural Water Uses (Irrigation and Livestock Water) www.ccme.ca Health and Welfare Canada. 1992. Guidelines for Canadian Recreational Water Quality.
ii) Same as (i) except the information is not known but strongly suspected based on indirect observations.	8			
iii) Meets CWQG or absence of surface water exposure pathway (i.e., Distance to nearest surface water is > 5 km.)	0			
	12			
Score	12			

NOTE: If a score is assigned here for Demonstrated Migration in Surface Water, then you can skip Part B (Potential for migration of COPCs in surface water) and go to Section 3 (Surface Soils)

CCME National Classification System (2008)

(II) Migration Potential (Evaluation of contaminant migration pathways)

Vehicle Dump and Community Landfill

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
B. Potential for migration of COPCs in surface water				
a. Presence of containmen No containment Partial containmen Full containment Do Not Know Score	Do Not Know 3		Review the existing engineered systems and relate these structures to site conditions and proximity to surface water and determine if full containment is achieved: score low if there is full containment such as capping, berms, dikes; score medium if there is partial containment such as natural barriers, trees, ditches, sedimentation ponds; score high if there are no intervening barriers between the site and nearby surface water. Full containment must include containment of all chemicals.	
b. Distance to Surface Water 0 to <100 m 100 - 300 m >300 m Do Not Know Score	Do Not Know 2		Review available mapping and survey data to determine distance to nearest surface water bodies.	
c. Topography Contaminants above ground level and slope is stee Contaminants at or below ground level and slope is stee Contaminants above ground level and slope is intermedia Contaminants at or below ground level and slope is intermedia Contaminants above ground level and slope is fl Contaminants at or below ground level and slope is fl Do Not Know Score	Do Not Know 1		Review engineering documents on the topography of the site and the slope of surrounding terrain. Steep slope = >50% Intermediate slope = between 5 and 50% Flat slope = < 5% Note: Type of fill placement (e.g., trench, above ground, etc.).	
d. Run-off potential High (rainfall run-off score > 0.6) Moderate (0.4 < rainfall run-off score <0.6) Low (0.2 < rainfall run-off score <0.4) Very Low (0 < rainfall run-off score < 0.2) None (rainfall run-off score = 0) Do Not Know Score	Do Not Know 0.4		Rainfall Refer to Environment Canada precipitation records for relevant areas. Divide rainfall by 1000 and round to nearest tenth (e.g., 667 mm = 0.7 score). The former definition of "annual rainfall" did not include the precipitation as snow. This minor adjustment has been made. The second modification was the inclusion of permeability of surface materials as an evaluation factor. Permeability For infiltration assume: gravel (0), sand (0.3), loam (0.6) and pavement or clay (1). Multiply the infiltration factor with precipitation factor to obtain rainfall run off score.	Selected Sources: Environment Canada web page linkwww.msc.ec.gc.ca Snow to rainfall conversion apply ratio of 15 (snow):1(water)
e. Flood potentia 1 in 2 years 1 in 10 years 1 in 50 years Do Not Know Score	Do Not Know 0.5		Review published data such as flood plain mapping or flood potential (e.g., spring or mountain run-off) and Conservation Authority records to evaluate flood potential of nearby water courses both up and down gradient. Rate zero if site not in flood plain.	
Potential surface water pathway total Allowed Potential score	6.9 ---	Note: If a "known" score is provided, the "potential" score is disallowed.		
Surface water pathway total	**12**			
3. Surface Soils (potential for dust, dermal and ingestion exposure)				
A. Demonstrated concentrations of COPC in surface soils (top 1.5 m)				
COPCs measured in surface soils exceed the CCME soil quality guideline. Strongly suspected that soils exceed guidelines COPCs in surface soils does not exceed the CCME soil quality guideline o is not present (i.e., bedrock). Score	12 9 0 12 12	Metals (copper, lead, cadmium), PCBs, PAHs, and PHC (F2 to F4) were detected in the surface soils on site.	Collect all available information on quality of surface soils (i.e., top 1.5 metres) at the site. Evaluate available data against Canadian Soil Quality Guidelines. Select appropriate guidelines based on current (or proposed future) land use (i.e, agricultural, residential/parkland, commercial, or industrial) and soil texture if applicable (i.e., coarse or fine).	Selected References: CCME. 1999. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health www.ccme.ca
NOTE: If a score is assigned here for Demonstrated Concentrations in Surface Soils, then you can skip Part B (Potential for a surface soils migration pathway) and go to Section 4 (Vapour)				
B. Potential for a surface soils (top 1.5 m) migration pathway				
a. Are the soils in question covered? Exposed Vegetatec Landscapec Paved Do Not Know Score	Do Not Know 4		Consult engineering or risk assessment reports for the site. Alternatively, review photographs or perform a site visit. Landscaped surface soils must include a minimum of 0.5 m of topsoil.	The possibility of contaminants in blowing snow have not been included in the revised NCS as it is difficult to assess what constitutes an unacceptable concentration and secondly, spills to snow or ice are most efficiently mitigated while freezing conditions remain.
b. For what proportion of the year does the site remain covered b snow? 0 to 10% of the yeai 10 to 30% of the yeai More than 30% of the yeai Do Not Know Score	Do Not Know 3		Consult climatic information for the site. The increments represent the full span from soils which are always wet or covered with snow (and therefore less likely to generate dust) to those soils which are predominantly dry and not covered by snow (and therefore are more likely to generate dust).	
Potential surface soil pathway total Allowed Potential score	7 ---	**Note: If a "known" score is provided, the "potential" score is disallowed**		
Soil pathway total	**12**			

CCME National Classification System (2008)

(II) Migration Potential (Evaluation of contaminant migration pathways)

Vehicle Dump and Community Landfill

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
4. Vapour				
A. Demonstrated COPCs in vapour.				
Vapour has been measured (indoor or outdoor) in concentrations exceeding risk based concentrations.	12		Consult previous investigations, including human health risk assessments, for reports of vapours detected.	
Strongly suspected (based on observations and/or modelling)	9			
Vapour has not been measured and volatile hydrocarbons have not been found in site soils or groundwater.	0			
	Go to Potential			
Score	---			
NOTE: If a score is assigned here for Demonstrated COPCs in Vapour, then you can skip Part B (Potential for COPCs in vapour) and go to Section 5 (Sediment)				
B. Potential for COPCs in vapour				
a. Relative Volatility based on Henry's Law Constant, H' (dimensionless) High (H' > 1.0E-1) Moderate (H' = 1.0E-1 to 1.0E-3 Low (H' < 1.0E-3) Not Volatile Do Not Know		PHCs are mainly F2 and F3 with lower volatility.	Reference: US EPA Soil Screening Guidance (Part 5 - Table 36) *Provided in Attached Reference Materials*	If the Henry's Law Constant for a substance indicates that it is not volatile, and a score of zero is assigned here for relative volatility, then the other three questions in this section on Potential for COPCs will be automatically assigned scores of zero and you can skip to section 5.
	Low			
Score	1			
b. What is the soil grain size Fine Coarse Do Not Know		Soils are coarse grained.	Review soil permeability data in engineering reports. The greater the permeability of soils, the greater the possible movement of vapours. Fine-grained soils are defined as those which contain greater than 50% by mass particles less than 75 µm mean diameter (D50 < 75 µm). Coarse-grained soils are defined as those which contain greater than 50% by mass particles greater than 75 µm mean diameter (D50 > 75 µm).	
	Coarse			
Score	4			
c. Is the depth to the source less than 10m? Yes No Do Not Know		Source is exposed in many areas.	Review groundwater depths below grade for the site.	
	Yes			
Score	2			
d. Are there any preferential pathways? Yes No Do Not Know		Exposure route would be to outdoor air.	Visit the site during dry summer conditions and/or review available photographs. Where bedrock is present, fractures would likely act as preferential pathways.	Preferential pathways refer to areas where vapour migration is more likely to occur because there is lower resistance to flow than in the surrounding materials. For example, undergrou conduits such as sewer and utility lines, drains, or septic systems may serve as preferential pathways. Features of the building itself that may also be preferential pathways include earthen floors, expansion joints, wall cracks, or foundation perforations for subsurface features such as utility pipes, sumps, and drains.
	Yes			
Score	2			
Potential vapour pathway total	9	Note: If a "known" score is provided, the "potential" score is disallowed.		
Allowed Potential score	9			
Vapour pathway total	**9**			

CCME National Classification System (2008)

(II) Migration Potential (Evaluation of contaminant migration pathways)

Vehicle Dump and Community Landfill

Definition	**Score**	**Rationale for Score** (document any assumptions, reports, or site-specific information; provide references)	**Method Of Evaluation**	**Notes**
5. Sediment Movement				
A. Demonstrated migration of sediments containing COPCs				
There is evidence to suggest that sediments originally deposited to the site (exceeding the CCME sediment quality guidelines) have migrated.	12	Arsenic, cadmium, chromium, copper, lead, zinc, PCBs, and pesticides were detected in sediment samples on and down-gradient from site. This suggests that sediment migration is taking place along surface water pathways.	Review sediment assessment reports. Evidence of migration of contaminants in sediments must be reported by someone experienced in this area.	Usually not considered a significant concern in lakes/marine environments, but could be very important in rivers where transport downstream could be significant.
Strongly suspected (based on observations and/or modelling)	9			
Sediments have been contained and there is no indication that sediments will migrate in future. **or** Absence of sediment exposure pathway (i.e., within 5 km of the site there are no aquatic receiving environments, and therefore no sediments).	0			
	12			
Score	12			
NOTE: If a score is assigned here for Demonstrated Migration of Sediments, then you can skip Part B (Potential for Sediment Migration) and go to Section 6 (Modifying Factors)				
B. Potential for sediment migration				
a. Are the sediments having COPC exceedances capped with sediments having no exceedances ("clean sediments")?	Do Not Know		Review existing sediment assessments. If sediment coring has been completed, it may indicate that historically contaminated sediments have been covered over by newer "clean" sediments. This assessment will require that cores collected demonstrate a low concentration near the top and higher concentration with sediment depth.	
Yes No Do Not Know	2			
b. For lakes and marine habitats, are the contaminated sediments in shallow water and therefore likely to be affected by tidal action, wave action or propeller wash?	Do Not Know		Review existing sediment assessments. If the sediments present at the site are in a river, select "no" for this question.	
Yes No Do Not Know	2			
c. For rivers, are the contaminated sediments in an area prone t sediment scouring?	Do Not Know		Review existing sediment assessments. It is important that the assessment is made under worst case flows (high yearly flows). Under high yearly flows, areas which are commonly depositional may	
Yes No Do Not Know	2			
Potential sediment pathway total	6			
Allowed Potential score	---	Note: If a "known" score is provided, the "potential" score is disallowed.		
Sediment pathway total	**12**			
6. Modifying Factors				
Are there subsurface utility conduits in the area affected b contamination?	Do Not Know		Consult existing engineering reports. Subsurface utilities can act as conduits for contaminant migration.	
Yes No Do Not Know				
Known	---			
Potential	2			
Migration Potential Total				
Raw "known" tota	45			
Raw "potential" tota	11.0			
Raw combined tota	56.0	Note: If "Known" and "Potential" scores are provided, the checklist defaults to known. Therefore, the total "Potential" Score may not reflect the sum of the individual "Potential" scores.		
Total (max 33)	**28.9**			

CCME National Classification System (2008)

(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

Vehicle Dump and Community Landfill

Definition	**Score**	**Rationale for Score** (document any assumptions, reports, or site-specific information; provide references)	**Method Of Evaluation**	**Notes**
1. Human				
A. Known exposure				
Documented adverse impact or high quantified exposure which has or will result in an adverse effect, injury or harm or impairment of the safety to humans as a result of the contaminated site. (Class 1 Site*) Same as above, but "Strongly Suspected" based on observations or indirect evidence. No quantified or suspected exposures/impacts in humans. Score	22 10 0 Go to Potential ---	PQRA is currently being completed for this site and will provide future direction in this category	*Where adverse effects on humans are documented, the site should be automatically designated as a Class 1 site (i.e., action required). There is no need to proceed through the NCS in this case. However, a scoring guideline (22) is provided in case a numerical score for the site is still desired (e.g., for comparison with other Class 1 sites). This category can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients >1 for noncarcinogenic chemicals and incremental cancer risks that exceed acceptable levels defined by the jurisdiction for carcinogenic chemicals (for most jurisdictions this is typically either $>10^{-5}$ or $>10^{-6}$). Known impacts can also be evaluated based on blood testing (e.g. blood lead >10 ug/dL) or other health based testing. This category can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients of less than 0.2 for non-carcinogenic chemicals and incremental lifetime cancer risks for carcinogenic chemicals that are within acceptable levels as defined by the jurisdiction (for most jurisdictions this is less than either 10^{-6} or 10^{-5}).	Known adverse impact includes domestic and traditional food sources. Adverse effects based on food chain transfer to humans and/or animals can be scored in this category. However, the weight of evidence must show a direct link of a contaminated food source/supply and subsequent ingestion/transfer to humans. Any associated adverse effects to the environment are scored separately later in this worksheet. Someone experienced must provide a thorough description of the sources researched to evaluate and determine the quantified exposure/impact (adverse effect) in the vicinity of the contaminated site. **Selected References:** Health Canada – Federal Contaminated Site Risk Assessment in Canada Parts 1 and 2 Guidance on Human Heath Screening Level Risk Assessments (www.hc-sc.gc.ca/ewh-semt/pubs/contamsite/index_e.htm) United States Environmental Protection Agency, Integrated Risk Information System (IRIS) –http://toxnet.nml.nih.gov
NOTE: If a score is assigned here for Known Exposure, then you can skip Part B (Potential for Human Exposure) and go to Section 2 (Human Exposure Modifying Factors)				
B. Potential for human exposure				
a) Land use (provides an indication of potential human exposure scenarios) Agricultural Residential / Parkland Commercial Industrial Do Not Know Score	Res / Parkland 2	The site is classified as a commercial property. However, general public use of the site is for recreation (hiking and fishing).	Review zoning and land use maps over the distances indicated. If the proposed future land use is more "sensitive" than the current land use, evaluate this factor assuming the proposed future use is in place Agricultural land use is defined as uses of land where the activities are related to the productive capability of the land or facility (e.g., greenhouse) and are agricultural in nature, or activities related to the feeding and housing of animals as livestock. Residential/Parkland land uses are defined as uses of land on which dwelling on a permanent, temporary, or seasonal basis is the activity (residential), as well as uses on which the activities are recreational in nature and require the natural or human designed capability of the land to sustain that activity (parkland). Commercial/Industrial land uses are defined as land on which the activities are related to the buying, selling, or trading of merchandise or services (commercial), as well as land uses which are related to the production, manufacture, or storage of materials (industrial).	This is the main "receptor" factor used in site scoring. A higher score implies a greater exposure and/or exposure of more sensitive human receptors (e.g., children).
b. Indicate the level of accessibility to the contaminated portion of the site (e.g., the potential for coming in contact with contamination) Limited barriers to prevent site access; contamination not covered Moderate access or no intervening barriers, contaminants are covered. Remote locations in which contaminants not covered. Controlled access or remote location and contaminants are covered Do Not Know Score	Access, not covered 2	Full access is available to the site. No barriers are in place and many contaminents and sources are not capped adequately.	Review location and structures and contaminants at the site and determine if there are intervening barriers between the site and humans. A low rating should be assigned to a (covered) site surrounded by a fence or in a remote location, whereas a high score should be assigned to a site that has no cover, fence, natural barriers or buffer.	
B. Potential for human exposure				
c) Potential for intake of contaminated soil, water, sediment or foods for operable or potentially operable pathways, as identified in Worksheet II (Migration Potential). i) direct contact Is dermal contact with contaminated surface water, groundwater, sediments or soils anticipated? Yes No Do Not Know Score	Yes 3	The site is used by the general public for hiking and fishing activities. Wild berries also grow throughout the site and berry picking is a common practice in Iqaluit.	If soils or potable groundwater are present exceeding their respective CCME guidelines, dermal contact is assumed. Exposure to surface water, non-potable groundwater or sediments exceeding their respective CCME guidelines will depend on the site. Select "Yes" if dermal exposure to surface water, non-potable groundwater or sediments is expected. For instance, dermal contact with sediments would not be expected in an active port. Only soils in the top 1.5 m are defined by CCME (2003) as surface soils. If contaminated soils are only located deeper than 1.5 m, direct contact with soils is not anticipated to be an operable contaminant exposure pathway.	Exposure via the skin is generally believed to be a minor exposure route. However for some organic contaminants, skin exposure can play a very important component of overall exposure. Dermal exposure can occur while swimming in contaminated waters, bathing with contaminated surface water/groundwater and digging in contaminated dirt, etc.
ii) inhalation (i.e., inhalation of dust, vapour) Vapour - Are there inhabitable buildings on the site within 30 m of soils or groundwater with volatile contamination as determined in Worksheet II (Migration Potential)? Yes No Do Not Know Score Dust - If there is contaminated surface soil (e.g. top 1.5 m) , indicate whether the soil is fine or coarse textured. If it is known that surface soil is not contaminated, enter a score of zero. Fine Coarse Surface soil is not contaminated or absent (bedrock) Do Not Know Texture Score inhalation total	No 0 Coarse 1 1	No ihabitable buildings or infrastructure are located near by the site.	If inhabitable buildings are on the site within 30 m of soils or groundwater exceeding their respective guidelines for volatile chemicals, there is a potential of risk to human health (Health Canada, 2004). Review site investigations for location of soil samples (having exceedances of volatile substances) relative to buildings. Refer to (II) Migration Potential worksheet, 4B.a),*Potential for COPCs in Vapour* for a definition of volatility. Consult grain size data for the site. If soils (containing exceedances of the CCME soil quality guidelines) predominantly consist of fine material (having a median grain size of 75 microns; as defined by CCME (2006)) then these soils are more likely to generate dusts.	Exposure via the lungs (inhalation) can be a very important exposure pathway. Inhalation can be via both particulates (dust) and gas (vapours). Vapours can be a problem where buildings have been built on former industrial sites or where volatile contaminants have migrated below buildings resulting in the potential for vapour intrusion. Assesses the potential for humans to be exposed to vapours originating from site soils. The closer the receptor is to a source of volatile chemicals in soil, the greater the potential of exposure. Also, coarser-grained soil will convey vapour much more efficiently in the soil than finer grained material such as clays and silts. General Notes; Someone experienced must provide a thorough description of the sources researched to determine the presence/absence of a vapour migration and/or dust generation in the vicinity of the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps/reports and other resource such as internet links. Selected References; Canadian Council of Ministers of the Environment (CCME). 2006. Protocol for the Derivation of Environmental and Human Health Soil Quality Guidelines. PN 1332.www.ccme.ca Golder, 2004. Soil Vapour Intrusion Guidance for Health Canada Screening Level Risk Assessment (SLRA) Submitted to Health Canada, Burnaby, BC

CCME National Classification System (2008)

(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

Vehicle Dump and Community Landfill

Definition	**Score**	**Rationale for Score** (document any assumptions, reports, or site-specific information; provide references)	**Method Of Evaluation**	**Notes**
B. Potential for human exposure				
iii) Ingestion (i.e., ingestion of food items, water and soils [for children]), including traditional foods. Drinking Water: Choose a score based on the proximity to a drinking water supply, to indicate the potential for contamination (present or future). 0 to 100 m 100 to 300 m 300 m to 1 km 1 to 5 km No drinking water present Do Not Know			Review available site data to determine if drinking water (groundwater, surface water, private, commercial or municipal supply) is known or suspected to be contaminated above Guidelines for Canadian Drinking Water Quality. If drinking water supply is known to be contaminated, some immediate action (e.g., provision of alternate drinking water supply) should be initiated to reduce or eliminate exposure. The evaluation of significant potential for exceedances of the water supply in the future may be based on the capture zones of the drinking water wells; contaminant travel times; computer modelling of flow and contaminant transport.	**Selected References:** Guidelines for Canadian Drinking Water Quality: www.hc-sc.gc.ca/hecs-sesc/water/publications/drinking_water_quality_guidelines/toc.htm Drinking water can be an extremely important exposure pathway to humans. If site groundwater or surface water is not used for drinking, then this pathway is considered to be inoperable. Consider both wild foods such as salmon, venison, caribou, as well as agricultural sources of food items if the contaminated site is on or adjacent to agricultural land uses.
	No drinking water presen			
Score	0	No drinking water sources nearby.		
Is an alternative water supply readily available? Yes No Do Not Know	Yes			
Score	0	Site is in close proximity to Iqaluit (~1.7 km), which is supplied by city reservoir.		
Is human ingestion of contaminated soils possible? Yes No Do Not Know	Yes		If contaminated soils are located within the top 1.5 m, it is assumed that ingestion of soils is an operable exposure pathway. Exposure to soils deeper than 1.5 m is possible, but less likely, and the duration is shorter. Refer to human health risk assessment reports for the site in question.	
Score	3	Humans could ingest the soil as the impacts are at surface and within the site and wild berries grown throughout the site and down-gradient.		
Are food items consumed by people, such as plants, domestic animals or wildlife harvested from the contaminated land and its surroundings? Yes No Do Not Know	Yes		Use human health risk assessment reports (or others) to determine if there is significant reliance on traditional food sources associated with the site. Is the food item in question going to spend a large proportion of its time at the site (e.g., large mammals may spend a very small amount of time at a smal contaminated site)? Human health risk assessment reports for the site in question will also provide information on potential bioaccumulation of the COPC in question.	
Score	1	Wild berries are present on site and Arctic Char fishing takes place nearby in Sylvia Grinnell River.		
Ingestion total	4			
Human Health Total "Potential" Score	12	Note if a "Known" Human Health score is provided, the "Potential" score is disallowed.		
Allowed "Potential" Score	12			
2. Human Exposure Modifying Factors				
a) Strong reliance of local people on natural resources for survival (i.e., food, water, shelter, etc.) Yes No Do Not Know	Yes			
Known	6			
Potential	---			
Raw Human "known" total	6			
Raw Human "potential" total	12			
Raw Human Exposure Total Score	18	Local people rely upon shipped goods. However, Arctic Char fishing in Sylvia Grinnell River provides many people of Iqaluit with food for the winter.		
Human Health Total (max 22)	**18.0**			
3. Ecological				
A. Known exposure				
Documented adverse impact or high quantified exposure which has or will result in an adverse effect, injury or harm or impairment of the safety to terrestrial or aquatic organisms as a result of the contaminated site.	18		Some low levels of impact to ecological receptors are considered acceptable, particularly on commerci and industrial land uses. However, if ecological effects are deemed to be severe, the site may be categorized as class one (i.e., a priority for remediation or risk management), regardless of the numerical total NCS score. For the purpose of application of the NCS, effects that would be considere severe include observed effects on survival, growth or reproduction which could threaten the viability of a population of ecological receptors at the site. Other evidence that qualifies as severe adverse effects may be determined based on professional judgement and in consultation with the relevant jurisdiction. ecological effects are determined to be severe and an automatic Class 1 is assigned, there is no need to proceed through the NCS. However, a scoring guideline (18) is provided in case a numerical score for the site is still desired (e.g., for comparison with other Class 1 sites).	CCME, 1999: Canadian Water Quality Guidelines for the Protection of Aquatic Life. www.ccme.ca CCME, 1999: Canadian Water Quality Guidelines for the Protection of Agricultural Water Uses. www.ccme.ca Sensitive receptors- review: Canadian Council on Ecological Areas www.ccea.org. Ecological effects should be evaluated at a population or community level, as opposed to at the level of individuals. For example, population-level effects could include reduced reproduction, growth or survival in a species. Community-level effects could include reduced species diversity or relative abundances. Further discussion of ecological assessment endpoints is provided in *A Framework for Ecological Risk Assessment: General Guidance* (CCME 1996). Notes: Someone experienced must provide a thorough description of the sources researched to classify the environmental receptors in the vicinity of the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps/reports and other resource such as internet links.
Same as above, but "Strongly Suspected" based on observations or indirect evidence.	12		This category can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients >1. Alternatively, known impacts can also be evaluated based on a weight o evidence assessment involving a combination of site observations, tissue testing, toxicity testing and quantitative community assessments. Scoring of adverse effects on individual rare or endangered species will be completed on a case-by-case basis with full scientific justification.	
No quantified or suspected exposures/impacts in terrestrial or aquatic organisms	0		This category can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients of less than 1 and no other observable or measurable sign of impacts. Alternatively, it can be based on a combination of other lines of evidence showing no adverse effects, such as site observations, tissue testing, toxicity testing and quantitative community assessments.	
	Go to Potential			
Score	---	Ecological RA currently being completed for the site, which may provide further guidance for this section.		

NOTE: If a score is assigned here for Known Exposure, then you can skip Part B (Potential for Ecological Exposure) and go to Section 4 (Ecological Exposure Modifying Factors)

CCME National Classification System (2008)

(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

Vehicle Dump and Community Landfill

Definition	**Score**	**Rationale for Score** (document any assumptions, reports, or site-specific information; provide references)	**Method Of Evaluation**	**Notes**
B. Potential for ecological exposure (for the contaminated portion of the site)				
a) Terrestrial i) Land use Agricultural (or Wild lands) Residential/Parkland Commercial Industrial Do Not Know Score	Residential/Parkland 2	The site borders Sylvia Grinnel Territorial Park and wild lands.	Review zoning and land use maps. If the proposed future land use is more “sensitive” than the current land use, evaluate this factor assuming the proposed future use is in place (indicate in the worksheet that future land use is the consideration). Agricultural land use is defined as uses of land where the activities are related to the productive capability of the land or facility (e.g., greenhouse) and are agricultural in nature, or activities related to the feeding and housing of animals as livestock. Wild lands are grouped with agricultural land due to the similarities in receptors that would be expected to occur there (e.g., herbivorous mammals and birds) and the similar need for a high level of protection to ensure ecological functioning. Residential/Parkland land uses are defined as uses of land on which dwelling on a permanent, temporary, or seasonal basis is the activity (residential), as well as uses on which the activities are recreational in nature and require the natural or human designed capability of the land to sustain that activity (parkland). Commercial/Industrial land uses are defined as land on which the activities are related to the buying, selling, or trading of merchandise or services (commercial), as well as land uses which are related to the production, manufacture, or storage of materials (industrial).	
ii) Uptake potential Direct Contact - Are plants and/or soil invertebrates likely exposed to contaminated soils at the site? Yes No Do Not Know Score	Yes 1	Vegetation samples on site show elevated metal concentrations.	If contaminated soils are located within the top 1.5 m, it is assumed that direct contact of soils with plants and soil invertebrates is an operable exposure pathway. Exposure to soils deeper than 1.5 m is possible, but less likely.	
iii) Ingestion (i.e., wildlife or domestic animals ingesting contaminated food items, soils or water) Are terrestrial animals likely to be ingesting contaminated water at the site? Yes No Do Not Know Score	Yes 1	Evidence of terrestrial animals was observed on site.	Refer to an Ecological Risk Assessment for the site. If there is contaminated surface water at the site, assume that terrestrial organisms will ingest it.	
Are terrestrial animals likely to be ingesting contaminated soils at the site? Yes No Do Not Know Score	Yes 1	Animals would consume contaminated surface waters and potentially impacted vegetation.	Refer to an Ecological Risk Assessment report. Most animals will co-ingest some soil while eating plant matter or soil invertebrates.	
Can the contamination identified bioaccumulate? Yes No Do Not Know Score	Yes 1		Bioaccumulation of contaminants within food items is considered possible if: 1) The Log(Kow) of the contaminant is greater than 4 (as per the chemical characteristics work sheet) and concentrations in soils exceed the most conservative CCME soil quality guideline for the intended land use, or 2) The contaminant in collected tissue samples exceeds the Canadian Tissue Residue Guidelines.	
Distance to sensitive terrestrial ecological area 0 to 300 m 300 m to 1 km 1 to 5 km > 5 km Do Not Know Score	0 to 300 m 3	Sylvia Grinnell River is an important Arctic Char rearing habitat.	It is considered that within 300 m of a site, there is a concern for contamination. Therefore an environmental receptor located within this area of the site will be subject to further evaluations. It is also considered that any environmental receptor located greater than 5 km will not be a concern for evaluation. Review Conservation Authority mapping and literature including Canadian Council on Ecological Areas link: www.ccea.org.	Environmental receptors include: local, regional or provincial species of interest or significance; arctic environments (on a site specific basis); nature preserves, habitats for species at risk, sensitive forests, natural parks or forests.
Raw Terrestrial Total Potential	9	Note if a "Known" Ecological Effects score is provided, the "Potential" score is disallowed.		
Allowed Terrestrial Total Potential	9			
B. Potential for ecological exposure (for the contaminated portion of the site)				
b) Aquatic i) Classification of aquatic environment Sensitive Typical Not Applicable (no aquatic environment present) Do Not Know Score	Sensitive 3	Sylvia Grinnel River is a typical river system of the area and presents a crutial habitat for Arctic Char.	"Sensitive aquatic environments" include those in or adjacent to shellfish or fish harvesting areas, marine parks, ecological reserves and fish migration paths. Also includes those areas deemed to have ecological significance such as for fish food resources, spawning areas or having rare or endangered species. "Typical aquatic environments" include those in areas other than those listed above.	
ii) Uptake potential Does groundwater daylighting to an aquatic environment exceed the CCME water quality guidelines for the protection of aquatic life at the point of contact? Yes No (or Not Applicable) Do Not Know Score	Yes 1	Impacts were detected along surface water pathways on site, which drain into Sylvia Grinnell River.	Groundwater concentrations of contaminants at the point of contact with an aquatic receiving environment can be estimated in three ways: 1) by comparing collected nearshore groundwater concentrations to the CCME water quality guidelines (this will be a conservative comparison, as contaminant concentrations in groundwater often decrease between nearshore wells and the point of discharge). 2) by conducting groundwater modeling to estimate the concentration of groundwater immediately before discharge. 3) by installing water samplers, "peepers", in the sediments in the area of daylighting groundwater.	
Distance from the contaminated site to an important surface water resource 0 to 300 m 300 m to 1 km 1 to 5 km > 5 km Do Not Know Score	0 to 300 m 3	The site boudaries are ~ 70 m from the shore of Sylvia Grinnell River.	It is considered that within 300 m of a site, there is a concern for contamination. Therefore an environmental receptor or important water resource located within this area of the site will be subject to further evaluation. It is also considered that any environmental receptor located greater than 5 km away will not be a concern for evaluation. Review Conservation Authority mapping and literature including Canadian Council on Ecological Areas link: www.ccea.org.	Environmental receptors include: local, regional or provincial species of interest or significance, sensitive wetlands and fens and other aquatic environments.
Are aquatic species (i.e., forage fish, invertebrates or plants) that are consumed by predatory fish or wildlife consumers, such as mammals and birds, likely to accumulate contaminants in their tissues? Yes No Do Not Know Score	Yes 1	It is possible that bioaccumulation could take place in aquatic species.	Bioaccumulation of food items is possible if: 1) The Log(Kow) of the contaminant is greater than 4 (as per the chemical characteristics work sheet) and concentrations in sediments exceed the CCME ISQGs. 2) The contaminant in collected tissue samples exceeds the CCME tissue quality guidelines.	
Raw Aquatic Total Potential	8	Note if a "Known" Ecological Effects score is provided, the "Potential" score is disallowed.		
Allowed Aquatic Total Potential	8			

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(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

Vehicle Dump and Community Landfill

Definition	**Score**	**Rationale for Score** (document any assumptions, reports, or site-specific information; provide references)	**Method Of Evaluation**	**Notes**
4. Ecological Exposure Modifying Factors				
a) Known occurrence of a species at risk.		No known species at risk frequent the site or are present in the area.	Consult any ecological risk assessment reports. If information is not present, utilize on-line databases such as Eco Explorer. Regional, Provincial (Environment Ministries), or Federal staff (Fisheries and Oceans or Environment Canada) should be able to provide some guidance.	Species at risk include those that are extirpated, endangered, threatened, or of special concern. For a list of species at risk, consult Schedule 1 of the federal Species at Risk Act (http://www.sararegistry.gc.ca/species/schedules_e.cfm?id=1). Many provincial governments may also provide regionally applicable lists of species at risk. For example, in British Columbia, consult: BCMWLAP. 2005. Endangered Species and Ecosystems in British Columbia. Provincial red and blue lists. Ministry of Sustainable Resource Management and Water, Land and Air Protection.http://srmwww.gov.bc.ca/atrisk/red-blue.htm
Is there a potential for a species at risk to be present at the site?				
Yes				
No				
Do Not Know	No			
	0			
Score	---			
b) Potential impact of aesthetics (e.g., enrichment of a lake or tainting of food flavor).				
Is there evidence of aesthetic impact to receiving water bodies?	Yes		Documentation may consist of environmental investigation reports, press articles, petitions or other records.	This Item will require some level of documentation by user, including contact names, addresses, phone numbers, e-mail addresses. Evidence of changes must be documented, please attach copy of report containing relevant information.
Yes				
No	2	Some orange staining from oxydation was notived in the ponded areas on site. No staining was observed in Sylvia Grinnell River.		
Do Not Know	---			
Is there evidence of olfactory impact (i.e., unpleasant smell)?	Yes		Examples of olfactory change can include the smell of a COPC or an increase in the rate of decay in an aquatic habitat.	
Yes				
No	2			
Do Not Know	---	Oil and grease smells are present on site near surface water bodies.		
Is there evidence of increase in plant growth in the lake or water body?	No		A distinct increase of plant growth in an aquatic environment may suggest enrichment. Nutrients e.g., nitrogen or phosphorous releases to an aquatic body can act as a fertilizer.	
Yes				
No	0			
Do Not Know	---	No increased plant growth was noted.		
Is there evidence that fish or meat taken from or adjacent to the site smells or tastes different?	No		Some contaminants can result in a distinctive change in the way food gathered from the site tastes or smells.	
Yes	0			
No	---			
Do Not Know				
Ecological Modifying Factors Total - Known	**4**			
Ecological Modifying Factors Total - Potential	**---**			
Raw Ecological Total - Known	4			
Raw Ecological Total - Potential	17			
Raw Ecological Total	21			
Ecological Total (Max 18)	**18.0**			
5. Other Potential Contaminant Receptors				
a) Exposure of permafrost (leading to erosion and structural concerns)				Plants and lichens provide a natural insulating layer which will help prevent thawing of the permafrost during the summer. Plants and lichens may also absorb less solar radiation. Solar radiation is turned into heat which can also cause underlying permafrost to melt.
Are there improvements (roads, buildings) at the site dependant upon the permafrost for structural integrity?	Do Not Know		Consult engineering reports, site plans or air photos of the site. When permafrost melts, the stability of the soil decreases, leading to erosion. Human structures, such as roads and/or buildings are often dependent on the stability that the permafrost provides.	
Yes				
No	---			
Do Not Know	2			
Is there a physical pathway which can transport soils released by damaged permafrost to a nearby aquatic environment?	Do Not Know		Melting permafrost leads to a decreased stability of underlying soils. Wind or surface run-off erosion can carry soils into nearby aquatic habitats. The increased soil loadings into a river can cause an increase in total dissolved solids and a resulting decrease in aquatic habitat quality. In addition, the erosion can bring contaminants from soils to aquatic environments.	
Yes				
No	---			
Do Not Know	1			
Other Potential Receptors Total - Known	**---**			
Other Potential Receptors Total - Potential	**3**			
Exposure Total				
Raw Human Health + Ecological Total - Known	10	Only includes "Allowed potential" - if a "Known" score was supplied under a given category then the "Potential" score was not included.		
Raw Human Health + Ecological Total - Potentia	32			
Raw Total	42			
Exposure Total (max 34)	**31.0**			

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Score Summary

Scores from individual worksheets are tallied in this worksheet.
Refer to this sheet after filling out the revised NCS completely.

I. Contaminant Characteristics	Known	Potential
1. Residency Media	6	1
2. Chemical Hazard	8	---
3. Contaminant Exceedance Factor	6	---
4. Contaminant Quantity	6	---
5. Modifying Factors	5	---
Raw Total Score	31	1
Raw Total Score (Known + Potential)	32	
Adjusted Total Score (Raw Total / 40 *33)	**26.4**	(max 33)

II. Migration Potential	Known	Potential
1. Groundwater Movement	9	---
2. Surface Water Movement	12	---
3. Soil	12	---
4. Vapour	---	9
5. Sediment Movement	12	---
6. Modifying Factors	---	2
Raw Total Score	45	11
Raw Total Score (Known + Potential)	56	
Adjusted Total Score (Raw Total / 64 * 33)	**28.9**	(max 33)

III. Exposure	Known	Potential
1. Human Receptors		
A. Known Impact	---	
B Potential		
a. Land Use		2
b. Accessibility		2
c. Exposure Route		
i. Direct Contact		3
ii. Inhalation		1
iii. Ingestion		4
2. Human Receptors Modifying Factors	6	---
Raw Total Human Score	6	12
Raw Total Human Score (Known + Potential)	18	
Adjusted Total Human Score	18.0	(maximum 22)
3. Ecological Receptors		
A. Known Impact	---	
B. Potential		
a. Terrestrial		9
b. Aquatic		8
4. Ecological Receptors Modifying Factors	4	---
Raw Total Ecological Score	4	17
Raw Total Ecological Score (Known + Potential)	21	
Adjusted Total Ecological Score	18.0	(maximum 18)
5. Other Receptors	---	3
Total Other Receptors Score (Known + Potential)	3	
Total Exposure Score (Human + Ecological + Other)	**39.0**	
Adjusted Total Exposure Score (Total Exposure / 46 * 34)	**28.8**	(max 34)

Site Score

Vehicle Dump and Community Landfill

Site Letter Grade	**C**
Certainty Percentage	**69%**
% Responses that are "Do Not Know"	**7%**
Total NCSCS Score for site	**84.1**
Site Classification Category	**1**

Site Classification Categories*:

Class 1 - High Priority for Action (Total NCS Score >70)
Class 2 - Medium Priority for Action (Total NCS Score 50 - 69.9)
Class 3 - Low Priority for Action (Total NCS Score 37 - 49.9)
Class N - Not a Priority for Action (Total NCS Score <37)
Class INS - Insufficient Information (>15% of responses are "Do Not Know")

* NOTE: The term "action" in the above categories does not necessarily refer to remediation, but could also include risk assessment, risk management or further site characterization and data collection.