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Former Refuse Site – Wilmer Marsh Unit
Columbia National Wildlife Area
Near Wilmer, British Columbia

DFRP# 16096, ARMS #00394, FCSI# 16096079

2013/2014 Site Works Summary and Remedial Action Plan Report

March 2014
SLR Project No.: 219.05112.00008

2013/2014 SITE WORKS SUMMARY

AND REMEDIAL ACTION PLAN REPORT

FORMER REFUSE SITE – WILMER MARSH UNIT

COLUMBIA NATIONAL WILDLIFE AREA

NEAR WILMER, BRITISH COLUMBIA

SLR Project No.: 219.05112.00008

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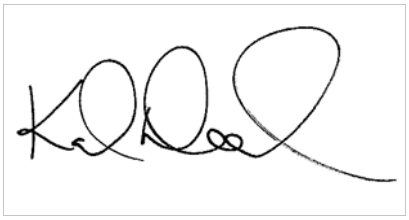

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EXECUTIVE SUMMARY

SLR Consulting (Canada) Ltd. (SLR) was retained by Public Works and Government Services Canada (PWGSC) on behalf of Environment Canada (EC) to conduct a subsurface investigation and geotechnical assessment and to develop a Remedial Action Plan (RAP) for the unofficial refuse area within the Wilmer Marsh Unit of the Columbia National Wildlife Area (the Site). Unauthorized disposal of refuse has historically occurred at the Site and has resulted in the contamination of soil, sediment and surface water at the Site.

SLR was present at the Site in October 2013 to locate, delineate and attempt to quantify debris and associated soil contamination (if present) identified on the southern portion of the Site during a geophysical survey conducted in February 2013. Prior to the intrusive works, the geotechnical consultant (Clarke Geoscience Ltd.) reviewed the proposed work area to assess slope stability, evaluate potential work restrictions and identify erosion and sediment control measures. SLR's Environmental Monitor also reviewed site conditions prior to the commencement of the test pit program.

SLR advanced fourteen test pits in the area of the access trail to a maximum investigated depth of 4.5 m below grade using a spider-type excavator supplied and operated by SPIDEX All Terrain Excavating. SLR visually assessed the test pits for refuse/debris and collected soil samples at regular intervals for laboratory analysis of potential contaminants of concern (PCOCs). Excavations were terminated when native material was encountered or the test pit was deemed too deep to safely excavate further. Additionally, SLR collected surficial soil samples along the southern edge of the uplands bench above the access trail and submitted the samples for chemical analysis.

Three areas of highest debris occurrence were identified from the test pit works and coincided with areas of anomalous response noted during the February 2013 geophysical survey. Debris consisted of automobile parts and tires, bedsprings, and minor household garbage. Mounded soil was observed along the trail and adjacent slopes but was largely found to consist of disturbed soil/fill. Soil metals contamination above Canadian Council of Ministers of the Environment (CCME) Agricultural land use guidelines was identified in three test pits in the trail area, coincident with the highest densities of debris. The contamination was generally located 1 m or greater below the soil surface. Soil metals contamination was also identified in two samples collected on the uplands bench above the main debris zone in the access trail.

In addition to the test pit works, an area previously identified as being a channel for water flow below the trail was investigated. No water was flowing at the time of the investigation; however, a chamber was found leading to a channel flowing downslope to a lower trail. No debris was observed in this area and it is anticipated that the water channel reflects erosion processes.

Areas previously remediated in 2011 and 2012 were evaluated for restoration progress. Photographs of remediated areas were taken and compared to previous photographs to evaluate recovery. All locations were noted to be recovering well although the most recent disturbance (November 2012) at a larger gully at the northeast side of the upper bench was noted to be recovering slowly; however, silt loss was minimal and being contained by silt fencing.

SLR developed a RAP for both the trail and marsh areas of the Site based on the remedial excavation option outlined in the remedial options analysis (ROA) prepared by SLR in 2012-

2013. The RAP included the presentation of several remediation strategies involving differing levels of excavation and debris removal in the trail and marsh. Costs (including a 20% contingency) associated with the strategies range from $33,000 (no debris removal/excavation) to $5.3 million (complete excavation of the trail area).

SLR completed additional items related to EC policy requirements, including updating the Federal Contaminated Sites Inventory input form, updating the Conceptual Site Model for the Site and completing the relevant parts of the Site Closure Tool.

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LIST OF ACRONYMS

AL	Agricultural Land
AEC	Area of Environmental Concern
APEC	Area of Potential Environmental Concern
AVS	Acid Volatile Sulfides
BC	British Columbia
BC MOE	BC Ministry of Environment
BTEX	Benzene, Toluene, Ethylbenzene, Total Xylenes
CCME	Canadian Council of Ministers of the Environment
COC	Contaminants of Concern
COPC	Contaminants of Potential Concern
CEAA	Canadian Environmental Assessment Act
CSM	Conceptual Site Model
CWS	Canadian Wildlife Service
DQERA	Detailed Quantitative Ecological Risk Assessment
FOC	Fisheries and Oceans Canada
EC	Environment Canada
EKES	East Kootenay Environmental Society
EM	Electromagnetic
EPH	Extractable Petroleum Hydrocarbons
ESA	Environmental Site Assessment
FCSI	Federal Contaminated Sites Inventory
GPS	Global Positioning System
HEPH	Heavy Extractable Petroleum Hydrocarbons
HQ	Human Health Hazard Quotients
ILCR	Incremental Lifetime Cancer Risk
km	Kilometres
LEPH	Light Extractable Petroleum Hydrocarbons
m	Metres
m asl	metres above sea level
m bgs	metres below ground surface
m^3	Cubic Metres
NMS	National Master Specification
NWA	National Wildlife Area

PAHs	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PCOCs	Potential Contaminants of Concern
PHCs	Petroleum Hydrocarbons
PWGSC	Public Works and Government Services Canada
RAP	Remedial Action Plan
RMP	Risk Management Plan
SAR	Species at Risk
SARA	Species at Risk Act
SCT	Site Closure Tool
SEM	Simultaneously Extractable Metals
SLERA	Screening Level Risk Assessment
SSHHERA	Site-Specific Human Health and Ecological Risk Assessment
VOCs	Volatile Organic Compounds
VPH	Volatile Petroleum Hydrocarbons

1.0 INTRODUCTION

SLR Consulting (Canada) Ltd. (SLR) was retained by Public Works and Government Services Canada (PWGSC), on behalf of Environment Canada (EC), under Task Authorization 700264633 and Standing Offer Agreement number EO276-110680/001XSB to conduct a subsurface investigation and geotechnical assessment and to develop a Remedial Action Plan (RAP) for the unofficial refuse area within the Wilmer Marsh Unit of the Columbia National Wildlife Area (NWA) (hereafter referred to as the Site). Unauthorized disposal of refuse has historically occurred at the Site and has resulted in the contamination of soil, sediment and surface water at the Site.

The purpose of this Summary Report is to document works which occurred at the Site in 2013 and 2014 (Section 4.0), to outline the RAP for the debris and associated contaminated media present at the Site (Section 5.0) and to present information (e.g. Site Closure Tool) related to EC policy requirements (Section 6.0).

The project team included the following individuals:

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The project team has over 20 years combined experience in the assessment and remediation of similar projects and is familiar with works carried out at the Site.

2.0 SITE DESCRIPTION

2.1 Site History

The Site is situated within the Wilmer Marsh Unit of the Columbia NWA and is located approximately 1.2 kilometre (km) north of the village of Wilmer, British Columbia (BC) (50°33'00.78"N, 116°04'16.82"W). The Columbia NWA is managed by the Canadian Wildlife Service (CWS) of EC. The Wilmer Marsh Unit is the southernmost of the four units that make up the Columbia NWA. It is SLR's understanding that the Wilmer Marsh Unit, and by extension the Site, is owned by CWS. CWS has indicated that the Wilmer Wildlife Area, as it is also known, was first established in 1973 when CWS acquired privately owned lands that were to be developed into recreational and residential subdivisions. The area was officially designated as a wildlife area under the Canada Wildlife Act, Wildlife Area Regulation in 1978.

The Columbia NWA is a federally protected area designed to conserve wildlife and their habitat and is not intended for recreational uses. It is an important segment of a bird migratory corridor within the Pacific Flyway. Staff from Environment Canada and other federal departments use these lands to conduct research. Human activities by the general public are limited and regulated under the Federal Wildlife Area Regulations (C.R.C., c. 1609), under the Canada Wildlife Act. Under the Wildlife Area Regulations, prohibited human uses include hunting; fishing; grazing livestock; allowing domestic animals to run at large; swimming; picnicking; camping; lighting a fire; operating a conveyance; disturbing or removing plants, soils or any other materials; or dumping or depositing any other materials. These uses are prohibited unless a permit is obtained from an authorized federal authority or a federal authority has posted a notice indicating specific activities are permitted in specific locations.

Past non-permitted human uses of the Wilmer Marsh Unit of the Columbia NWA have included livestock grazing and recreational pursuits such as fishing, hang-gliding, hunting, canoeing, hiking, and all-terrain and off-road vehicle use. However, the most prevalent non-permitted use of the Site has been the unauthorized historical disposal of refuse. Previous reports and site visits have indicated that this has occurred at the Site over the past several decades. Refuse deposited at the Site included, but was not limited to, automobile bodies and parts, cans, glass, building debris, scrap metal, used oil containers and filters, automotive batteries, drums, etc. on both the uplands bench and the shoreline/marsh below. The East Kootenay Environmental Society (EKES) reportedly conducted a clean-up of the Site (uplands, shoreline and marshlands) in 1997 which included the removal of approximately 150 car bodies.

2.2 Physical Setting and Soils

The Site is located within the Columbia River Valley in southeastern British Columbia. The Columbia River Valley is part of the Rocky Mountain Trench which separates the Rocky Mountains to the east from the Purcell Mountains to the west. The Site is located on the western side of the valley, and consists of remnant river bench upland with an adjacent shoreline and marsh below. The benchland is relatively flat, with steep slopes and gullies on the south, east and north boundaries; Wilmer Marsh borders the Site at the bottom of the steep slopes to the east. The average elevation across the benchland is 870 metres above sea level (m asl), and the elevation of Wilmer Marsh below is 810.5 m asl, an elevation change of approximately 60 m (195 feet). A steep trail leads down to the marsh along the southern edge of the uplands bench. A fence borders the Site along the western boundary (along Westside Road); prior to 2012, the fence included a narrow person gate (no vehicle access), but this was

removed in 2012 to deter human access to the Site. There are no buildings, utilities or any other structures on the Site.

Soils on the uplands bench are well-drained glacio-lacustrine silts, with minor amounts of clay and fine sands, likely overlying till. The southern and eastern portions of the Site are sparsely vegetated; the vegetative regime includes Sagebrush (*Artemisia cana*), Pasture Sage (*Artemisia frigida*), Sandberg's Bluegrass (*Poa secunda*), Bluebunch Wheatgrass (*Agropyron spicatum*) and various fescues (*Festuca* sp.). The northern portion of the Site is well vegetated; the vegetation regime includes Douglas Fir (*Pseudotsuga menziesii*), Rocky Mountain Juniper (*Juniperus scopulorum*) and Bluebunch Wheatgrass (*Agropyron spicatum*). On the wetter northern aspects, including the gullies leading down to the marsh, the vegetation grades to include Douglas Fir (*Pseudotsuga menziesii*), Pinegrass (*Calamagrostis rubescens*) and Stepmoss (*Hylocomium splendens*).

Soils on the higher areas of the shoreline consist of moderately-drained glacio-lacustrine silts, with minor amounts of clay and fine sands, likely overlying till at depth. Vegetation includes sedges (*Carex* sp.) in areas subject to seasonal flooding, cattails (*Typha latifolia*), bulrushes (*Scripus* sp.) and horsetails (*Equisetum* sp.). Vegetation in the marsh includes bladderwort (*Utricularia vulgaris*), yellow pond lily (*Nuphar variegatum*) and pondweed (*Potamogeton* sp.).

The marsh area is shallow and seasonally fluctuating water levels result in marsh shoreline areas expanding and contracting as determined by elevation and regional climatic influences. Consequently, areas of marsh sediment are under water during higher water levels and exposed as surface soil during lower water levels. The sediments contain visible organic matter and were observed to have a dark appearance and mucky consistency.

2.3 Climatology

Climate normals for the region were reviewed using meteorological data for the Kootenay National Park West Gate Station (ID 1154410), which is the closest station to the Site. Data used was compiled for the years of 1981 to 2010 from the Canadian Climate Normals (web site address-http://climate.weatheroffice.ec.gc.ca/climate_normals). The average annual precipitation for this station was 341.9 mm of rain and 99.2 cm of snowfall, totalling 441.1 mm. The highest average annual rainfall occurs during the months of May to August and ranges from 40.7 mm to 69.0 mm. The highest average annual snowfall occurs in the months of December and January and ranges from 25.5 cm to 27.2 cm. The average annual daily maximum temperature occurs in July at 25.6^{o}C, and the daily minimum temperature occurs in December and January at -9.7^{o}C. Extreme maximum and minimum temperatures were measured in August 1998 (37.5^{o}C) and December 1968 (-37.8^{o}C).

2.4 Hydrogeology

As stated in a previous section, the Site is located within the Columbia River Valley which is part of the Rocky Mountain Trench. The Columbia River flows northwest through this valley until it reaches the northern end of the Selkirk Mountain Range (Big Bend Country), where it turns sharply and then flows south through the Arrow Lakes and into the United States. The Wilmer Marsh Unit is located in the Columbia Wetlands, and is comprised of approximately seventy percent riverine marshlands and approximately thirty percent uplands bench areas.

The regional topography of the Site is fairly flat across the centre of the uplands bench, sloping steeply downwards on the south, east and northern edges of the bench. The shoreline is

narrow and slopes towards the marshlands; it is bounded by steep slopes leading to the uplands bench to the west. There is evidence across the Site of rilling and erosion due to surface water runoff.

It is anticipated that groundwater in the area of the Site will be consistent with the elevation of the marsh; consequently, groundwater is assumed to be approximately 60 m below grade in the area of the uplands bench at the Site. No groundwater wells have been advanced on the Site and consequently groundwater flow direction cannot be inferred from measured groundwater elevations. Based on local and regional topography, local groundwater beneath the bench is expected to flow in an eastern to northeastern direction towards Wilmer Marsh and the Columbia River beyond.

No water wells were identified on the BC Water Resources Atlas within a 500 m radius of the Site; water wells were identified southeast of the Site in the village of Wilmer. Well records for these wells indicated that the depth to water-bearing gravels was generally more than 30 m below grade in that area.

2.5 Current and Future Land Use

It is anticipated that the future land use at the Site, and ownership, will be the same as the current use as a federally owned NWA. To the best of SLR's knowledge, there is no plan currently, or in the future, to allow the Site to be used for recreational activities.

2.6 Adjacent Land Use

The adjacent lands to the north, east and west are also part of the Columbia NWA. Similar to the Site, it is anticipated that these lands would continue to be federally protected wildlife areas in the future with no allowance for human recreational use.

Westside Road borders the Site to the west and it is anticipated that it will continue to provide vehicle access between the village of Wilmer and lands further north into the future.

The parcel adjacent to the south boundary of the Site (SE ¼ Lot 5, DL 377, Plan X-15) was forfeited to the Provincial Crown in 1989. The adjacent lands to the south are currently undeveloped.

2.7 Applicable Regulatory Guidelines

The Columbia NWA is owned by the Federal Government and administered by CWS. Therefore, the Site falls under federal regulatory jurisdiction which is subject to the Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (CEQG). Provincial regulatory standards, guidelines and protocols have also been utilized for comparison purposes.

2.7.1 Land Use

Applicable regulatory guidelines and/or standards are often based on the current and/or potential land use at a site. In the absence of a wildlands land use designation within the federal guidelines, the Site has been classified as Agricultural (AL), for the following reasons:

- The Canadian Council of Ministers of the Environment (CCME) definition for Agricultural land use "includes agricultural lands that provide habitat for resident and transitory wildlife and native flora."

- The CCME definition for Residential/Parkland land use "excludes wildlands such as national or provincial parks."

- Agricultural land use guidelines tend to be the most sensitive guidelines and thus are considered appropriate in settings such as national parks or conservation areas, where conservatism is warranted.

2.7.2 CCME Guidelines

On the basis of the land use considerations discussed in the preceding section, as well as the proximity of Wilmer Marsh to the Site, the following federal guidelines are considered to apply to the Site:

- CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (Agricultural land use, fine-grained soil type, 10^{-5} incremental lifetime cancer risk level).

- CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life (Freshwater).

- CCME Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (interim sediment quality guidelines and probable effect levels).

- CCME Canada-Wide Standards (CWS) for Petroleum Hydrocarbons (PHC) in Soil (Agricultural land use, fine-grained soil type).

Please note that the CCME soil quality guidelines have been considered applicable to soils that are located above the natural boundary or high water mark of Wilmer Marsh as well as to sediments that are seasonally exposed during periods of low water.

Exposure pathways considered applicable at the Site with respect to the soil guidelines listed above include:

- Direct contact (ingestion, dermal and/or particulate inhalation) by humans;
- Soil contact by ecological receptors;
- Soil and/or food ingestion by ecological receptors;
- Nutrient cycling;
- Protection of groundwater for aquatic life and;
- Management Limit (to prevent formation of non-aqueous phase liquids, fire/explosion hazards, etc).

Although groundwater in the vicinity of the Site is not used as drinking water currently (i.e. there are no registered water wells or surface water intakes within 500 m of the Site), soil quality guidelines protective of human consumption of groundwater have also been referenced in the event that groundwater in the vicinity of the Site is used as a potable water resource in the future.

2.7.3 BC Ministry of Environment

The BC Ministry of Environment (BCMOE) is the provincial environmental regulatory agency responsible for the administration of contaminated sites policy and management. Although the Site does not fall under provincial regulatory jurisdiction, the following provincial guidelines/standards have been considered for comparison purposes:

- Contaminated Sites Regulation (with amendments to 2014);
- BC Approved Water Quality Guidelines and;
- A Compendium of Working Water Quality Guidelines for British Columbia.

Numerous policies, procedures, protocols and guidance documents related to contaminated sites assessment, management and remediation have been published by BCMOE and are available on-line. Specifically, for determining the background soil concentrations of metals parameters at the Site, SLR has referenced BCMOE Protocol 4 (Determining Background Soil Quality).

3.0 PREVIOUS ENVIRONMENTAL WORKS SUMMARY

Numerous environmental works have been conducted at the Site including investigations of soil, sediment and surface water quality and remedial excavation and debris removal programs. The previous environmental investigations are summarized in the sections below. Please note that interpretation of the analytical results from the previous investigations has been completed with respect to current standards/guidelines rather than the guidelines applicable at the time of the original reports.

3.1 Phase 1 Environmental Site Assessment (ESA) and Soil, Sediment and Surface Water Sampling (PWGSC, dated January 2003)

A Phase 1 ESA was completed by PWGSC in 2002/2003 to determine if historical or current land use practices had resulted in any significant environmental impacts at the Wilmer Marsh Unit of the Columbia NWA (larger area including the Site). Based on the information gathered, the entire extent of the Site was identified as an Area of Potential Environmental Concern (APEC) due to the nature and extent of debris evident across the uplands, on the shoreline and in the marsh. A significant amount of waste material (including car bodies, old drums, cans, batteries, scrap metal, broken glass, and asbestos-containing materials) was noted.

PWGSC conducted an investigation of the APEC (i.e. refuse disposal area) in August 2002. Fifteen soil samples were collected at eight locations and select samples analyzed for metals, petroleum hydrocarbon fractions (PHC) F2 to F4, polychlorinated biphenyls (PCBs), and hazardous materials (asbestos). The analytical results indicated the following:

- Asbestos was found in one bulk sample of building materials at the Site (30-50% chrysotile asbestos by volume).
- PHC F3 concentrations in soil sample WMU2 (0.05-0.2 m below ground surface [m bgs]) exceeded the CWS PHC standards for agricultural land use. A sample from WMU2 at 0.55-0.85 m bgs did not exceed the standards.
- Concentrations of metals (specifically, cadmium, hexavalent chromium, copper, lead, tin and zinc) in four soil samples (WMU2, WMU4, WMU5 and WMU7) exceeded the CCME soil quality guidelines for agricultural land use (CCME AL).

PWGSC also collected one sediment sample and one surface water sample during the investigation. The sediment sample was analyzed for metals, PHC F2 to F4, PCBs, and polycyclic aromatic hydrocarbons (PAH). The surface water sample was analyzed for total metals, PAHs and extractable petroleum hydrocarbons (EPH). The analytical results indicated the following:

- Concentrations of arsenic, lead and zinc in the sediment sample exceeded the CCME interim sediment quality guidelines (ISGQ) and/or probable effect levels (PEL).
- Concentrations of cadmium in the surface water sample exceeded the CCME water quality guideline for protection of aquatic life (CCME AW).

The analytical results for soil, sediment and surface water samples which are assumed to still be present at the Site following subsequent remediation activities are presented on Drawings 3 through 5.

3.2 Phase 2 Environmental Site Assessment (SEACOR, dated January 2004)

A Phase 2 ESA was completed by SEACOR (now part of SLR) in 2003/2004 to provide additional characterization of identified contamination areas in the uplands refuse disposal area and to assess additional areas where refuse was visible. Sampling was also conducted to further assess sediment and surface water contamination in the marsh immediately below the refuse area. A geophysical survey was conducted on the uplands bench to assess the potential for buried objects at the Site. Several anomalies were detected during the geophysical survey; one anomaly near the western side of the bench was inferred to be a drum or small tank while other anomalies located across the bench were likely due to miscellaneous metallic surface debris consistent with previous observations of car parts and other metal debris. The Site reconnaissance indicated that despite snow cover of approximately 10 to 15 cm, metal debris was visible on the uplands bench in areas coincident with the geophysical survey results. It was observed that the asbestos debris previously noted on the Site had been removed.

In November 2003, SLR collected a total of twenty-seven soil samples at fifteen locations (HA1 to HA15), eighteen sediment samples at ten locations (MS1 to MS10) and four surface water samples (SW1 to SW4). Select soil, sediment and surface water samples were analyzed for Benzene, Toluene, Ethylbenzene, Total Xylenes (BTEX), PHC F1 - F4, PAH, metals and pH, Volatile Organic Compounds (VOCs), PCBs, glycols, and/or select pesticides/herbicides. The analytical results indicated the following:

- Lead and thallium in two soil samples (HA5 and HA11) exceeded the CCME AL guidelines; tin in one sample (HA2) exceeded the CCME AL guideline.
- Arsenic, cadmium, copper, lead and zinc in sediment (MS2, MS5, MS7, MS8 and MS9) exceeded the CCME ISQG and/or CCME PEL.
- Selenium concentrations in one sediment sample (MS9) exceeded the CCME AL guidelines for soil (compared to soil guidelines due to seasonal fluctuations in water levels).
- Total aluminum, arsenic, cadmium, copper, iron (also dissolved), lead and zinc concentrations in surface water (SW1, SW2 and SW3) exceeded the CCME AW guidelines.

The analytical results from the remaining soil, sediment and surface water samples submitted for laboratory analysis were less than the applicable CCME guidelines. The analytical results for soil, sediment and surface water samples which are assumed to still be present at the Site following subsequent remediation activities are presented on Drawings 3 through 5.

3.3 Supplemental Phase 2 Environmental Site Assessment (SLR, dated March 2009)

Supplemental Phase 2 Environmental Assessment works were conducted at the Site by SEACOR in October 2005. The works were conducted to provide additional characterization of contamination at the Site and to further assess sediment and surface water contamination in the marsh immediately below the refuse area. A geophysical survey was also conducted at the Site to evaluate potential buried debris on the uplands bench. The results of this survey indicated responses that were consistent with piles of debris noted on the surface of the Site. The fence along Westside Road was also repaired to limit access to the Site.

SLR collected a total of nineteen surficial soil samples (HA05-20 to HA05-38), eight sediment samples (MS05-20 to MS05-27) and six surface water samples (SW05-10 to SW05-15) in October 2005. Select soil, sediment and surface water samples were analyzed for BTEX, PHC

F1 - F4, PAH, metals and pH, VOCs, PCBs and/or acid volatile sulfides/simultaneous extractable metals (AVS/SEM, completed in sediment only). The analytical results indicated the following:

- Concentrations of PAH in soil exceeded the CCME AL guidelines at one location (HA05-31.
- Concentrations of tin and lead in soil exceeded the CCME AL guidelines at one location each (HA05-28 and HA05-37, respectively).
- Concentrations of arsenic, cadmium, copper, lead and zinc exceeded the CCME ISQG and/or CCME PEL in five sediment samples (MS05-21, MS05-22, MS05-23, MS05-24 and MS05-25).
- Total aluminum, cadmium and/or iron concentrations exceeded the CCME AW guidelines in two surface water samples (SW05-12 and SW05-14).

The analytical results from the remaining soil, sediment and surface water samples submitted for analysis were less than the applicable CCME guidelines. The analytical results for soil, sediment and surface water samples which are assumed to still be present at the Site following subsequent remediation activities are presented on Drawings 3 through 5.

3.4 2009/2010 Soil and Sediment Sampling Summary

In late 2009 and early 2010, SLR conducted supplemental soil, sediment and surface water sampling as well as other works at the Site. The purpose of the supplemental investigation was to delineate previously noted exceedances on the uplands and in the marsh, as well as to collect soil samples from the steep gullies that had not previously been investigated.

SLR visited the Site in November 2009 to attempt to collect delineation soil, sediment and surface water samples from the uplands and marsh. Due to unsafe weather conditions on the marsh (high winds) SLR was unable to collect the sediment or surface water samples during the November Site visit. A total of thirty four delineation soil samples were collected and submitted for one or more laboratory analyses including metals, PAHs, BTEX and Volatile Petroleum Hydrocarbons (VPH). Laboratory results for all soil samples submitted were less than the applicable CCME standards for the parameters analyzed.

SLR returned to the Site in February 2010 to collect soil samples from five of the steep uplands gullies to assess the soils in these areas where significant debris accumulations were noted. An attempt was made to collect samples from the top of the slope and at two locations downslope. Twenty-one soil samples were collected and submitted for laboratory analysis of BTEX, PHC F1, EPH, PAH and metals. The analytical results indicated the following:

- Concentrations of PAH in one soil sample exceeded the CCME AL guidelines (M-3).
- Concentrations of copper and lead in one soil sample exceeded the CCME AL guidelines (I-1).

During the February 2010 site visit, SLR again attempted to collect delineation sediment and surface water samples from the marsh. Due to the presence of ice on the marsh, surface water samples were not collected, and as the ice was unsafe in certain areas, only limited sediment sampling was conducted. Nine sediment samples were collected and submitted for laboratory analysis of metals. The analytical results indicated the following:

- Concentrations of arsenic, cadmium, copper, lead and zinc in several sediment samples exceeded the CCME ISQG and/or CCME PEL (1S, 1D, 2S, 3S, 3D, 4S, 4D, 5S).

The analytical results from the remaining soil and sediment samples submitted for laboratory analysis were less than the applicable CCME guidelines. The analytical results for soil and sediment samples, which are assumed to still be present at the Site following subsequent remediation activities, are presented on Drawings 3 through 5.

3.5 2010 Geotechnical Assessment

AMEC provided preliminary geotechnical recommendations for proposed remedial works at the Site in January 2010. Clarke Geoscience Ltd. (CGL) was subsequently contracted to provide a more detailed assessment of slope stability conditions in the area of the trail down to the marsh and the proposed debris removal area along the shoreline, as well as provide recommendations for erosion and sediment control measures to be implemented during and after remedial activities. CGL provided the following conclusions and recommendations:

- The slopes at the Site are inherently unstable and prone to slumping, sloughing and failures;

- A cavity (0.3 m wide by 1.5 m deep by approximately 20 to 30 m in length) is present in the central portion of the trail down to the marsh which may be an issue for equipment;

- The movement of equipment up and down the trail to and from the marsh will likely cause further instability in this area as it is prone to sloughing, piping and slumping; the trail must be improved prior to being used for equipment;

- Work during rainy or wet periods is not recommended as it could exacerbate slope stability issues and could be a health and safety concern;

- A slot approach (3 to 4 m wide) would limit slope instability during removal of debris from the shoreline; and

- A geotechnical monitor should be on-Site for the duration of remedial activities involving the trail, shoreline and marsh works.

3.6 2010 Debris Removal - Gullies

Greely Rock Ltd. (Greely) was contracted to remove debris from the steep gullies adjacent to the uplands portion of the Site in February 2010. Debris was removed by hand and transported to the western Site fence using rubber tire wheelbarrows; no equipment was brought onto the Site. The debris was sorted where possible (wood, metal, mixed) into large disposal bins placed between the Site fence and Westside Road. Seventeen bins (111 m^3) of debris were removed from the Site and disposed by Waste Management Corporation.

3.7 2010 Uplands and Marsh Draft Risk Assessments

In late 2010 and early 2011, SLR completed a draft Site Specific Human Health and Ecological Risk Assessment (SSHHERA) for the uplands area, as well as a draft Screening Level Risk Assessment (SLERA) for the marsh area. Both risk assessments were undertaken to determine data gaps and potential ecological and human health risks at the Site in an effort to determine

the most appropriate and least invasive remediation and/or risk management options. The results of the draft SSHHERA for the uplands indicated that source removal of the remaining debris would result in a low potential risk for human and ecological receptors, with no further remedial work required in this area. The results of the marsh SLERA indicated sediment and toxicological data gaps; a supplemental work program was proposed to close these gaps.

The SSHHERA for the uplands area and the SLERA for the marsh area were subsequently updated in 2012 and 2013, respectively, and are discussed in further detail in Sections 3.12 and 3.13.

3.8 2010/2011 Supplemental Site Investigations

SLR conducted a sediment sampling program at the Site in August 2010 to delineate previously identified sediment contamination at the Site, to address data gaps identified in the draft SLERA for the marsh, and to support future risk assessment work. Sediment and surface water samples were collected from forty five locations along the marsh (including two background locations). A total of fifty seven sediment samples (including six blind field duplicates) were submitted for analysis of metals, PAH, BTEX, PHC F1-F4 and/or AVS/SEM. A total of thirty surface water samples (including four blind field duplicates and one field blank) were submitted for analysis of total and dissolved metals, BTEX and/or PHC F1-F4.

In March 2011, additional sediment samples were obtained in areas where the depth of water had previously limited sample collection. A total of thirteen sediment samples were collected from five locations and submitted for analysis of metals, PAH and/or PHC F2-F4. No surface water samples were collected as the marsh was frozen.

The results of the August 2010 and March 2011 sediment and August 2010 surface water sampling programs indicated the following:

- Concentrations of metals and PAH in numerous sediment samples exceeded the CCME ISQG and/or CCME PEL.
- Concentrations of arsenic in two background sediment samples exceeded the CCME ISQG (BG2-10 and BG2-20).

The analytical results for sediment and surface water samples which are assumed to still be present at the Site, following remediation activities at the Site, are presented on Drawings 3 through 5.

3.9 2011 Marsh Foreshore Remediation Program

Based on the results of the sediment and surface water investigations in the marsh area and the observed presence of significant debris along an approximate 60 m length of the marsh shoreline which was eroding into the marsh, SLR recommended the completion of a remedial excavation to remove the debris. Quantum Remediation, a division of Quantum Murray LP (QMLP), conducted the excavation of the marsh foreshore in February and March of 2011. The objective of the remedial works was to:

- remove approximately 300 m^3 of debris and impacted foreshore soils from a 60 m section of foreshore along the marsh;

- remove approximately 35 m^3 of exposed impacted sediment directly adjacent to the foreshore along the marsh; and

- remove approximately 20 m^3 of debris and impacted sediment and debris from four previously identified areas within the marsh adjacent to the foreshore. These four areas consisted of three known areas of large debris accumulation (i.e., portions of car bodies) and one location where a tank was visible.

Prior to the remedial work commencing on the Site, an Environmental Monitor conducted a detailed wildlife survey as required under the CWS permit for the project. No wildlife issues were identified. Per the CWS permit conditions, SLR also provided a Geotechnical Contractor to monitor slope stability and an Environmental Monitor for the duration of the remedial work program.

The remedial excavation was carried out using specialized low-impact excavators (spider hoes) to excavate the material and helicopters to transport materials between the foreshore area and the staging area adjacent to Westside Road. All debris and materials excavated were transported to the Regional District of East Kootenay Columbia Valley Landfill for disposal.

Following the excavation and removal of all debris, soil samples were collected from the excavation limits; a total of thirty seven soil samples were collected from the excavation limits and were submitted for analysis of metals, PAH and/or PHC F2-F4. One soil sample (FS15-1) collected from the limits of the excavation exceeded the applicable guidelines for tin.

Upon completion of the foreshore excavation, fill materials consisting of a mixture of silt, sand and gravel were transported to the foreshore area and the excavation was backfilled and compacted to ensure a stable base for the upper slope. Jute/coir was interwoven with willow stakes which were used for stabilization and the area was then overlain with topsoil from a nearby supply area (outside the NWA) and jute. The upper slopes were re-seeded with a mix of annual stabilizing species and native perennials; the lower slopes were left to naturally re-vegetate with riparian species.

3.10 2011/2012 Supplemental Site Investigations

SLR conducted a sediment sampling program at the Site in August 2011. The purpose of the sediment sampling was to obtain samples from the marsh area for toxicity testing to evaluate the potential for adverse effects to aquatic life in the marsh. SLR collected eight sediment samples at locations where residual refuse was present and where contamination was previously identified; three background samples were also collected. Sample locations were selected to provide a range of contaminant concentrations representative of conditions in the marsh. The samples were submitted to Nautilus Environmental for toxicity tests using *Hyallela azteca*, *Chironimus tentans*, and *Tubifex tubifex*, which were selected to provide a range of chronic and acute endpoints. Sub-samples were submitted to ALS Environmental for the analysis of chemical and physical parameters. The results of the August 2011 soil sampling indicated the following:

- Concentrations of tin in two samples (BF-03 and BF-04) exceeded the CCME AL soil guideline (compared to soil guidelines due to seasonal fluctuations in water levels).
- Concentrations of PAH in two samples (TOX1 and BF-03) exceeded the CCME ISQG.
- Concentrations of arsenic, cadmium, copper, lead and zinc in sediment exceeded the CCME ISQG and/or CCME PEL in numerous samples.

The results of the sediment toxicity tests did not identify any clear relationships between contaminant concentrations in sediment and adverse effects to toxicity test organisms.

As previously stated, the draft SSHHERA completed for the uplands bench in March 2010 indicated that source removal of the remaining debris would result in a low potential risk for human and ecological receptors. Removal of debris from the uplands would also deter future dumping in this location and remove physical hazards to ecological receptors. SLR was retained to oversee the removal of remaining debris from the uplands bench in support of the uplands SSHHERA. Debris removal works were conducted in November 2011 by King Hoe Contracting Ltd. (King Hoe) and consisted of removing the majority of the large debris piles, picking up scattered debris by hand, and hauling five car bodies and a partial car body up from a gully. Debris removed from the uplands included: car bodies; partial car bodies; car pieces (e.g., doors, fenders, engine blocks, engine pieces) and other metal debris that appeared to have been associated with automobiles; numerous tin cans of varying sizes (most too rusted to be able to discern what they previously contained, though some were the size and shape of historical oil cans); carpeting; bed frames; metal plumbing piping; asphalt shingles; treated (construction) wood; glass and plastic bottles/jars; pieces of glass; pieces of plastic (use indiscernible); wire (type used for fencing); rubber tires; empty metal barrels; and other unidentifiable pieces of non-natural materials. As well, two pipes covered with suspected asbestos were identified and bagged for appropriate disposal. Two bins of miscellaneous debris totalling approximately 15 m^3 were removed from the uplands bench; this did not include the car bodies that were also removed.

Additional debris was also removed from a location just north of the Site on the opposite side of Westside Road. Several large piles of garbage/debris were removed from this area; one bin (approximately 8 m^3) of debris was transported from this area for disposal. The types of materials encountered included: empty plastic pails; the remnants of a pickup truck bed topper; carpeting; pallets; construction (treated) wood; drywall; bed frames; a damaged flat screen television; and general household garbage.

All materials removed from the Site and the additional area was sent to the Regional District of East Kootenay Columbia Valley Landfill for recycling and/or disposal where appropriate.

Upon completion of all works at the Site, the fence was repaired, the man-gate access to the Site was blocked using large pieces of wood that were screwed across the entrance, and signs were installed indicating access to the Site is prohibited.

During debris removal activities at the Site, a mound of previously unidentified debris, approximately 2.5 m down a steep slope immediately above the marsh, was located on the eastern part of the uplands bench. This material was not removed due to the likelihood of it being quite unstable. No mitigation strategy was readily available to prevent disturbed materials from falling down the slope into the marsh at that time. Furthermore, equipment capable of removing the material in a safe manner (i.e. large excavator with a reach greater than 8 m) was not present at the Site in November 2011. As such, it was recommended that this material be removed prior to any further works proposed for the marsh.

3.11 2012/2013 Supplemental Site Investigation

Due to on-going concerns regarding unauthorized human access to the Site, the fence bordering Westside Road was replaced in Fall 2012 by One Time Fencing of Briscoe, BC. A number of the original fence posts were salvaged therefore limiting the number of new posts

required. The fence was constructed as a seven strand, smooth wire fence to allow for the passage of wildlife. In addition, new signage was placed along the fence, in particular at the historical access gate.

King Hoe returned to the Site in November 2012 to remove the additional debris identified during the November 2011 site works. Soil and debris was excavated as far down slope as safely possible; where out of reach of the excavator arm and bucket, debris was handpicked and thrown upslope. Some debris that couldn't be reached safely by hand, or would result in loss of stability of the slope, was left in place. Silt fencing was installed below the excavated area to mitigate any movement of soil and remaining debris. As part of the November 2012 site works, King Hoe returned to the area north of the Site to collect additional garbage that had been dumped following clean up in November 2011. Approximately 240 m^3 (13 loads) of debris were transported from the gully area and from the area across Westside Road for disposal. The types of materials encountered included: glass bottles, cans, metal debris, wood debris, roofing material, plastics, bricks, and other miscellaneous household garbage.

SLR reviewed the restoration progress along the marsh shoreline in November 2012. A number of pieces of metal and debris were observed during the site visit as there was no ice or snow present to obscure the view. No slumping was observed following disturbance at the toe of the slope. Matting had retained soil and vegetation growth was noted as good in this area.

In early December 2012, Focus Corporation conducted staking of the provincial/federal boundary at the Site. In February 2013, AKS Geoscience Inc. (AKS) conducted a geophysical survey (EM 31/38 survey) of the marsh adjacent to the previously excavated foreshore area and along the trail to the marsh area. The EM survey was started at the federal/provincial boundary marker at the south end of the marsh and completed just north of the previously remediated shore area. Anomalous readings indicative of metallic debris were identified in discrete areas of the marsh and in several areas along the trail, including one very extensive area. Based on the staked location of the federal/provincial boundary, it was confirmed that the majority of the anomalous EM readings noted along the trail fall within the boundaries of the federal land.

During the February 2013 site visit, running water was heard below the ground surface at one section of the trail. The location was noted for future assessment.

3.12 2012 Update to Site Specific Human Health and Ecological Risk Assessment

The SSHHERA for the uplands area of the Site was updated following the debris removal works in November 2012. The SSHHERA indicated the following:

Human Health Risk Assessment (HHRA)

- Human receptors of concern (ROC) included adult and teenaged trespassers and EC/CWS personnel. The teenaged trespasser was considered to be the surrogate receptor for the human ROC.
- Contaminants of potential concern (COPCs) retained with respect to the HHRA included:
    - Cadmium;
    - Hexavalent Chromium;
    - Lead;
    - Thallium;
    - Tin;
    - Zinc; and

    - Pyrene.
- Potentially complete exposure pathways for the human ROC included incidental ingestion of soil, dermal contact with soil and inhalation of fugitive dust.
- Hazard quotients (HQs) and incremental lifetime cancer risks (ILCRs), as well as cumulative exposure to non-carcinogenic and carcinogenic COPCs, were less than the risk based standards (i.e. 0.2 for non-carcinogenic risks and 1E-05 for carcinogenic risks).

Ecological Risk Assessment (ERA)

- Ecological ROCs evaluated in the ERA included:
    - Invertebrates;
    - Plants/trees;
    - Granivorous, invertivorous and omnivorous birds;
    - Herbivorous, invertivorous and omnivorous mammals; and
    - Carnivorous reptiles.
- COPCs retained with respect to the ERA included:
    - Hexavalent chromium;
    - Copper;
    - Lead;
    - Thallium;
    - Tin;
    - Zinc;
    - PHC F3;
    - Benzo[a]pyrene;
    - Dibenz[a,h]anthracene, and;
    - Indeno[1,2,3-c,d]pyrene.
- Potentially complete exposure pathways for the ecological ROC included direct contact with soil (all ROC) and ingestion of food items (wildlife ROC).
- Potentially unacceptable risks to soil invertebrates from exposure to PHC F3 and hexavalent chromium were identified. However, based on the spatial extent of the PHC F3 contamination and the low magnitude of the hexavalent chromium exceedances relative to the soil invertebrate toxicity reference value, these parameters were determined to pose a low risk to soil invertebrates at a population level.

Based on the results of the HHRA and ERA discussed above, no additional remedial works were recommended for the uplands area.

3.13 2013 Detailed Quantitative Ecological Risk Assessment

Following the remediation of the marsh in 2011 and the supplemental sediment investigation (sediment sampling and sediment toxicity testing), SLR updated the SLERA for the marsh portion of the Site through the completion of a detailed quantitative ecological risk assessment (DQERA). The DQERA was submitted to Fisheries and Oceans Canada (FOC) and EC Expert Support for review and comment in March 2013. Following receipt of the FOC and EC review comments, the DQERA was finalized in October 2013. The DQERA indicated the following:

- Ecological ROCs identified for the marsh area included:
    - Phytoplankton, periphyton and macrophytes;
    - Benthic invertebrates;
    - Pelagic invertebrates;

  - Benthivorous, planktivorous and piscivorous fish;
  - Carnivorous amphibians;
  - Omnivorous reptiles;
  - Herbivorous, omnivorous, invertivorous, piscivorous and carnivorous birds; and
  - Herbivorous, omnivorous, piscivorous and carnivorous mammals.
- The following surrogate ROC were selected for evaluation in the DQERA:
  - Benthic invertebrates, Green Frog, Painted Turtle and Muskrat.
- COPCs retained with respect to the DQERA included:
  - Sediment: PHC F4 (aromatic subfraction), barium and tin;
  - Soil: no COPCs retained;
  - Surface Water: no COPCs retained.
- Potentially complete exposure pathways included direct contact with sediment (all ROC) and ingestion of food items (wildlife ROC).
- The results of the DQERA did not identify unacceptable risks to ecological receptors as a result of residual contamination within the marsh.
- The DQERA indicated that further debris removal within areas identified by the EM survey may improve marsh conditions and reduce uncertainties surrounding the presence of metals in the marsh.

4.0 2013/2014 SUPPLEMENTAL SITE INVESTIGATION

4.1 Objectives

The objectives of the 2013/2014 supplemental site investigations at the Site included the following:

- Locate, delineate, and quantify debris and associated soil contamination (if present) identified during the geophysical survey completed in February 2013.
- Complete a geotechnical assessment of the trail area to determine its ability to sustain disturbances during the activities indicated above and during potential future debris removal activities.
- Collect water samples in the trail area during spring melt where there is a potential pathway to the marsh.

4.2 Scope of Work

The following scope of work was developed based on Environment Canada's Terms of Reference dated June 2013:

- Application for a permit from CWS to conduct intrusive investigations in the trail area and liaison with Fisheries and Oceans Canada (FOC) to discuss the proposed program.
- Completion of an initial site visit with the geotechnical consultant (CGL), SLR's Environmental Monitor and the excavation contractor (SPIDEX All Terrain Excavating) to:
    - assess slope stability and evaluate geotechnical restrictions on completing the proposed test pitting program;
    - assess equipment access to the proposed investigation areas and any potential restrictions on completing the proposed work;
    - evaluate any potential restrictions related to wildlife considerations.
- Preparation of a site-specific Health and Safety Plan.
- Verification of potential utilities in the area of the Site through BC One Call prior to the proposed work.
- Coordination with a fencing contractor to allow temporary equipment access through the fence along Westside Road.
- Advancement of fourteen test pits to a maximum investigated depth of 4.5 m bgs using a spider hoe excavator supplied and operated by SPIDEX All Terrain Excavating.
- Review of the test pitting program by the geotechnical consultant (CGL) to provide guidance on slope stability, maximum test pit depths, closure of test pits for stability and requirements for erosion control measures (if any).
- Review of the test pitting program by SLR's Environmental Monitor to document any species at risk or sensitive species and identify any potential impacts to wildlife at the Site.
- Collection of soil samples (including blind field duplicates) at regular intervals during test pit advancement and submission of select soil samples to the project laboratory (ALS

Environmental) for analysis of potential contaminants of concern (PCOCs) including BETX, PHC F1-F4, PAH, metals, total organic carbon content and grain-size.

- Installation of pre-packed piezometers to intercept groundwater (including perched or seasonal groundwater) where encountered during test pit excavation.
- Collection of water samples from the trail area during periods of significant snowmelt to assess presence of PCOCs in surface runoff or groundwater (if encountered during test pitting).
- Collection of additional surficial soil samples in eight locations along the southern edge of the uplands bench using a hand auger to supplement data for the uplands SSHHERA and to reduce some of the uncertainties noted in the SSHHERA.
- Documentation of test pit locations using UTM coordinates, photographs and videos.

4.3 Project Permitting

SLR began discussions with personnel from CWS in July 2013 regarding the proposed test pitting activities along the access trail. A permit (BC-13-0041) for the test pitting program was received from CWS in August 2013. A copy of the permit is provided in Appendix A.

4.4 Initial Site Visit

On August 12, 2013, personnel from SLR, CGL and SPIDEX met on-site to discuss feasibility of advancing test pits in the anomalous areas identified by the geophysical survey in February 2013. Slope integrity, damage to sensitive vegetation and access were discussed.

As a result of information collected during the site visit, CGL determined that:

- The test pit locations are situated within highly erodible soils which may be accelerated by repeated passage by heavy equipment.
- Slope integrity is unlikely to be compromised by shallow test pit excavations.
- Test pit works should occur during a period of dry or frozen ground conditions.
- Test pits should be closed following examination and grading should occur to reduce the occurrence of surface runoff.
- An on-site monitoring plan should be implemented during test pit works.

The CGL report dated September 12, 2013 has been included in Appendix B.

4.5 Test Pit Investigation

SLR, CGL and SPIDEX were present at the Site on October 28 and 29, 2013 to conduct the test pit investigation of the trail. One Time Fencing provided temporary access to the Site via the fence along Westside Road (Photo 1). Invermere Sales and Rentals provided a portable toilet for use by site personnel near the fence access point; per instructions from CWS, a sign was placed on the portable toilet indicating it was for use by on-site workers only. On the morning of the second day of investigations (October 29), the portable toilet was observed to have been pushed over and moved towards the fence (Photo 22). Obvious damage was observed on the outside of the portable toilet.

Test pit locations were concentrated within the areas of anomalous response measured during the geophysical survey performed by AKS Geoscience in February 2013. Throughout the test pit works, the SLR Environmental Monitor and CGL were present to provide guidance on equipment access/egress routes to minimize disturbance to soils and potential wildlife and to review slope stability during and following test pit excavation.

4.5.1 Field Observations

Investigation Locations

SLR used the maps compiled by AKS Geoscience in February 2013 to locate the areas of anomalous responses along and downslope of the trail noted during the geophysical survey. To ensure that the area of response as indicated on the map was located accurately on the ground, SLR downloaded PDF Maps by Avenza Systems Inc., an application for iPhone, that allows the user to download a map and see their placement on the map using the cellular phone as a Global Positioning System (GPS).

Investigation locations were recorded using a Trimble GeoExplorer 6000 Series GPS unit. Following excavation, all test pits were marked with a stake and flagging tape. The following table lists the UTM coordinates for the test pit locations and other areas assessed during the October 2013 site works. Investigation locations are also depicted on Drawing 2.

Table A
Investigation Locations

Investigation Location	Easting	Northing
TP1	565887.68	5600202.75
TP2	565895.22	5600188.58
TP3	565896.35	5600206.94
TP4	565884.07	5600199.62
TP5	565913.57	5600198.30
TP7	565894.15	5600194.95
TP6	565920.14	5600176.53
TP8	565916.41	5600169.27
TP10	565951.82	5600106.73
TP11	565944.36	5600095.84
TP12	565900.15	5600141.40
TP13	565871.91	5600203.62
TP14	565872.90	5600210.77
Surficial Debris Assessed	565851.56	5600190.35
Cavity Test Area	565927.26	5600154.02
Cavity Identified	565931.64	5600147.76
Water Channel outlet	565927.04	5600139.25
RA1	566010.56	5600155.15
RA2	565984.65	5600165.82
RA3	565960.96	5600178.10
RA4	565942.02	5600192.46

Investigation Location	Easting	Northing
RA5	565918.62	5600208.98
RA6	565892.00	5600218.32
RA7	565867.74	5600239.51
RA8	565845.42	5600248.38

Environmental Monitor Observations

The field observations noted by SLR's Environmental Monitor are presented in the summary memo included in Appendix D.

Soil Observations

Detailed test pit logs are included in Appendix I and are summarized below with reference to applicable photographs following the report text.

Test Pit 1 (TP1) – This test pit was established at the top of the trail at the northwest end of the large anomalous response (Photo 2). The excavator scraped the surface at TP1 to 0.5 m bgs (Photo 3). Minor debris was observed. A soil sample was collected at this depth. Excavation continued to 3 m bgs (Photo 4) with samples collected at 1 m bgs, 2 m bgs and 3 m bgs. Only minor debris was observed throughout. The soil material was noted to be mostly disturbed soil/fill and not native material.

Test Pit 2 (TP2) – This test pit was established on the south edge of the trail within an area of anomalous response (Photo 5). Excavation of cover material occurred up to 2 m bgs (Photo 6). Three samples were collected at 0.5 m bgs, 1 m bgs and 2 m bgs. At approximately 2.5 m, metal debris was encountered (Photo 7). This continued to 4.5 m (Photo 8). Excavation was halted at this depth. An additional two soil samples were collected at 3 m bgs and 4 m bgs.

Test Pit 3 (TP3) – This test pit was established upslope of the trail as there was indication of anomalous response in this area (Photo 9). Soil samples were collected below surface at 0.5 m bgs and again at 1 m bgs. Native material was encountered at 1 m bgs (Photo10). Soil above this was mostly disturbed soil/fill material with minor debris likely deposited from the bench above.

Test Pit 4 (TP4) – This test pit was established upslope of TP1, adjacent to the area of anomalous response, to confirm an absence of debris in this area (Photo 11). Soil in the area was observed to be native material (Photo 12). One sample was collected at 0.5 m bgs.

Test Pit 5 (TP5) – This test pit was established upslope of the trail to the east of TP3 (Photo 17). Only native soil was observed (Photo 18). One soil sample was collected at 0.5 m bgs.

Test Pit 7 (TP7) – This test pit was located within the trail adjacent to TP2 due to the volume of debris observed in TP2 (Photo 13). Debris was observed at 0.5 m bgs (Photo 14) to a depth of 4 m (Photo 16). Debris was estimated at 60% to 40% soil (by volume). Vehicle parts and other metal debris were observed throughout (Photo 15). Samples of soil were collected at 0.5 m bgs, 1 m bgs, 2 m bgs, 3 m bgs and 4 m bgs.

Test Pit 6 (TP6) and Test Pit 8 (TP8) – These test pits were located downslope along the trail (Photo 19). TP6 was advanced in an area of humped soil to determine if debris was present;

the area was mostly disturbed soil/fill with a minor amount of metal debris. One sample was collected at 0.5 m bgs. A second test pit (TP8) was advanced towards the trail from TP6 to determine if metal debris in larger volumes was present as indicated by the geophysical survey but not identified in TP6. Within the first 0.5 m bgs, debris was encountered (Photo 20). Debris continued to be observed down to 4 m. Excavation was halted at this point (Photo 21). Samples of soil were collected at 0.5 m bgs, 1 m bgs, 2 m bgs, 3 m bgs and 4 m bgs.

Test Pit 9 (TP9) – This test pit was established in a mounded area along the trail. The mound was scraped with the excavator bucket to assess potential debris; only disturbed soil/fill was observed. No samples were collected.

Test Pit 10 (TP10) – This test pit was advanced along an upper bench at the base of the lower trail (Photo 27). Excavation continued to a depth of 3 m bgs (Photo 28). No debris was found from surface to 3 m bgs. Soil appeared to be comprised of disturbed native soil. A sample was collected at 0.5 m bgs.

Test Pit 11 (TP11) – This test pit was established south of TP 10 in an area of anomalous response (Photo 29). Within the first 2 m bgs metal debris was found. Native soil was noted at 2.3 m bgs. A longer strip was excavated at TP11 to determine the full extent of the debris. Additional debris was observed within the area of the elongated test pit (Photo 30). Excavation was stopped at 2.3 m depth. Three samples were collected at 0.5 m bgs, 1 m bgs and 2 m bgs.

Test Pit 12 (TP12) – TP12 was located downslope of TP6 and TP8 in an area of anomalous response (Photo 31). The area of response was tested in three areas for potential debris. Only disturbed soil/fill and some tires were excavated (Photo 32). Excavation was stopped at 3 m depth. Samples were collected at 0.5 m bgs and 1 m bgs. Based on the presence of metal debris on the slope surface around TP 12, it is likely that the response originates from the surface debris (Photo 33). Upon closer observation, it was noted that some of the large embedded debris in the slope had been used by wildlife in the past as dens (Photo 34). Bedding and tracks were observed in and around the debris cavities.

Test Pit 13 (TP13) and Test Pit 14 (TP14) – An area of piled soil was observed west of TP1. This area was excavated in two locations, one at the base (TP13) (Photo 36) and at an upper area of the soil pile (TP14) (Photo 37). One sample was collected at a depth of 0.5 m bgs at both locations. No obvious debris was observed in this soil pile; surficial debris was observed which was likely deposited from the bench above.

Based on the test pit observations, SLR identified three areas of highest debris density along the trail and south of the trail (Areas of Impact 1 through 3 depicted on Drawing 2). Debris encountered was predominantly metal (vehicle parts, vehicle frames, mattress frames, appliances etc.). Tires, glass, and some plastic were also encountered. Soil excavated from each test pit was placed back in the test pit and contouring of the disturbed soil was conducted.

SLR visually assessed an area of anomalous response in the gully downslope from TP4. Surficial metal debris was noted in the area (Photo 35) which likely resulted in the anomalous response. No excavation was conducted at this location.

SLR collected an additional eight surficial soil samples (RA1 through RA8) along the south edge of the uplands bench using a hand auger to supplement the data in the area and to reduce uncertainties noted in the SSHHERA.

Groundwater/Surface Water Observations

During the test pitting program in October 2013, SLR evaluated an area where water had been heard beneath the trail in February 2013. No anomalous response was noted in the area during the February 2013 EM survey. The area was excavated to determine the origin of the suspected water (i.e. whether a subsurface cavity transmitting surface runoff or perched/seasonal groundwater) (Photo 23). The excavator removed soil at the location of the cavity until an obvious chamber was discovered on the south side of the trail (Photo 24). The chamber was further excavated and determined to flow north/south across the trail (Photo 25). The outlet of the channel was located downslope between the upper and lower trails (Photo 26). The outlet location was recorded for potential water sampling in the future and the excavation was backfilled following examination. No groundwater was observed in the area of the cavity.

Soils in the trail area were observed to be very dry during the test pitting program. No evidence of groundwater was noted during the investigation. Consequently, pre-packed piezometers were not installed in any of the test pits.

Site Restoration Observations (Previously Excavated Areas)

During the 2013 site works, SLR also reviewed the current conditions in areas previously remediated. SLR assessed and photo-documented seven areas. SLR subsequently compared the 2013 photographs to photographs taken at the time of remediation.

Location 0565811E, 5600294N - Cleanup of debris from a small pit occurred in 2011 (Photo 41). The area was noted to have vegetation in 2013 (Photo 42).

Location 0565875E, 5600301N – Cleanup of debris within a wood pile occurred in 2011 (Photo 43). The conditions observed in 2013 are documented in Photo 44.

Location 0565018E, 5601261N – Cleanup of a wood pile at edge of clearing. Left woody debris in place in 2011 as cover (Photo 45). The conditions observed in 2013 are documented in Photo 46.

Location 0565876E, 5600295N – Cleanup of car bodies on slope. A number of car bodies removed using a crane in 2011 (Photo 47). No obvious signs of slope integrity loss were noted in 2013 (Photo 48).

Location 0565901E, 5600278N – Cleanup of a larger gully with metal debris, tree stumps and automobile parts in 2011 (Photo 49). The area was noted to be stable and re-vegetating in 2013 (Photo 50).

Location 0565809E, 5600309N – Cleanup of a small area of metal debris (old cans) in a smaller gully (Photo 51). The conditions observed in 2013 are documented in Photo 52.

Location 0565971E, 5600234N – Cleanup of a large gully occurred in 2012. Silt fencing was erected following the cleanup to reduce sediment loss to the gully and sensitive, restored wetland shore below (Photos 53 and 55). The area was assessed again in 2013 (Photos 54 and 56). Silt fencing will require replacement but is holding sediment well at this time. Re-vegetation is slow but no major loss of sediment was observed. This gully will require installation of stability measures and re-vegetation assistance in the future.

Geotechnical Observations

The field observations noted by CGL are presented in the report dated November 21, 2013 provided in Appendix C and are summarized below.

- No adverse effects associated with slope stability were experienced during the test pitting program.
- There is a potential that the large void (approx. 10 m^3) located below the access trail may collapse.
- There is a concern that soil disturbance on the steeper slopes and along the trail will lead to surface erosion and gullying along the sloping soil surfaces. It is unlikely that mobilized sediment will reach Wilmer Marsh. However, undue gully erosion would have an undesirable effect on the area.
- The total surface area affected by soil disturbance is 135 m^2 and is comprised of the following areas:
    - TP 3 area = 10 m^2 ; steep (70%) slope;
    - TP 6 area = 15 m^2 ; steep (70%) slope;
    - TP 5 area = 10 m^2 ; steep (70%) slope;
    - TP 7 area = 100 m^2 ; moderately steep (30%) slope.

CGL also provided the following erosion and sediment control recommendations for the disturbed areas noted above:

- To provide temporary cover to protect the slope from rain splash erosion and to check surface flow across the slope, a coconut fibre mat cover is recommended.
    - The matting would provide mulch and will protect surface soils until grasses establish.
    - The matting should be natural and biodegradable.
    - The mat should have good contact with the underlying surface (tamp down) and should be installed on the slope, top to bottom, with overlapping edges and pinned in place (install as per manufacturers recommendations). Due to the loose nature of the soils, the pins should be at least 50 cm long.
    - The uphill end of the mat should be buried in a trench at least 300 mm deep and the backfill should be compacted. This will help ensure that water flows over top of the mat and not underneath.
    - In addition, coarse woody debris (CWD) should be scattered over the surface. This will provide a rough surface to aid the establishment of vegetation cover, will reduce runoff velocity, increase surface infiltration and will trap sediment on the slope. CWD is not abundant at the Site but there is some woody debris and some fallen branches in the nearby gully.

CGL noted that the onset of winter conditions prevented the implementation of the above-listed measures immediately following the test pitting program. CGL recommended the installation of the erosion control measures in early Spring 2014.

4.5.2 Analytical Results

The analytical results for the subsurface investigations in the trail area and uplands bench are discussed below. The detailed analytical chemistry report is included in Appendix J.

Trail Area

A total of 31 soil samples (including three blind field duplicates) were submitted to ALS Environmental for analysis of metals, PAH, BTEX, PHC F1-F4, grain size and/or total organic carbon content. The analytical results are presented in Tables 1 through 4 and are summarized below:

- Based on the grain-size distribution of the samples analyzed, the soils in the trail area are considered to be fine-grained.
- Total organic carbon ranged between 0.12% and 1.54% for the samples submitted.
- BTEX and PAH concentrations were below the CCME AL guidelines for all samples submitted.
- PHC F1-F4 concentrations were below the CWS PHC standards for all samples submitted.
- pH values were above CCME AL guidelines for all samples submitted except for TP7-4; however, the pH values at the Site are expected to reflect background concentrations.
- Concentrations of cadmium, lead, nickel, tin and/or zinc exceeded the CCME AL guidelines in TP2, TP7 and TP8. The metals exceedances were delineated vertically to surface (i.e. non-contaminated soil is present overlying the metals exceedances) but were not delineated vertically with depth due to equipment and geotechnical restrictions. The exceedances were laterally delineated by other test pits advanced in the trail area.

Uplands Bench

Nine soil samples (including one blind field duplicate) were also submitted to the project laboratory for analysis of metals, PAH, BTEX, PHC F1-F4, grain size and/or total organic carbon content. The analytical results are presented in Tables 1 through 4 and are summarized below:

- Based on the grain-size distribution of the samples analyzed, the soils in the uplands bench area include both fine-grained and coarse-grained soils.
- Total organic carbon ranged between 0.32% and 1.26% for the samples submitted.
- BTEX and PAH concentrations were below the CCME AL guidelines for all samples submitted.
- PHC F1-F4 concentrations were below the CWS PHC standards for all samples submitted.
- pH values were above CCME AL guidelines for the samples analysed.
- Cadmium, lead, mercury, tin and/or zinc exceeded the CCME AL guidelines in two soil samples located immediately above the main debris zone in the trail (i.e. RA5 and RA6).

Quality Assurance/Quality Control

Two stages of QA/QC were completed for the intrusive investigations at the Site: one by ALS and the other by SLR. A detailed discussion of the QA/QC procedures and results is provided in Appendix H.

Based on a review of the laboratory QA/QC data summary and the relative percent differences calculated for the soil samples and the corresponding blind field duplicate samples submitted by SLR, the laboratory QA/QC data and the analytical data were considered acceptable.

4.6 Surface Runoff Investigation

As discussed in Section 4.5, groundwater was not encountered during the test pitting investigation in October 2013. SLR returned to the Site in March 2014 to evaluate surface runoff in the trail area, particularly in the vicinity of the cavity and outlet which was identified in October 2013. The site visit was scheduled to coincide during a period of predicted above zero daily temperatures (i.e. daily low greater than 0 ˚C), similar to the climatic conditions in February 2013 when the sound of running water was noted in the trail.

SLR was present at the Site on March 10 and 11, 2014. Although snow was observed in shaded parts of the Site (i.e. gully to the south of the trail), very little snow was present in the trail area at the time of the site visit. It is anticipated that the slope aspect (steep, south-facing slope) and very warm climatic conditions over the two days prior to the site visit resulted in significant snowmelt prior to SLR's arrival at the Site. Consequently, no viable surface runoff samples could be collected.

The soils in the area of the outlet were observed to be saturated suggesting that runoff had recently occurred (refer to Photo 57). Based on field observations, runoff from the outlet was observed to continue along the lower branch of the trail (Photos 58 and 59) and then pool in the gully at the base of the slope (Photo 60) where it appeared to infiltrate the soil rather than travelling further east overland toward the marsh. Based on field observations, it is expected that snowmelt will either infiltrate the underlying soils or collect at the bottom of the gully and subsequently infiltrate the soil. No evidence of migration of surface runoff from the trail area to the marsh was observed. Consequently, surface runoff is not considered to be a direct mechanism of migration of potential contamination from the trail area to the marsh.

Although groundwater has not been investigated at the Site, it is SLR's opinion that impacts to groundwater at the Site are likely minimal for the following reasons:

- With the exception of the trail area, the contaminant source zones in the uplands bench are highly localized spatially (in area and with depth) and are unlikely to contribute significant contaminant mass to the groundwater.
- Although a more extensive debris deposit was identified in the trail area, the soil contamination associated with the debris was spatially localized. If soil concentrations are assumed to be an indicator of relative contaminant mass in pore water (and subsequently groundwater), then extensive groundwater contamination is unlikely.
- The type of contamination (i.e. primarily metallic solid waste) requires that contaminants be leached to soil pore water (through direct contact) or released from soil into pore water (via partitioning) before migration to groundwater can occur. The extremely dry soil conditions observed at depth in the trail suggest that there is limited pore water present at depth which can then migrate to the groundwater.
- Area of Impact 3 is located approximately 15 m above the anticipated regional groundwater surface (assumed based on the elevation of surface water in the marsh) while Areas of Impact 1 and 2 are located between 40 m and 50 m above the anticipated regional groundwater surface. The uplands bench is 60 m above the anticipated regional groundwater surface. Based on the depth to the anticipated regional groundwater surface below the contaminant source zones, as well as the soil conditions at the Site (fine-textured glaciolacustrine soils), it is anticipated that very limited migration of contamination to the groundwater will occur.

On this basis, further evaluation of groundwater at the Site is not considered warranted.

5.0 REMEDIAL ACTION PLAN

Per the Terms of Reference for the project (dated June 2013), EC requested the development of a Remedial Action Plan (RAP) for the trail and marsh areas of the Site based on the previously recommended remedial excavation option (SLR, 2013).

The following sections provide background information on the areas of environmental concern (AECs) at the Site and details of the selected remediation strategy. For comparison purposes, SLR has also detailed alternative strategies that incorporate differing levels of excavation and/or debris removal.

5.1 Background Information

5.1.1 Site Summary

Site History Summary

Local anecdotal information, previous reports and site visits have indicated that unauthorized dumping of refuse has occurred at the Site over the past several decades. Refuse disposed of at the Site has included, but is likely not limited to, automobile bodies and parts, cans, glass, building debris, scrap metal, used oil containers and filters, automotive batteries, drums and other miscellaneous debris on both the uplands bench, the shoreline/marsh below and the trail connecting the two areas. To discourage further unauthorized dumping following more recent debris removal efforts at the Site, the fence along the western boundary of the Site (adjacent to Westside Road, refer to Drawing 2) was replaced/upgraded in late 2012. No dumping of debris has been observed at the Site in recent years.

Current and Proposed Future Land Use at the Site

It is anticipated that the future land use at the Site, and ownership, will be the same as the current use as a federally owned NWA. To the best of SLR's knowledge, there is no plan currently, or in the future, to allow the Site to be used for recreational activities.

Current and Probable Future Land Use of Surrounding Lands

The adjacent lands to the north, east and west are also part of the Columbia NWA. As discussed above for the Site, it is anticipated that these lands would continue to be federally protected wildlife areas in the future with no allowance for human recreational use.

Westside Road borders the Site to the west and it is anticipated that it will continue to provide vehicle access between the village of Wilmer and lands further north into the future.

The parcel adjacent to the south boundary of the Site (i.e. SE ¼ Lot 5, DL 377, Plan X-15) was forfeited to the Provincial Crown in 1989 (See Drawings 1 and 2 for provincial/federal boundary). The adjacent lands to the south are currently undeveloped.

Potential Receptors of Concern

Based on the current use, and probable future use, of the Site as an undeveloped NWA, ecological receptors of concern at the Site include, but are not limited to, the following:

- Aquatic and terrestrial plants
- Aquatic and terrestrial invertebrates and microorganisms
- Herbivore, invertivore, omnivore, piscivore and carnivore birds
- Herbivore, invertivore, omnivore, piscivore and carnivore mammals
- Amphibians and reptiles
- Fish

Of particular concern, are species considered to be endangered or at-risk as protection at the individual, rather than population, level may be warranted. Species-at-risk are summarized below.

Table B
Summary of Species-At-Risk

Common Name	Scientific Name	SARA	BC List
Alkaline Wing-Nerved Moss	***Pterygoneurum kozlovii***	***Threatened***	***Red***
American Avocet	*Recurvirostra americana*	-	Red
American Badger	*Taxidea taxus*	*Endangered*	*Red*
American White Pelican	*Pelecanus erythrorhynchos*	-	Red
Bull Trout	*Salvelinus confluentus*	-	Blue
Coeur d'Alene Oregonian	*Cryptomastix mullani*	-	Blue
Cutthroat Trout *lewisi* subsp. (Westslope Cutthroat Trout)	*Oncorhynchus herodia lewisi*	Special Concern	Blue
Flammulated Owl	*Otus flammeolus*	Special Concern	Blue
Great Blue Heron herodias ssp.	***Ardea herodias herodias***	***Special Concern***	***Blue***
Hooker's Townsendia	*Townsendia Hookerii*	-	Red
Lakeshore Sedge	***Carex lenticularis s.l.***	***-***	***Blue***
Lewis's Woodpecker	*Melanerpes lewis*	Threatened	Red
Long-billed Curlew	***Numenius americanus***	***Special Concern***	***Blue***
Monarch	*Danaus plexippus*	*Special Concern*	*Blue*
Nuttall's sunflower	*Hellanthus nuttali var. Nuttali*	-	Red
Olive-sided Flycatcher	*Contopus cooperi*	*Threatened*	*Blue*
Western Painted Turtle – Intermountain – Rocky Mountain Population	***Chrysemys picta pop. 2***	***Special Concern***	***Blue***
Rocky Mountain Tailed Frog	*Ascaphus montanus*	Endangered	Red
Rusty Blackbird	*Euphagus carolinus*	*Special Concern*	*Blue*
Upland Sandpiper	*Bartramia longicauda*	-	Red
Water Marigold	***Megalodonta beckii***	***-***	***Blue***
Western Grebe	*Aechmophorus occidentalis*	-	*Red*
Western Toad	***Anaxyrus boreas***	***Special Concern***	***Blue***
Westslope Cutthroat trout	*Oncorhynchus Clarkii lewisi*	Special Concern	Blue
Williamson's Sapsucker *nataliae* subsp.	*Sphyrapicus thyroideus nataliae*	Endangered	Red
Yellow Rail	*Coturnicpos noveboracensis*	Special Concern	Red

Note:
Italic – Species with the potential to be in the vicinity of Wilmer Marsh.
Bold – Species with the potential to use the Site.

In terms of human receptors of concern, access to the Site is restricted by a continuous six foot (1.8 metre) tall fence and signs are posted stating unauthorized entry and use of the Site is prohibited. EC personnel visit the Site on an infrequent basis (i.e. once annually) to perform maintenance and research. Despite the presence of the fence and "no unauthorized access" signs, persons may gain access to the Site by trespassing onto the lands and SLR has observed evidence of such access in recent years. Accordingly, trespassers and EC personnel are considered to be the primary human receptors of concern at the Site. Based on the undeveloped nature of the immediately adjacent lands and likelihood that land use will remain as such into the future, no off-Site human receptors of concern have been identified.

5.1.2 Environmental Site Conditions

Summary of Contaminants of Concern (COCs)

This section provides information on how and where contamination has been identified and summarizes the identified AECs and associated Contaminants of Concern (COCs). Given that the origin of the contamination at the Site is associated with the historical unauthorized dumping of refuse and debris, the entire Site has generally been identified as one AEC. However, within the Site, there are three sub-areas that reflect differences in refuse deposition and degradation over time. The sub-areas include AEC 1A (uplands bench), AEC 1B (marsh area) and AEC 1C (trail area). COCs were identified if a particular parameter was measured in the media at concentrations exceeding the applicable federal guidelines.

The following table (Table C) outlines the COCs remaining in the different environmental media for AECs 1A, 1B and 1C at the Site following the remediation activities which have been conducted. Drawings depicting sample locations and identified COCs remaining at the Site are included as Drawings 3 through 5.

Table C
Summary of Environmental Site Conditions

AEC	Media	COCs	Rationale for Selection
1A Uplands	Soil	**Metals** – Cadmium, Chromium (hexavalent), Copper, Lead, Mercury, Thallium, Tin, and Zinc **PAHs** –Benz[a]anthracene, Benzo[a]pyrene, Benzo[b]fluoranthene, Benzo[k]fluoranthene, Dibenz[a,h]anthracene, Indeno[1,2,3-c,d]pyrene, and Pyrene. **PHCs** –F3 fraction	Concentrations exceeded the applicable federal guidelines in one or more soil samples analyzed. COCs were generally found in the following locations: Metals • Metals exceedances were generally observed at the top of slope along the northeastern and south edge of AEC 1A. • Delineation samples collected in five separate areas of AEC 1A indicated contamination is highly spatially localized in those areas. PAHs • Exceedances were limited to two samples in the east portion of AEC 1A. • Delineation samples collected in one sample location indicated contamination is highly spatially localized. PHCs • Exceedances limited to one sample on the southeast portion of AEC 1A.
1B Marsh	Soil	**Metals** – Selenium and Tin	Concentrations exceeded the applicable federal guidelines in one or more soil samples analyzed. COCs were generally found in the following locations: • Exceedance of selenium in one soil sample approximately 60 m south of the excavation area at AEC 1B. • Exceedances of tin in three soil samples from the northern limit of the AEC 1B excavation.

AEC	Media	COCs	Rationale for Selection
1B Marsh	Sediment	**Metals** - Arsenic, Cadmium, Lead, Mercury, Zinc **PAHs** - Acenaphthene, Acenaphthylene, Anthracene, Benz[a]anthracene, Benzo[a]pyrene, Chrysene, Dibenz[a,h]anthracene, Fluoranthene, Fluorene, 2-Methylnaphthalene, Naphthalene, Phenanthrene, Pyrene	Concentrations exceeded the applicable federal guidelines in one or more sediment samples analyzed. COCs were generally found in the following locations: • Exceedances of metals and PAHs above the CCME ISQG were observed throughout the investigation area at AEC 1B. • Exceedances of metals above the CCME PEL were limited to an area of 45 m by 30 m adjacent to the AEC 1B excavation. • Exceedances of PAH above the CCME PEL were limited to one sample approximately 20 m offshore from the AEC 1B excavation.
	Surface Water	**Metals** – Aluminum, Cadmium, Iron	Concentrations exceeded the applicable federal guidelines in one or more surface water samples analyzed during the period of 2002-2005. Exceedances primarily found in the area of the AEC 1B excavation as well as in one location approximately 30 m to the north of the AEC 1B excavation. More recent water sampling at AEC 1B (i.e. in 2010) did not identify any exceedances in surface water.
1C Trail	Soil	**Metals** – Cadmium, Lead, Nickel, Tin and Zinc	Concentrations exceeded the applicable guidelines in one or more soil samples analyzed. COCs were concentrated around areas where the largest amount of metal debris was observed.

Uplands (AEC 1A)

Between 2002 and 2013, surface soil samples were collected in the uplands area of the Site and analyzed for VOCs, PCBs, BTEX, CCME PHC fractions F1 through F4, total metals (including hexavalent chromium), pesticides, herbicides, glycols and PAHs. Metals, PAHs and PHC F3 concentrations exceeded the applicable federal guidelines in one or more soil samples.

Marsh (AEC 1B)

Soil samples were collected from the marsh shoreline between 2003 and 2011. Soil was analyzed for CCME PHC F2-F4, PAHs, and metals. Selenium and tin exceeded the applicable federal guidelines in one or more soil samples.

Sediment samples were collected from AEC 1B between 2003 and 2011. Sediment was analyzed for BTEX, CCME PHC F1-F4, PAHs, metals, glycols, VOCs, pesticides and herbicides. Metals and PAHs were identified above the applicable federal guidelines in one or more sediment samples.

Surface water samples were collected from the marsh between 2002 and 2010. Surface water was analyzed for BTEX, CCME PHC F1-F4, VPH, EPH, LEPH, HEPH, PAHs, VOCs, total and dissolved metals, glycols, pesticides and herbicides. Metals were identified above the federal guidelines in one or more surface water samples during the period of 2002-2005 but were not identified above guidelines in 2010.

Trail (AEC 1C)

In 2013, soil samples were collected along the trail and analyzed for PAH, BTEX, CCME PHC F1-F4 and metals (including hexavalent chromium). Cadmium, lead, nickel, tin and zinc were identified above the applicable federal guidelines in one or more soil samples.

Summary of Soil/Debris Volumes

The following table outlines the estimated volumes of debris (and soil/sediment closely associated with the debris) remaining at the AECs.

Table D
Summary of Soil/Debris Volumes

AEC	Volume of Debris	Volume of Associated Soil/Sediment	Total Volume
1A Uplands	0 m^3	None	0 m^3
1B Marsh	46.5 m^3	None	46.5 m^3
1C Area of Impact 3	600 m^3	400 m^3	1000 m^3
1C Surficial Debris	200 m^3	None	200 m^3
1C Main Debris Zone	4900 m^3	3300 m^3	8200 m^3

Uplands (AEC 1A)

No areas of significant debris remain in AEC 1A.

Marsh (AEC 1B)

Based on the 2013 EM survey, there are still several areas of the marsh where anomalous readings were observed (indicative of metallic debris). The areas of debris are fairly discreet and are likely comprised of portions of car bodies or other large materials (tanks or drums). It is anticipated that the debris in these locations will continue to contribute contamination, particularly metals, to the surrounding sediments and surface water over time as a result of weathering processes. Based on the results of the sediment sampling programs conducted in the marsh, the sediment contamination appears to be fairly localized to the areas immediately surrounding the debris.

Based on the preliminary results of the EM survey and visual observations, there are approximately seven areas of debris in the marsh. The largest area is approximately 3 m by

5 m; assuming a thickness of 1.5 m, this area consists of 22.5 m^3 of debris. The remaining six smaller areas are approximately 2.0 m by 2.0 m in area; assuming a thickness of 1 m, these areas represent a collective debris volume of 24 m^3. On this basis, it is anticipated that approximately 46.5 m^3 of debris remains in the marsh.

Trail (AEC 1C)

As described in Section 4.5, the test pit works confirmed debris to be present within the general spatial extent of anomalies identified in the 2013 EM survey. Three areas of highest density of debris along the trail and south of the trail were identified during the test pit works (Area of Impact 1 through 3, refer to Drawing 2). Debris encountered was predominantly metal (vehicle parts, vehicle frames, mattress frames, etc.). Tires, glass, and some plastic were also encountered. Additional surface debris was observed downslope of the trail, particularly in the area of TP12; this debris was noted to consist of car bodies and kitchen appliances.

The 2013 test pit works in the trail were unable to excavate to native soil in the areas of thickest debris (maximum depth excavated was 4.5 m). However, assuming that the debris was historically placed on top of the natural slope and was subsequently buried with soil pushed down the trail from uplands areas (rather than becoming buried by mass wasting of the slope above), SLR has estimated the debris/soil volume in the main portion of the trail (Area of Impact 1 and 2 on Drawing 2) to be approximately 8200 m^3. In order to estimate the amount of debris in Area of Impact 1 and 2, SLR retained FOCUS Surveys to provide slope cross-sections through the impacted areas as well as in an non-impacted area closer to the marsh (to provide a reference for the natural slope in the area). Based on the cross-sectional areas, FOCUS calculated the volume of material sitting over the "natural slope" line throughout the area of anomalous EM readings in the trail to be 8200 m^3 (refer to FOCUS survey plans in Appendix K).

A second significant area of buried debris was observed in the vicinity of TP 11 (Area of Impact 3). Based on the results of the test pitting investigation and EM survey, this material is anticipated to extend over an area of 20 m by 20 m. Assuming a thickness of 2.5 m, this area represents an estimated volume of 1000 m^3 of debris/soil.

Additional surficial debris observed throughout the area is anticipated to comprise another 200 m^3.

Please note that the volumes listed for Area of Impact 1 through 3 are for total soil and debris. Based on test pit observations, the relative proportion of soil to debris is anticipated to be approximately 40:60.

5.1.3 Risk Assessments

Site Specific Human Health and Ecological Risk Assessment

As discussed in Section 3.12, the SSHHERA for the uplands area (AEC 1A) was updated in 2012. The SSHHERA concluded that there are no unacceptable risks to human or ecological receptors from chemical exposure to site-related contaminants remaining in the uplands area. It is noted that PHC F3 and hexavalent chromium were determined to potentially pose ecological risks to soil invertebrates. However, based on the spatial extent of the PHC F3 contamination and the low magnitude of the hexavalent chromium exceedances relative to the soil invertebrate toxicity reference value, these parameters were determined to pose a low risk to soil invertebrates at a population level.

Detailed Quantitative Ecological Risk Assessment

As discussed in Section 3.13, the DQERA for the marsh area (AEC 1B) was completed in 2013. The DQERA concluded that there are no unacceptable risks to ecological receptors from chemical exposure to site-related contaminants remaining in Wilmer Marsh.

Uncertainties with Respect to Site Risk Assessments

Uncertainties highlighted in the Site risk assessments which are of particular note with respect to the remediation planning for the Site are the uncertainties associated with the presence of the remaining debris in the marsh as on-going sources of contamination to the sediment and surface water. There is also uncertainty associated with the composition and chemical nature of debris that was not observed or sampled directly.

5.2 Remedial Options Analysis

SLR conducted a remedial options analysis for both the marsh (AEC 1B) and trail (AEC 1C) areas of the Site in March 2013 (SLR, 2013).

The uplands area (AEC 1A) has undergone remediation via excavation, with the completion of a subsequent risk assessment to address the remaining contamination; no unacceptable risks to human or ecological receptors from chemical exposure to site-related contaminants remaining in AEC 1A were identified.

The following sections summarize the recommended remedial options for AEC 1B and the proposed remedial options for AEC 1C.

5.2.1 AEC 1B - Marsh Area

Remedial excavation and disposal of debris and associated contaminated sediments was recommended as the preferred remedial option based on the uncertainties associated with the presence of the debris as on-going sources of contamination to the sediment and surface water in the marsh.

5.2.2 AEC 1C - Trail Area

SLR provided two remedial options for the trail area:

- remedial excavation and disposal of debris and associated contaminated soil.
- risk assessment/risk management of contaminated soil.

Since the remedial options analysis was conducted prior to the investigation of the trail area in 2013, SLR has reviewed the remedial options based on the recent data collected from the trail.

The remedial excavation option (SLR, 2013) assumed that approximately 5000 m^3 of debris and associated contaminated soil would be identified following test pitting. Based on current data, that volume is likely to be closer to 9400 m^3. The March 2013 remedial option analysis also assumed that contaminants would be similar to those found in other areas of the Site. This assumption was confirmed by the test pit works conducted in 2013. Advantages and disadvantages identified with this option in March 2013 are still considered to be applicable.

The risk assessment/risk management option outlined by SLR in March 2013 recommended that data collected from the trail be compared to the existing SSHHERA for the uplands area (AEC 1A) to determine the level of risk, if any, that the contamination poses to human and ecological receptors at the Site. SLR has conducted a cursory review of the data with respect to the uplands SSHHERA. The test pit works determined that soil contamination was limited to the most extensive debris areas. The contaminant concentrations encountered in the test pit works appear to be consistent with those previously evaluated in the SSHHERA for AEC 1A.

Consequently, it is expected that similar conclusions regarding human health and ecological risks can be drawn for AEC 1C. However, the primary uncertainty with respect to these conclusions is that debris exists at AEC 1C, whereas the debris (i.e. source) has been removed from AEC 1A. Furthermore, the debris at AEC 1C is buried in sloped glacio-lacustrine silt which are prone to slope instability and are susceptible to piping, caving and collapse (CGL, 2010).

It is noted that during SLR's time at the Site, debris not observed in earlier years has become evident along the trail over time. Consequently, there is a degree of uncertainty regarding probable future soil concentrations as well as the future spatial extent of impacts both horizontally and vertically.

The results of the surface runoff assessment conducted in March 2014 (refer to Section 4.6) suggest that snowmelt will either infiltrate the underlying soils at AEC 1C or collect at the bottom of the adjacent gully and subsequently infiltrate the soil. SLR did not observe any evidence of migration of surface runoff from AEC 1C to the marsh. On this basis, surface runoff is not considered to be a direct mechanism of migration of potential contamination from AEC 1C to the marsh. As well, it is SLR's opinion that the debris and soil contamination at AEC 1C is unlikely to result in significant impacts to groundwater in this area (refer to Section 4.6 for further discussion).

Based on the above information as well as on discussions with EC/PWGSC, it is SLR's understanding that a remedial excavation approach to address source removal, with risk assessment/risk management of any residual contamination (if necessary), is preferred for AEC 1C.

5.3 Remediation Strategy – Complete Excavation

Based on the selection of a remediation option comprised of the removal of remaining debris in the marsh area, removal of debris from AEC 1C (Area of Impact 3), removal of surficial debris at AEC 1C and the complete excavation and removal of debris from the main debris zone at AEC 1C, SLR has provided a description of how the selected remediation option should be implemented. Key components of the remediation strategy are described and a conceptual schedule is presented. Costs to execute the remediation strategy are also provided.

5.3.1 Remediation Objectives

The objective of the selected remediation option is to reduce the uncertainty associated with risk assessment of the contamination at the Site, specifically through:

- Removal of on-going sources of contamination to sediment and surface water at AEC 1B.
- Removal of on-going (and potentially unknown) sources of soil contamination at AEC 1C, which may increase in intensity and/or spatial extent through soil erosion processes.

5.3.2 Regulatory Requirements

All intrusive works conducted at the Site require a permit from CWS prior to being completed. As well, it is anticipated that the proposed work in the marsh area will require a review by Fisheries and Oceans Canada (FOC) under the fisheries protection provisions of the Fisheries Act (Section 35(1)). Additionally, it is likely that a Water Act (Section 9) Notification, and possibly an Approval, will be required from the BC MOE Water Stewardship Division prior to the initiation of the works in the marsh.

An Environmental Assessment Screening was previously completed in support of the 2010-2011 remediation activities in the marsh area to meet the requirements of the 1992 CEAA. In 2012, CEAA was revised significantly. Section 67 of CEAA 2012 outlines the responsibilities for the assessment of environmental impacts on federal lands. Environmental Assessments are only required for projects that are listed in the *Regulations Designating Physical Activities*. The proposed remediation activities do not fall under the activities listed in the *Regulations Designating Physical Activities*. It is noted that federal departments must still perform due diligence to ensure that projects on federal lands are not likely to cause significant adverse environmental effects.

Based on previous correspondence with Environment Canada (letter dated November 25, 2010), a Species-at-Risk (SAR) Act permit application is likely not required for the proposed remediation activities. Environment Canada concluded at that time that the potential for SAR species to occur at the Site is low; however, Environment Canada recommended the implementation of a number of measures for select species, specifically the American Badger, Western Toad and Painted Turtle, as well as measures for potentially impacted wildlife trees and migratory bird nests. Those measures included:

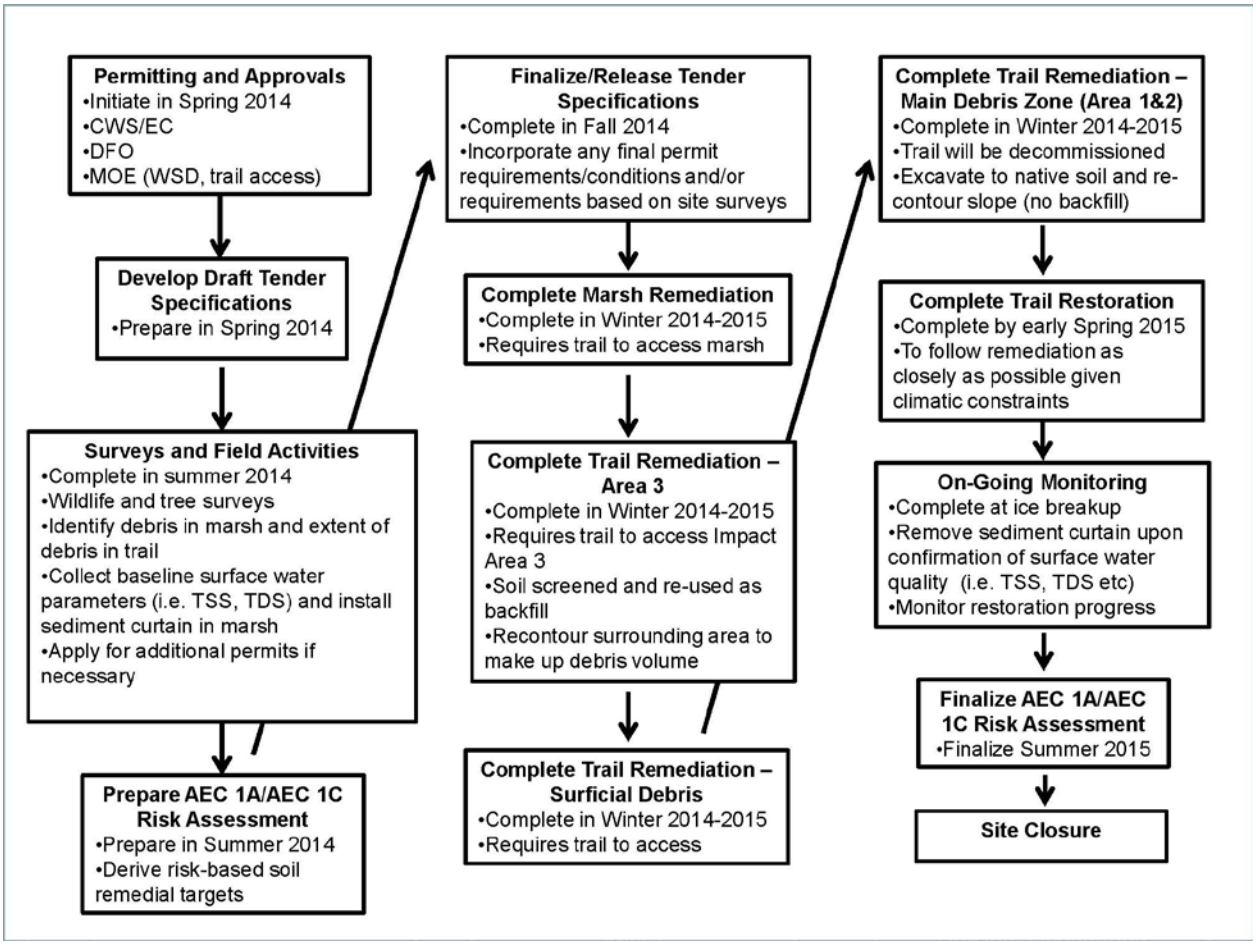
- Completion of Western Toad and Painted Turtle surveys.
- Completion of surveys for active American Badger dens at the Site.
- Completion of surveys to identify potential wildlife trees in the vicinity of the remediation works which may be impacted by the site activities and to identify “no-work” buffer zones around the affected wildlife trees.
- Avoidance of work during the migratory bird breeding season to minimize damage to nests.

It is recommended that Environment Canada be contacted to confirm their position remains unchanged. Pending the outcome of the American Badger, Western Toad and Painted Turtle surveys, a provincial wildlife permit may be required to handle/salvage/re-locate wildlife species.

It is anticipated that approval to use the portion of the trail that is located on the adjacent provincial land will be required to access the remaining debris in the marsh.

5.3.3 Strategy Overview

The components of the remediation strategy are depicted in the flowchart below.



As discussed above, the post-excavation risk assessment completed for the marsh area (AEC 1B) in 2013 concluded that there were no unacceptable risks to ecological receptors from chemical exposure to the contaminants remaining in the marsh. As well, SLR's cursory review of the trail data collected in 2013 suggests that the trail area (AEC 1C) can be incorporated into the uplands SSHHERA with likely similar conclusions. While the removal of potential on-going sources of contamination (i.e. those associated with remaining debris) at AEC 1B and AEC 1C, and subsequent risk assessment of remaining contaminant concentrations, may not necessarily reduce quantifiable risks associated with the AECs, the source removal excavations are expected to significantly reduce the uncertainties associated with the risk assessments at AEC 1B and AEC 1C.

5.3.4 Conceptual Remediation Program

The following sections discuss in further detail the components listed in the previous flowchart.

Remediation Preparation

Four tasks comprise the remediation preparation component of the project:

- Application for permits/approvals and liaison with stakeholders and regulators.
- Preparation of tender specifications (draft and final versions).
- Completion of pre-remediation field activities.

- Preparation of a preliminary risk assessment for AEC 1A and AEC 1C and development of risk-based soil remedial targets.

As discussed in Section 5.3.2, coordination with regulators and other stakeholders (i.e. CWS, FOC, BC MOE Water Stewardship Division, provincial Crown landowner) will be required to facilitate the remediation works. Given SLR's previous experience at the Site, it is recommended that the permitting and approval component of the project be initiated early in Spring 2014.

The preparation of draft National Master Specification (NMS) tender specifications for the project works should be initiated in Spring 2014 to allow for any supplementary remediation planning information to be collected in Summer 2014 and facilitate any modifications to the tender specifications that may result.

The pre-remediation field activities include the completion of wildlife and wildlife tree surveys, identification of the remaining debris in the marsh (UTM coordinates and field-flagging), identification of the limits of the AEC 1C buried and surficial debris areas (UTM coordinates and field-flagging), collection of baseline surface water turbidity parameters and installation of a sediment curtain in the marsh. It is recommended that these activities be completed in Summer 2014 so the results can be incorporated in the final tender specifications for the project.

As discussed in Section 5.2.2, SLR has conducted a cursory review of the AEC 1C data with respect to the current SSHHERA for AEC 1A. The review suggests that similar conclusions regarding human health and ecological risks can be drawn for AEC 1C as for AEC 1A. However, it is recommended that the AEC 1C results be formally incorporated into the existing SSHHERA in Summer 2014. As well, it is recommended that risk-based soil remedial targets be developed for the material to be excavated from AEC 1C for incorporation into the final tender specifications.

Following the completion of the above activities, the tender specifications for the project would be finalized in Fall 2014.

AEC 1B (Marsh Area) Remediation

Based on SLR's previous experience at the Site, equipment access to the marsh debris areas can only occur when there is sufficient ice upon the marsh to support the weight of the equipment. As well, work at the Site is constrained by wildlife breeding and migratory windows. Consequently, it is recommended that the AEC 1B remediation be completed in Winter 2014-2015.

Furthermore, access to the marsh is reliant upon the existence of the current trail; consequently, the AEC 1B remediation must be completed in advance of activities at AEC 1C.

Specialized equipment would be mobilized to the marsh via the existing trail. The trail slope, sensitivity of the Site soils and the presence of the large void space on the lower part of the trail limits the accessibility of the trail to most equipment save for spider-type hoes.

Holes would be cut into the ice at previously identified debris locations, sufficient in size to remove the debris safely without compromising the integrity of the ice to support the equipment. Should debris exceed the safe hole size, the debris would be broken down into smaller pieces for removal. The tender specifications would outline the requirement for the contractor to have

personnel qualified to assess the strength of the ice for health and safety considerations. Debris would be contained in impermeable sacks or steel buckets and transported to the staging area for disposal by helicopter.

AEC 1C (Trail Area) Remediation

The remediation of AEC 1C is comprised of three parts: excavation of the debris at Area of Impact 3, removal of surficial debris across the AEC and excavation of the debris in the main debris zone (i.e. Area of Impact 1 and 2). As the excavation of debris at Impact Area 3 and the removal of surficial debris across the AEC are reliant upon access via the existing trail, the remediation of these areas must be completed prior to the excavation of the main debris zone (which will result in the decommissioning of the existing trail).

SLR retained CGL to evaluate the geotechnical implications of remedial excavation activities in AEC 1C (refer to Appendix G). CGL noted that there were no slope stability concerns associated with remedial activities at Area of Impact 3 at AEC 1C based on the shallow depth of the debris in the area and the low slopes. CGL identified the following slope stability and soil erosion concerns associated with the proposed excavation of the main debris zone at AEC 1C, as well as general access activities for any equipment work at the Site:

- Compaction, vibration and rutting caused by repeated access by heavy equipment will accelerate erosion and instability along the trail.
- Since waste is imbedded into the soils, some on-site sorting may be required, increasing the area of disturbance and resulting in unconsolidated soil spoil areas.
- When disturbed by machine access or excavation, the fine-textured soils become loose and are difficult to consolidate without moisture. The loose nature of the soils will make disturbed areas, particularly those on sloping ground, susceptible to surface erosion.
- Excavation to depths of 4 m will result in over-steepened slope, removing the toe support along the slope. Over-steepened excavation cut slopes are more prone to surface erosion and slump failures. Consolidated native (i.e. undisturbed) silts can maintain near vertical (>1.5H:1V) grades on a short-term basis when dry. However, disturbed soils are more prone to erosion and instability and will require additional grading (3H:1V) or terracing to reduce the slope.

CGL concluded that remedial excavation activities in the main debris zone at AEC 1C would accelerate surface erosion, gullying and slump failure across the Site. It was noted that based on the topography and distance between the main debris zone and Wilmer Marsh, the risk of sediment delivery to the marsh was considered to be low to moderate.

CGL recommended the following mitigation measures to complete the remedial excavation activities in a safe and effective manner (report presented in Appendix G):

- Reduce excavation areas and depths to minimize the total area of disturbance and to reduce the height of potentially unstable cut slopes.
- Protect access routes on the Site by installing a 300 mm thick layer of well-graded, crushed angular gravel. The gravel layer must be installed on a layer of filter fabric to prevent the migration of fines into the gravel and to facilitate decommissioning upon completion. [Note: previous discussions with personnel from CWS have suggested that construction of “roads” on-site would likely involve a lengthy approval process and is generally not encouraged.]
- Complete remediation activities in AEC 1C only during extended periods of dry, or frozen, ground conditions.

- Utilize low-impact equipment such as rubber-tired or spider hoe-type excavators to reduce the potential for ground disturbance. Equipment operators should demonstrate experience in working on steep slopes.
- Exercise caution in operating equipment in the vicinity of the identified void.
- Construct cross-ditches at the top of the trail to divert surface flow from the work areas.
- Construct cross-slope terraces along long sections of steep uniform slopes to break the slope and slow surface runoff along the slope (see Figure 3 in the CGL report in Appendix G).
- Provide at least a part-time geotechnical monitor for the duration of the excavation activities.
- Implement erosion and sediment control measures as outlined in the following section.

Based on the above constraints, as well as known constraints related to wildlife breeding and migratory windows and climate (i.e. hot summers), it is recommended that the remediation in AEC 1C be conducted in Winter 2014-2015 immediately following the remediation of AEC 1B.

The remediation works at AEC 1C would involve the use of specialized equipment (i.e. spider-type hoes) to access the debris at Area of Impact 3 and the surficial debris areas. It is assumed that a larger excavator could be utilized on the upper part of the trail in the main debris zone. Given the proportion of soil to debris (approximately 40:60) and the cost differences between disposing debris versus soil contaminated above provincial agricultural land use guidelines (approximately \$200/tonne versus \$100/tonne, or alternatively \$400/m^3 versus \$200/m^3 assuming an average soil/debris density of 2 t/m^3), it is recommended that the majority of the excavated material be screened in a designated staging area, potentially located off-site, to separate out the debris. The remaining soil would be tested to facilitate soil disposal.

Given logistical constraints on importing backfill to Area of Impact 3, it is anticipated that debris and soil would be screened adjacent to the excavation area and the screened soil would be compared to the risk-based soil remedial targets to confirm that the material could be re-used as backfill. Soil above the risk-based targets would be transported off-site for disposal; however, it is assumed that negligible soil would require removal based on analytical results collected to date in the area. In order to compensate for the debris removed, the area around the excavation would need to be recontoured; it is anticipated that soil extending to 20 m from the limits of the excavation would need to be disturbed and recontoured to backfill the excavation.

It is assumed that, with the level of disturbance under this strategy, improvements to the existing trail could be completed that would facilitate transport of the surficial debris from AEC 1C and debris from Area of Impact 3 to the staging area.

The excavation of the main debris zone at AEC 1C would remove all soil and debris down to the native consolidated slope. No backfill would be imported into this area as unconsolidated soils would require significantly more terracing and gentler slopes in order to prevent erosion; this would require importation of a substantial amount of backfill and likely encroachment onto the adjacent provincial lands to the south. Rather, cross-slope terracing of the native consolidated material would be conducted to slow runoff down the slope.

Debris removed from AEC 1B and AEC 1C would be transported for disposal from the designated staging area to the Regional District of East Kootenay Columbia Valley landfill via Westside Road.

Post-Remediation Work

The post-remediation component of the project entails the implementation of sediment and erosion control measures and other restoration activities (see Section 5.3.5 below), post-remediation monitoring (see Section 5.3.6) and finalization of the risk assessment for AEC 1A and AEC 1C. Data and observations from the remediation works would be incorporated into the AEC 1A/AEC 1C risk assessment. The completion of the AEC 1A/AEC 1C risk assessment, in conjunction with the reduction of uncertainties associated with the DQERA for AEC 1B, would result in site closure.

5.3.5 Post-Remediation Sediment and Erosion Control and Other Restoration Activities

The removal of the debris in AEC 1B (marsh area) is anticipated to disturb sediments in the marsh and increase the turbidity of the water in the area of the disturbances. As discussed, a sediment curtain would be installed in advance of the remediation activities and prior to ice formation in the marsh. After ice breakup in the spring following the remediation activities, water quality would be assessed for parameters such as Total Suspended and Total Dissolved Solids and compared to pre-remediation conditions. Once the water quality within the sediment curtain has been confirmed to be consistent with pre-remediation conditions, the barrier would be removed.

As mentioned, the soils within AEC 1C (trail area) are comprised of glacio-lacustrine silts which are prone to slope instability and are susceptible to piping, caving and collapse (CGL, 2010). As discussed in the CGL 2013 report in Appendix G, the creation of surface roughness to control erosion is strongly recommended following remediation. Specifically, surface roughness should be created through the installation of coconut fibre mat cover and/or deposition of coarse woody debris. In the case of the coconut fibre mat cover, the matting would also provide mulch and protect surficial soils until grasses are established. Details of the surface roughness measures include the following (refer to CGL report in Appendix C):

- The matting should be natural and biodegradable.
- The mat should have good contact with the underlying surface, should be installed on the slope, top to bottom, with overlapping edges and pinned in place (pins at least 50 cm long).
- The uphill end of the mat should be buried in a trench at least 300 mm deep and the backfill should be compacted to ensure that water flows over top of the mat and not underneath.
- Coarse woody debris should be sourced from the Site or adjacent areas to prevent the importation of invasive species.

Additional restoration measures include seeding disturbed areas with a native grass mix in the spring following the remediation activities. Other measures that may be considered include the spot-treatment of any observed weed species with a soil contact herbicide.

5.3.6 Remediation and Post-Remediation Monitoring

As discussed above in Section 5.3.2., wildlife and wildlife tree surveys would likely be required in advance of the remediation activities.

No additional sediment or surface water quality monitoring is required in AEC 1B (marsh area) based on the conclusions of the DQERA. Consequently, sediment sampling would not be conducted during the remediation activities. Surface water monitoring at AEC 1B would be

limited to the evaluation of turbidity parameters in advance of and following remediation to evaluate the timing of the removal of the sediment curtain. Since the focus of the remediation activities at AEC 1B is to remove on-going sources of contamination (i.e. debris), it is recommended that a contractor be retained to conduct an EM survey of the marsh to confirm that all large debris has been removed prior to equipment demobilization.

As discussed above, geotechnical monitoring of the remediation activities in AEC 1C would be required based on slope stability concerns. Based on SLR's previous experience at the Site, it is likely that an environmental monitor for wildlife considerations would also be required for the duration of the remediation activities.

In terms of soil quality monitoring at AEC 1C, soil samples would be collected from the limits of the excavations (approximate 10 m spacing) as well as from the screened, excavated material (for use as backfill at Area of Impact 3 or to facilitate soil disposal). From a risk assessment perspective, the collection of soil data pertaining to the upper 1.5 metre of the final soil profile is of primary importance for the evaluation of risks to human and ecological receptors of concern in a post-remediation scenario.

As the focus of the remediation activities at AEC 1C is to remove on-going sources of contamination (i.e. debris), the removal of the debris would be monitored visually during the excavation activities.

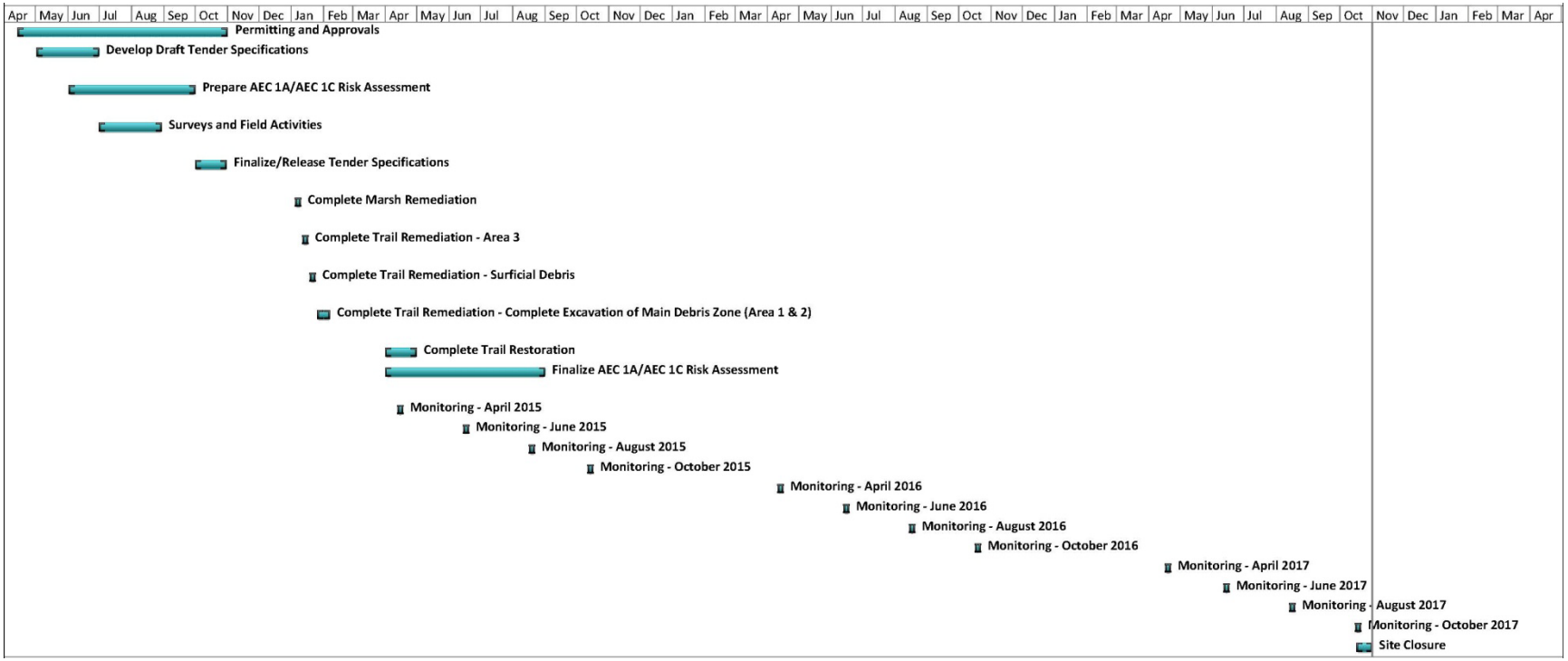
Sediment and erosion control measures and other restoration activities would be required following remediation in AEC 1C. Monitoring of post-remediation restoration progress (i.e. establishment of native grasses/plants) and surface erosion should be conducted every two to three months during non-frozen ground conditions for at least three years following the remediation works. It is assumed that an inspection of slope stability by a geotechnical monitor would be performed annually for a period of three years.

The metrics for evaluating compliance with the remediation objectives include the following:

- AEC 1B – confirmation via EM survey that all large debris has been removed.
- AEC 1B – confirmation that surface water turbidity parameters (e.g. total suspended and total dissolved solids) are consistent with pre-remediation conditions.
- AEC 1C – visual confirmation that all large debris has been removed.
- AEC 1C – confirmation that post-remediation soil concentrations meet risk-based targets (developed prior to remediation).
- AEC 1C – visual confirmation that grasses/plants are re-establishing in disturbed areas and that there is no evidence of significant erosion or slope instability.

5.3.7 Conceptual Schedule

The conceptual schedule for the implementation of the RAP is summarized in the Gantt chart on the following page. Key components of the RAP are identified, including post-remediation monitoring.


Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr
Permitting and Approvals
Develop Draft Tender Specifications
Prepare AEC 1A/AEC 1C Risk Assessment
Surveys and Field Activities
Finalize/Release Tender Specifications
Complete Marsh Remediation
Complete Trail Remediation - Area 3
Complete Trail Remediation - Surficial Debris
Complete Trail Remediation - Complete Excavation of Main Debris Zone (Area 1 & 2)
Complete Trail Restoration
Finalize AEC 1A/AEC 1C Risk Assessment
Monitoring - April 2015
Monitoring - June 2015
Monitoring - August 2015
Monitoring - October 2015
Monitoring - April 2016
Monitoring - June 2016
Monitoring - August 2016
Monitoring - October 2016
Monitoring - April 2017
Monitoring - June 2017
Monitoring - August 2017
Monitoring - October 2017
Site Closure

5.3.8 Communication Strategy

In order to minimize conflict with the local population, it is advised that signage be developed in consultation with CWS to indicate the nature of the remediation works. Vandalism of rental equipment (i.e. portable toilet) occurred during site works in 2013 and it is hoped that such acts can be minimized by engaging the public and communicating the benefits of the project.

Following remediation, it is advised that signage be developed to indicate that restoration measures are underway to prevent soil erosion. SLR's previous experience at the Site has suggested that members of the local population do not recognize that the Site is not intended for human use. It is hoped that the added concern of allowing plants to re-establish on the exposed soils may provide an additional incentive for trespassers to avoid the Site.

5.3.9 Contingency Plans

Contingency measures to mitigate potential adverse effects to receptors have been incorporated into the remediation strategy discussed above. Specifically, mitigating potential adverse effects to receptors during the remediation activities requires the completion of a number of tasks prior to the initiation of the remediation, including completion of wildlife and wildlife tree surveys, installation of sediment curtains and barriers during non-frozen ground conditions, and collection of baseline surface water samples. Implementation of additional mitigation measures during remediation, such as creating gravelled access routes, constructing cross-ditches for surface runoff and constructing cross-slope terraces, would also mitigate potential adverse effects to receptors.

Following remediation, the timely restoration of the disturbed areas and frequent monitoring of restoration progress, soil erosion and slope stability (and implementation of additional measures if necessary) would also mitigate potential adverse effects to receptors.

As the focus of the remediation plan is on the removal of potential on-going sources of contamination in order to reduce the uncertainties associated with the Site risk assessments, it is largely anticipated that any new contamination, if discovered, could be incorporated into the existing risk assessments. It is noted however, that if spatially extensive contamination is discovered which significantly exceeds risk-based targets for the Site, then this assumption may not be valid. However, given the amount of investigation that has been completed across the Site and the nature of the contamination source (i.e. domestic refuse/debris), it is unlikely that such spatially extensive contamination has yet to be encountered.

5.3.10 Costs

The table below summarizes the approximate costs associated with the implementation and execution of the RAP through to site closure (exclusive of taxes). A detailed cost breakdown of labour per task (time required and hourly rates), travel and living expenses, analytical fees and subcontractor costs per task (time required and lump sum or hourly rates) is provided in Table 5 following the report text.

Table E
Cost Estimate – Remediation of AEC 1B and AEC 1C (Complete Excavation)

Task	Cost Breakdown	Estimated Cost
1A - Permits/Approvals	Labour (SLR fees)	$6250
1B – Tender Specification Development	Labour (SLR fees)	$12500
	Direct Expenses (Subcontractors)	$4000
1C – Surveys and Field Activities	Labour	$13360
	Travel and Living	$3965
	Direct Expenses (Subcontractors)	$5035
1D – AEC 1A/1C SSHHERA and SSRTs	Labour	$17095
1E – Finalize Tender Specifications	Labour	$7250
	Travel and Living	$915
2A – AEC 1B Remediation	Labour	$13860
	Travel and Living	$3250
	Direct Expenses (Subcontractors)	$79790
2B – AEC 1C (Area 3) Remediation	Labour	$18800
	Travel and Living	$5145
	Direct Expenses (Subcontractors)	$325725
2C – AEC 1C (Surficial Debris) Remediation	Labour	$5690
	Travel and Living	$1895
	Direct Expenses (Subcontractors)	$94710
2D – AEC 1C (Main Zone) Remediation	Labour	$83620
	Travel and Living	$22160
	Direct Expenses (Subcontractors)	$3148685
3A – Site Restoration	Labour	$40450
	Travel and Living	$9750
	Direct Expenses (Subcontractors)	$420000
3B – Post-Remedial Monitoring	Labour	$40450
	Travel and Living	$17760
	Direct Expenses (Subcontractors)	$12185
3C – Finalize AEC 1A/1C SSHHERA	Labour	$4710
3D – Reporting and Site Closure Requirements	Labour	$16600
	Total	$4435605
	20% Contingency	$887120
	Total Including Contingency	$5322725

The cost estimate above assumes the following:

- Permits and approvals would be obtained from regulators and/or stakeholders prior to Fall 2014.
- Any additional wildlife permits (if required following wildlife surveys) would be readily obtained and would not delay the project schedule.
- The volume of materials at AEC 1B and AEC 1C are as estimated.
- The density of debris is approximately two tonnes per cubic metre and the density of soil is approximately two tonnes per cubic metre.
- Sufficient ice would be present on the marsh to support the weight of the necessary equipment.
- Spider-type excavators would be able to remove the debris in the marsh.

- The debris from the marsh would need to be transported to the staging area using helicopters.
- Helicopters could move approximately 6.5 tonnes of debris per hour from the marsh to the staging area.
- The debris from AEC 1C (Area of Impact 3) and the surficial debris at AEC 1C could be transported to the staging area using the existing trail as improvements could be made to the trail.
- The screened soil at AEC 1C (Area of Impact 3) would meet risk-based soil remedial targets and could be re-used. Furthermore, recontouring of the area around the excavation could be conducted to backfill the excavation.
- The excavation in the main debris zone would be completed down to the native consolidated slope and no backfill would be required in this area.
- The debris and excess excavated soil could be disposed at the Regional District of East Kootenay Columbia Valley landfill at the rates quoted in this RAP.
- The surficial debris at AEC 1C could be readily removed manually or by a spider-type excavator and would not result in extensive soil disturbance.
- The slope in the main debris area could be sufficiently stabilized with the construction of cross-ditches for surface runoff, construction of cross-slope terraces, installation of coconut fibre mat cover and/or deposition of coarse woody debris.
- The Environmental and Geotechnical Monitors would not identify any hazards or risks to receptors which requires a work stoppage.
- The coconut fibre mat cover and re-seeding would be sufficient to prevent soil erosion and allow the establishment of native plant communities on the slope within a period of three years following remediation.
- Post-remedial surface water quality would return to baseline conditions.
- SLR field personnel would work on an approximate nine day changeover cycle.

5.3.11 Uncertainties

The primary uncertainties associated with the RAP include the following:

- Issuance of permits/approvals from regulators/stakeholders.
- Estimate of the total volume of material at Area of Impact 1 through 3 at AEC 1C.
- Estimate of the density of the debris at AEC 1C.
- Usability of the access trail to transport debris from AEC 1C (Area of Impact 3) and surface debris from AEC 1C to the staging area.
- Suitability of the screened soil for use as backfill in select locations (i.e. Area of Impact 3).
- Suitability of the excess excavated soil for disposal at the Regional District landfill.
- Potential for increases in landfill tipping fees prior to completing remediation (tipping fees represent the largest single expenditure of the project cost).
- Long-term stability and restoration of remediated slopes at AEC 1C.

5.4 Remediation Strategy – Partial Excavation and Debris Removal

For comparison purposes, SLR has developed a remediation strategy based on partial excavation and/or removal of debris in AEC 1C. Specifically, the remediation option considered is comprised of the removal of the debris remaining in the marsh area, excavation and removal of all debris from Area of Impact 3 at AEC 1C, removal of surficial debris at AEC 1C and removal of debris and potentially contaminated soil in the upper 1.5 m of the soil profile in the

main debris zone at AEC 1C. Key components of the remediation strategy are described and a conceptual schedule is presented. Costs to execute the remediation strategy are also provided.

5.4.1 Remediation Objectives

The objective of the selected remediation option is to reduce the uncertainty associated with risk assessment of the contamination at the Site, specifically through:

- Removal of on-going sources of contamination to sediment and surface water at AEC 1B.
- Removal of accessible sources of potential future soil contamination at AEC 1C (i.e. Area of Impact 3 and surficial debris at AEC 1C) and removal of sources of potential future soil contamination (i.e. debris) from the upper 1.5 m of the soil profile from the main debris zone at AEC 1C. Debris located at depths greater than 1.5 m below grade in the main debris zone would remain in place and be capped with non-contaminated imported backfill. The upper 1.5 m of the soil profile is considered the most relevant zone of exposure for potential human and terrestrial ecological receptors of concern at the Site under current Site conditions.

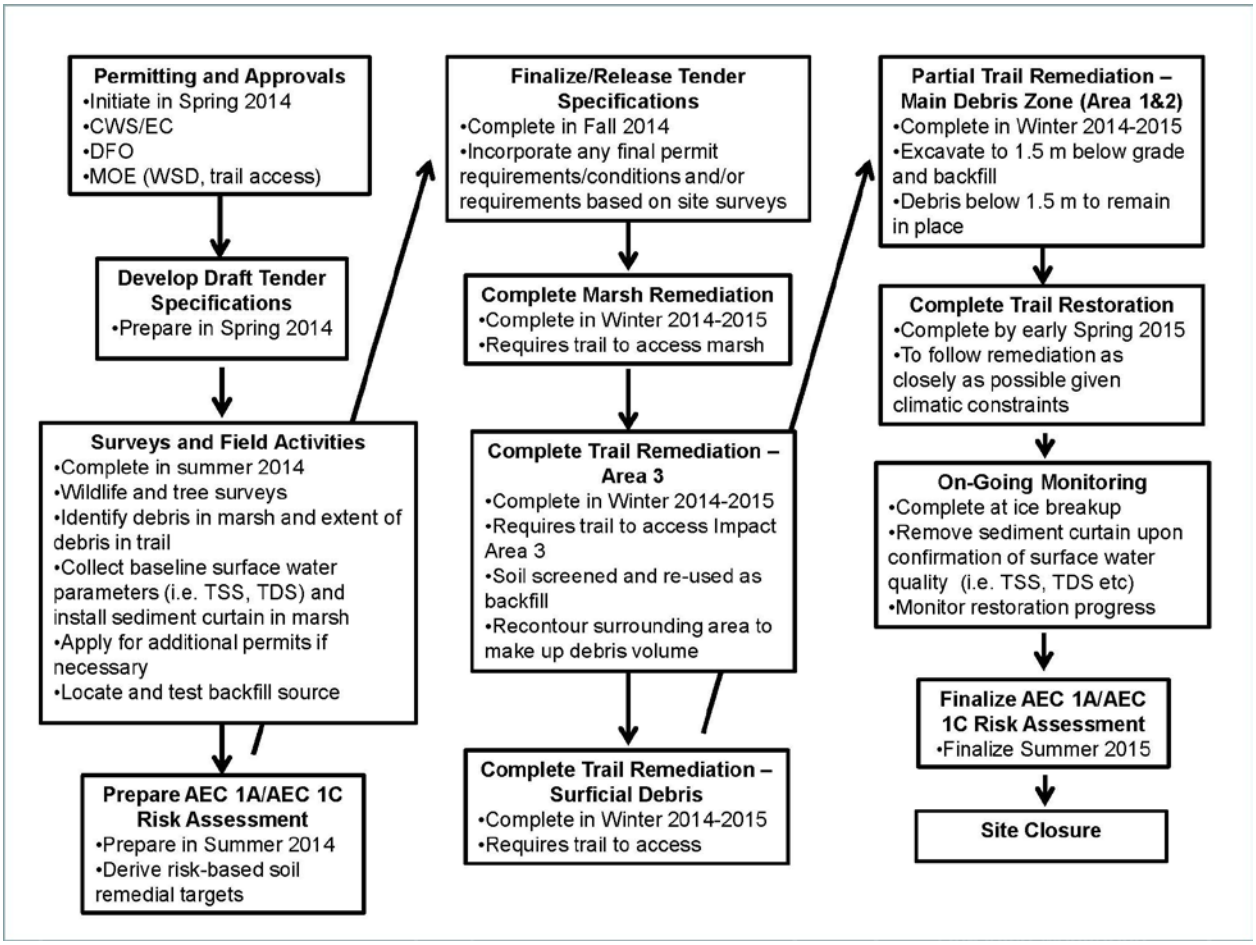
5.4.2 Regulatory Requirements

As outlined in Section 5.3.2, the proposed project works would likely require a permit from CWS, review by FOC, submission of a Water Act Notification (and possibly Approval) to BC MOE Water Stewardship Division and discussions with EC regarding SAR at the Site. Provincial wildlife permits may also be required.

It is anticipated that approval to use the portion of the trail that is located on the adjacent provincial land will be required to access the remaining debris in the marsh.

5.4.3 Strategy Overview

The components of the remediation strategy are depicted in the flowchart below.



As discussed above, the post-excavation risk assessment completed for the marsh area (AEC 1B) in 2013 concluded that there were no unacceptable risks to ecological receptors from chemical exposure to the contaminants remaining in the marsh. As well, SLR's cursory review of the trail data collected in 2013 suggests that the trail area (AEC 1C) can be incorporated into the uplands SSHHERA with likely similar conclusions. While the removal of potential on-going sources of contamination (i.e. those associated with remaining debris) at AEC 1B and AEC 1C, and subsequent risk assessment of remaining contaminant concentrations, may not necessarily reduce quantifiable risks associated with the AECs, the removal of sources in the upper 1.5 m of the soil profile are expected to significantly reduce the uncertainties associated with the risk assessments at AEC 1B and AEC 1C.

5.4.4 Conceptual Remediation Program

The following sections discuss in further detail the components listed in the previous flowchart.

Remediation Preparation

The remediation preparation component of the project is as outlined in Section 5.3.4 with the addition of the identification and testing of a local backfill source (backfill will likely be required to cap the remaining debris in the main debris zone).

AEC 1B (Marsh Area) Remediation

The remediation of AEC 1B has been discussed previously in Section 5.3.4.

AEC 1C (Trail Area) Remediation

The remediation of AEC 1C is comprised of three parts: excavation of the debris at Area of Impact 3, removal of surficial debris across the AEC and excavation of the debris from the upper 1.5 m of the soil profile in the main debris zone (i.e. Area of Impact 1 and 2). Given the need to maintain the access trail to complete the excavation at Impact Area 3 and to remove surficial debris from AEC 1C, the remediation of these areas should be completed prior to the excavation of the main debris zone (in order to minimize soil disturbance following excavation in the main debris zone). For reasons previously discussed, it is recommended that the remediation activities at AEC 1C be conducted in Winter 2014-2015 following the remediation of AEC 1B.

The geotechnical implications of remedial excavation activities at AEC 1C have been discussed in Section 5.3.4. It is noted that limiting the excavation activities to a depth of 1.5 m bgs in the main debris zone is consistent with the recommendation in the CGL Report (Appendix G) to reduce excavation areas and depths to minimize the total area of disturbance and to reduce the height of potentially unstable cut slopes.

The remediation activities at AEC 1C would largely be implemented as discussed in Section 5.3.4, with the exception that excavation would only occur to a depth of 1.5 m in the main debris zone and the area backfilled with non-contaminated imported material to return the area to the existing grade. As well, additional measures (i.e. crane) would be required to move surficial debris at AEC 1C and debris from Area of Impact 3 to the staging area if significant improvements cannot be made to the existing trail.

Post-Remediation Work

The post-remediation components of the project are similar to those discussed in Section 5.3.4.

5.4.5 Post-Remediation Sediment and Erosion Control and Other Restoration Activities

The post-remediation restoration and sediment/erosion control measures required following the removal of debris at AEC 1B and partial excavation of AEC 1C are similar to those discussed in Section 5.3.5. The total area of disturbed soil requiring restoration measures is expected to be less than if complete excavation of AEC 1C was completed.

5.4.6 Remediation and Post-Remediation Monitoring

Remediation and post-remediation monitoring requirements are considered to be similar to those outlined in Section 5.3.6. However, it is anticipated that the geotechnical monitor would be required for a shorter period of time during the remediation activities than if complete excavation was conducted in the main debris zone.

In terms of soil quality monitoring at AEC 1C, soil samples would be collected from the limits of the excavation at Area of Impact 3 (approximate 10 m spacing) as well as from the screened, excavated material to evaluate re-use as backfill. In the main debris zone, soil samples would be collected from the walls of the excavation, from the excavated material (to facilitate disposal)

and from the imported backfill material (collected in advance of remedial activities). From a risk assessment perspective, the collection of soil data pertaining to the upper 1.5 metre of the final soil profile is of primary importance for the evaluation of risks to human and ecological receptors of concern in a post-remediation scenario.

The removal of the debris at AEC 1C (Area of Impact 3) would be monitored visually during the excavation activities. The vertical extent of the excavation in the main debris zone at AEC 1C would be limited by depth (i.e. 1.5 m) while the lateral extent would be monitored visually to confirm removal of debris.

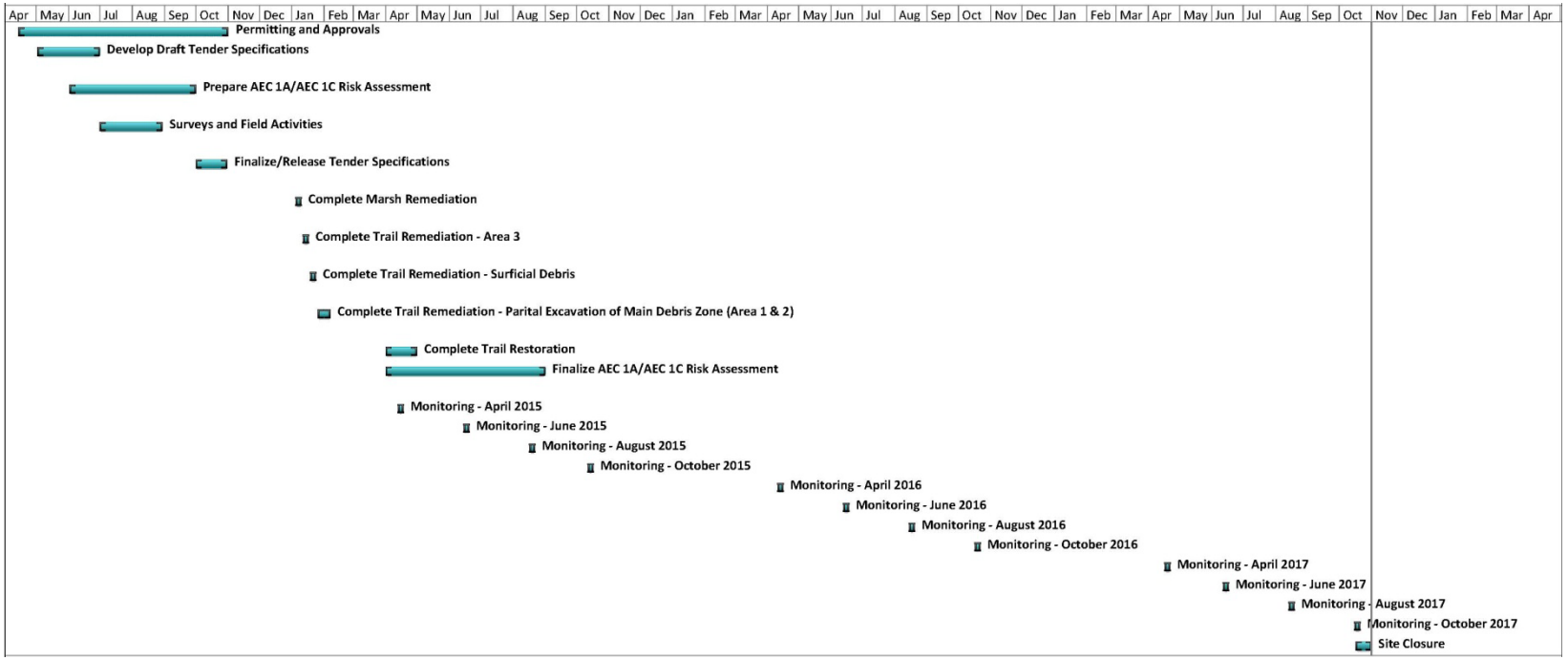
Monitoring of post-remediation restoration progress and evaluation of erosion should be conducted every two to three months during non-frozen ground conditions for at least three years following the remediation works. It is assumed that inspection of slope stability by a geotechnical monitor would be performed annually for a period of three years.

The metrics for evaluating compliance with the remediation objectives include the following:

- AEC 1B – confirmation via EM survey that all large debris has been removed.
- AEC 1B – confirmation that surface water turbidity parameters (e.g. total suspended and total dissolved solids) are consistent with pre-remediation conditions.
- AEC 1C – visual confirmation that all large debris has been removed from the upper 1.5 m of the soil profile in the main debris zone and completely removed at Area of Impact 3.
- AEC 1C – confirmation that post-remediation soil concentrations meet risk-based targets (developed prior to remediation).
- AEC 1C – visual confirmation that grasses/plants are re-establishing in disturbed areas and that there is no evidence of significant erosion or slope instability.

5.4.7 Conceptual Schedule

The conceptual schedule for the implementation of the RAP is summarized in the Gantt chart on the following page. Key components of the RAP are identified, including post-remediation monitoring.


Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr
Permitting and Approvals
Develop Draft Tender Specifications
Prepare AEC 1A/AEC 1C Risk Assessment
Surveys and Field Activities
Finalize/Release Tender Specifications
Complete Marsh Remediation
Complete Trail Remediation - Area 3
Complete Trail Remediation - Surficial Debris
Complete Trail Remediation - Parital Excavation of Main Debris Zone (Area 1 & 2)
Complete Trail Restoration
Finalize AEC 1A/AEC 1C Risk Assessment
Monitoring - April 2015
Monitoring - June 2015
Monitoring - August 2015
Monitoring - October 2015
Monitoring - April 2016
Monitoring - June 2016
Monitoring - August 2016
Monitoring - October 2016
Monitoring - April 2017
Monitoring - June 2017
Monitoring - August 2017
Monitoring - October 2017
Site Closure

5.4.8 Communication Strategy

The implementation of the communication strategy discussed in Section 5.3.8 is recommended.

5.4.9 Contingency Plans

Contingency measures to mitigate potential adverse effects to receptors have been incorporated into the remediation strategy discussed above. As noted previously, limiting the excavation activities to a depth of 1.5 m below grade in the main debris zone at AEC 1C will minimize the total area of disturbance and reduce the height of potentially unstable cut slopes.

Following remediation, the timely restoration of the disturbed areas and frequent monitoring of restoration progress, soil erosion and slope stability would also mitigate potential adverse effects to receptors.

As discussed in Section 5.3.9, it is anticipated that any new contamination, if discovered, could be incorporated into the existing risk assessments. If spatially extensive contamination is discovered which significantly exceeds risk-based targets for the Site, then additional activities to support the risk assessment may be required. However, given the amount of investigation that has been completed across the Site and the nature of the contamination source, it is unlikely that such spatially extensive contamination has yet to be encountered.

5.4.10 Costs

The table below summarizes the approximate costs associated with the implementation and execution of the RAP (based on partial excavation at AEC 1C) through to site closure. Costs provided are exclusive of taxes. A detailed cost breakdown is provided in Table 6 following the report text.

Table F
Cost Estimate – Remediation of AEC 1B and AEC 1C (Partial Excavation)

Task	Cost Breakdown	Estimated Cost
1A - Permits/Approvals	Labour (SLR fees)	$6250
1B – Tender Specification Development	Labour (SLR fees)	$12500
	Direct Expenses (Subcontractors)	$4000
1C – Surveys and Field Activities	Labour	$13360
	Travel and Living	$3965
	Direct Expenses (Subcontractors)	$9610
1D – AEC 1A/1C SSHHERA and SSRTs	Labour	$17095
1E – Finalize Tender Specifications	Labour	$7250
	Travel and Living	$915
2A – AEC 1B Remediation	Labour	$13860
	Travel and Living	$3250
	Direct Expenses (Subcontractors)	$82790
2B – AEC 1C (Area 3) Remediation	Labour	$18800
	Travel and Living	$5145
	Direct Expenses (Subcontractors)	$385925
2C – AEC 1C (Surficial Debris) Remediation	Labour	$5690
	Travel and Living	$1895
	Direct Expenses (Subcontractors)	$106510
2D – AEC 1C (Main Zone) Remediation	Labour	$24510
	Travel and Living	$5935
	Direct Expenses (Subcontractors)	$579970
3A – Site Restoration	Labour	$40450
	Travel and Living	$9750
	Direct Expenses (Subcontractors)	$327500
3B – Post-Remedial Monitoring	Labour	$40450
	Travel and Living	$17760
	Direct Expenses (Subcontractors)	$12185
3C – Finalize AEC 1A/1C SSHHERA	Labour	$4710
3D – Reporting and Site Closure Requirements	Labour	$16600
	Total	$1778630
	20% Contingency	$355725
	Total Including Contingency	$2134355

The cost estimate above assumes the following:

- Permits and approvals would be obtained from regulators and/or stakeholders prior to Fall 2014.
- Any additional wildlife permits (if required following wildlife surveys) would be readily obtained and would not delay the project schedule.
- The volume of materials at AEC 1B and AEC 1C are as estimated.
- The density of debris is approximately two tonnes per cubic metre and the density of soil is approximately two tonnes per cubic metre.
- Sufficient ice would be present on the marsh to support the weight of the necessary equipment.
- Spider-type excavators would be able to remove the debris in the marsh.

- The debris from the marsh would need to be transported to the staging area using helicopters.
- Helicopters could move approximately 6.5 tonnes of debris per hour from the marsh to the staging area.
- Transport of the debris from AEC 1C (Area of Impact 3) and the surficial debris at AEC 1C would require additional measures (e.g. crane) if improvements cannot be made to the existing trail.
- The screened soil at AEC 1C (Area of Impact 3) would meet risk-based soil remedial targets and could be re-used. Furthermore, recontouring of the area around the excavation could be conducted to backfill the excavation.
- A suitable source of backfill for the main debris zone could be identified locally.
- The debris and excess excavated soil could be disposed at the Regional District of East Kootenay Columbia Valley landfill at the rates quoted in this RAP.
- The surficial debris at AEC 1C could be readily removed manually or by a spider-type excavator and would not result in extensive soil disturbance.
- The slope in the main debris area could be sufficiently stabilized with the construction of cross-ditches for surface runoff, construction of cross-slope terraces, installation of coconut fibre mat cover and/or deposition of coarse woody debris.
- The Environmental and Geotechnical Monitors would not identify any hazards or risks to receptors which requires a work stoppage.
- The coconut fibre mat cover and re-seeding would be sufficient to prevent soil erosion and allow the establishment of native plant communities on the slope within a period of three years following remediation.
- Post-remedial surface water quality would return to baseline conditions.
- SLR field personnel would work on an approximate nine day changeover cycle.

5.4.11 Uncertainties

The primary uncertainties associated with the RAP include the following:

- Issuance of permits/approvals from regulators/stakeholders.
- Estimate of the total volume of material at Area of Impact 1 through 3 at AEC 1C.
- Estimate of the density of the debris at AEC 1C.
- Approval to conduct improvements to the access trail to transport debris from AEC 1C (Area of Impact 3) and surface debris from AEC 1C to the staging area.
- Suitability of the screened soil for use as backfill in select locations (i.e. Area of Impact 3).
- Suitability of the excess excavated soil for disposal at the Regional District landfill.
- Potential for increases in landfill tipping fees prior to completing remediation (tipping fees represent the largest single expenditure of the project cost).
- Long-term stability and restoration of remediated slopes at AEC 1C.

5.5 Remediation Strategy – Surficial Debris Removal at AEC 1C and Debris Removal at AEC 1B

SLR has also developed a remediation strategy based on the removal of surficial debris in AEC 1C and the removal of debris at AEC 1B (marsh area). Key components of the remediation strategy are described and a conceptual schedule is presented. Costs to execute the remediation strategy are also provided.

5.5.1 Remediation Objectives

The objective of the selected remediation option is to reduce the uncertainty associated with risk assessment of the contamination at the Site, specifically through:

- Removal of on-going sources of contamination to sediment and surface water at AEC 1B.
- Removal of readily accessible sources of potential future soil contamination at AEC 1C (i.e. surficial debris).

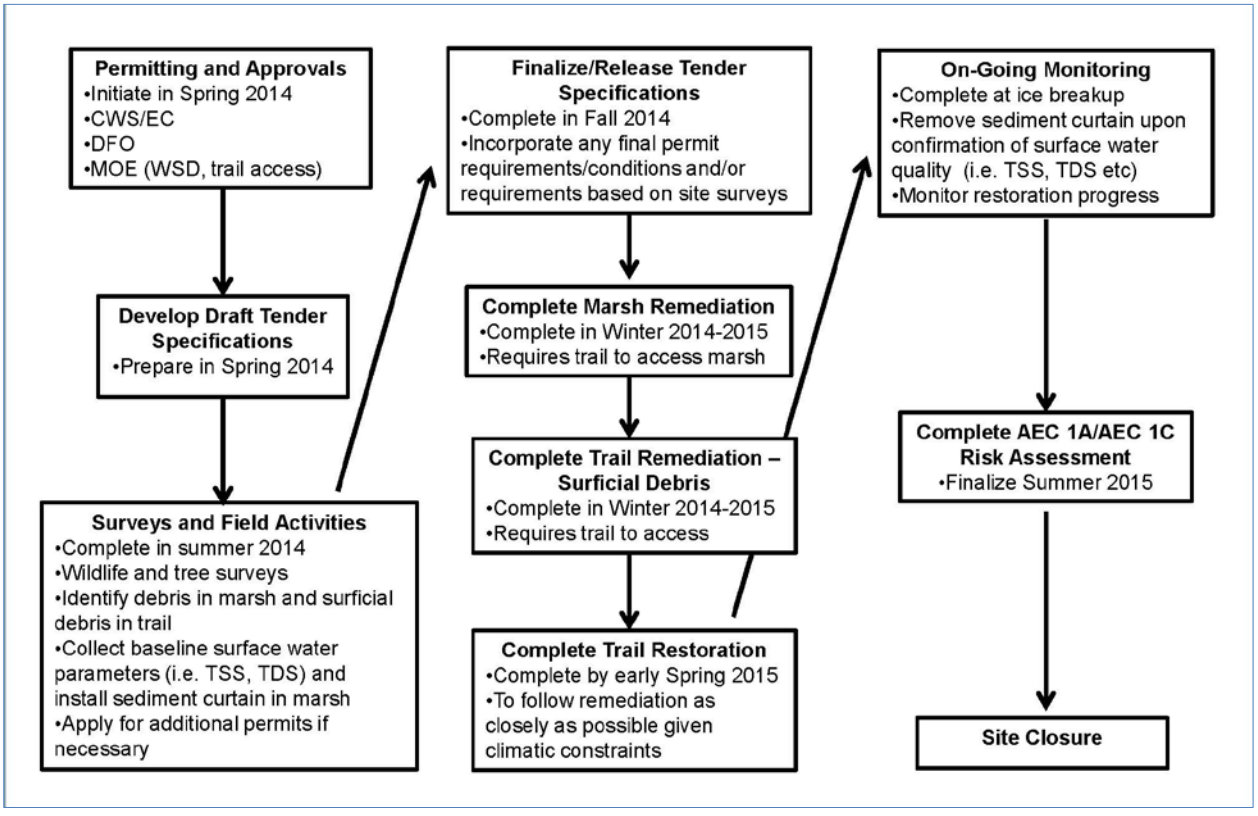
5.5.2 Regulatory Requirements

Proposed project works would likely require a permit from CWS, review by FOC, submission of a Water Act Notification (and possibly Approval) to BC MOE Water Stewardship Division and discussions with EC regarding SAR at the Site. Provincial wildlife permits may also be required.

It is anticipated that approval to use the portion of the trail that is located on the adjacent provincial land will be required to access the remaining debris in the marsh.

5.5.3 Strategy Overview

The components of the remediation strategy are depicted in the flowchart below.



The post-excavation risk assessment completed for the marsh area (AEC 1B) in 2013 concluded that there were no unacceptable risks to ecological receptors from chemical exposure to the contaminants remaining in the marsh. SLR's cursory review of the trail data

collected in 2013 suggests that the trail area (AEC 1C) can be incorporated into the uplands SSHHERA with likely similar conclusions. While the removal of potential on-going sources of contamination (i.e. those associated with remaining debris) at AEC 1B and AEC 1C, and subsequent risk assessment of remaining contaminant concentrations, may not necessarily reduce quantifiable risks associated with the AECs, the removal of readily accessible sources at AEC 1B and AEC 1C are expected to reduce the uncertainties associated with the risk assessments in these areas.

5.5.4 Conceptual Remediation Program

The following sections discuss in further detail the components listed in the previous flowchart.

Remediation Preparation

The remediation preparation component of the project is as outlined in Section 5.3.4 excluding the preparation of a preliminary risk assessment for AEC 1A and AEC 1C and development of risk-based soil remedial targets. Rather the completion of the SSHHERA for AEC 1A and AEC 1C would be completed following the debris removal programs. Risk-based soil remedial targets would not be required as no soil would be removed under this strategy.

AEC 1B (Marsh Area) Remediation

The remediation of AEC 1B has been discussed previously in Section 5.3.4.

AEC 1C (Trail Area) Remediation

The remediation of AEC 1C would be limited to the removal of surficial debris across the AEC. It is recommended that the remediation activities at AEC 1C be conducted in Winter 2014-2015 following the remediation of AEC 1B.

The geotechnical implications of remedial excavation activities at AEC 1C have been discussed in Section 5.3.4.

The remediation works at AEC 1C would involve the use of specialized equipment (i.e. spider-type hoes) to remove the surficial debris areas. Additional measures (i.e. crane) would be required to move surficial debris at AEC 1C to the staging area if significant improvements cannot be made to the existing trail.

Debris removed from AEC 1B and AEC 1C would be transported for disposal from the designated staging area to the Regional District of East Kootenay Columbia Valley landfill via Westside Road.

Post-Remediation Work

The post-remediation components of the project are similar to those discussed in Section 5.3.4. Sediment and erosion control measures would be limited to areas where surficial debris removal has resulted in soil disturbance. Following the debris removal programs, the SSHHERA for AEC 1A and AEC 1C would be completed. Details of the post-remediation monitoring program are detailed in Section 5.5.6.

5.5.5 Post-Remediation Sediment and Erosion Control and Other Restoration Activities

The post-remediation restoration and sediment/erosion control measures required following the removal of debris at AEC 1B and removal of surficial debris at AEC 1C are similar to those discussed in Section 5.3.5. However, sediment and erosion control measures at AEC 1C would be more limited due to the anticipated reduced level of disturbance under this strategy (assumed to be a total area of 500 m^2).

5.5.6 Remediation and Post-Remediation Monitoring

Wildlife and wildlife tree surveys would likely be required in advance of the remediation activities.

Remediation and post-remediation monitoring at AEC 1B (marsh area) would be limited to the evaluation of turbidity parameters in advance of and following remediation to evaluate the timing of the removal of the sediment curtain and completion of an EM survey to confirm that all large debris has been removed prior to equipment demobilization.

Geotechnical monitoring of the remediation activities in AEC 1C would be required based on general slope stability concerns and to provide technical advice regarding sediment and erosion control measures following debris removal. An environmental monitor for wildlife considerations would also be required for the duration of the remediation activities.

The removal of the surficial debris at AEC 1C would be monitored visually during the work program.

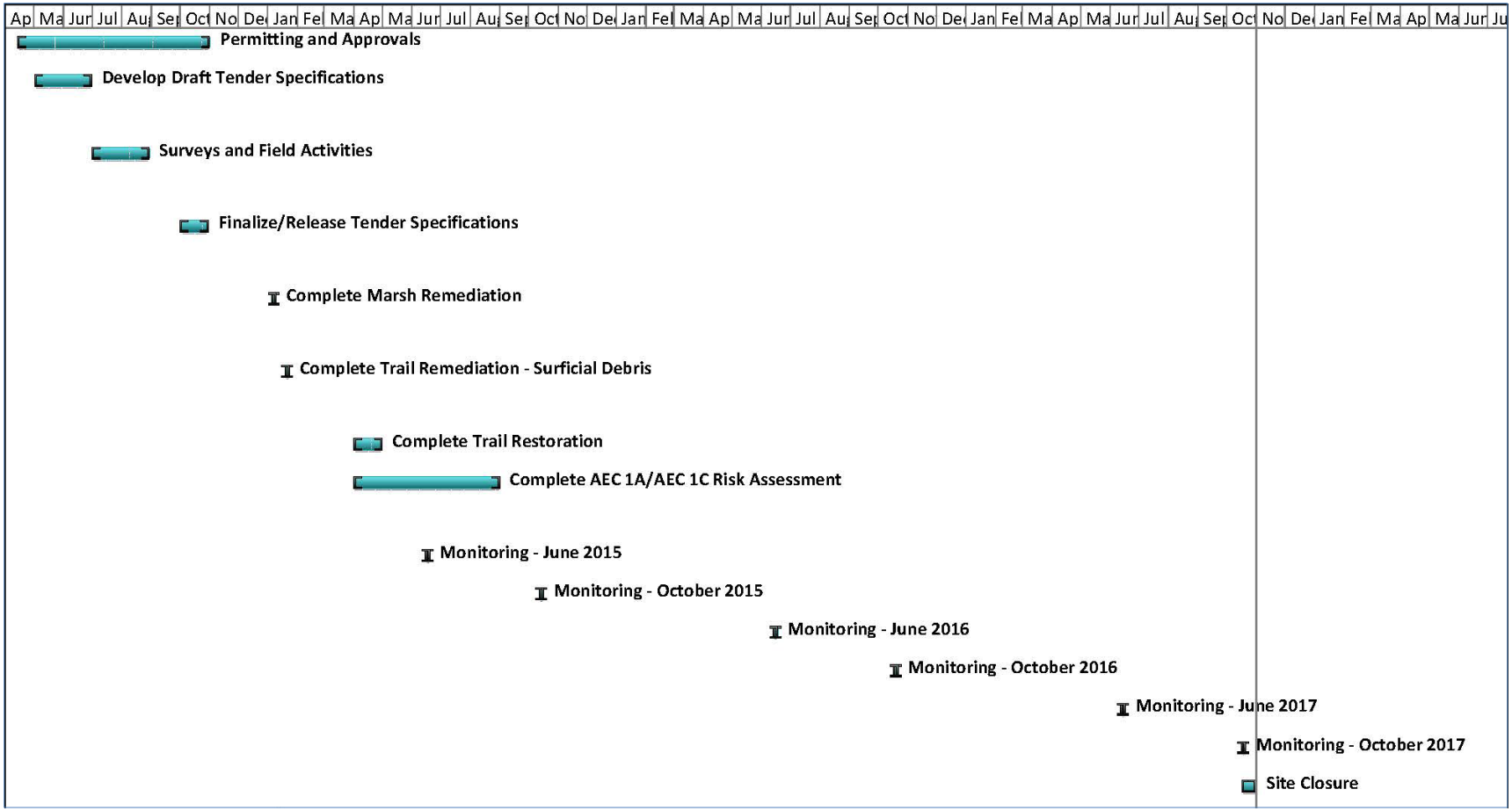
Sediment and erosion control measures and other restoration activities would be required in areas of soil disturbance following the surficial debris removal at AEC 1C. Monitoring of post-remediation restoration progress (i.e. establishment of native grasses/plants) and surface erosion should be conducted twice per year during non-frozen ground conditions for at least three years following the remediation works. Since no excavation of the slope would be conducted under this strategy, it is assumed that a geotechnical monitor would not be required to evaluate slope stability.

The metrics for evaluating compliance with the remediation objectives include the following:

- AEC 1B – confirmation via EM survey that all large debris has been removed.
- AEC 1B – confirmation that surface water turbidity parameters (e.g. total suspended and total dissolved solids) are consistent with pre-remediation conditions.
- AEC 1C – visual confirmation that all large debris has been removed.
- AEC 1C – visual confirmation that grasses/plants are re-establishing in disturbed areas and that there is no evidence of significant erosion.

5.5.7 Conceptual Schedule

The conceptual schedule for the implementation of the RAP is summarized in the Gantt chart on the following page. Key components of the RAP are identified, including post-remediation monitoring.


Permitting and Approvals
Develop Draft Tender Specifications
Surveys and Field Activities
Finalize/Release Tender Specifications
Complete Marsh Remediation
Complete Trail Remediation - Surficial Debris
Complete Trail Restoration
Complete AEC 1A/AEC 1C Risk Assessment
Monitoring - June 2015
Monitoring - October 2015
Monitoring - June 2016
Monitoring - October 2016
Monitoring - June 2017
Monitoring - October 2017
Site Closure

5.5.8 Communication Strategy

The implementation of the communication strategy discussed in Section 5.3.8 is recommended.

5.5.9 Contingency Plans

Contingency measures to mitigate potential adverse effects to receptors have been incorporated into the remediation strategy discussed above. Limiting the work program in AEC 1C to the removal of surficial debris will minimize the total area of disturbance and reduce impacts to slope stability.

Following remediation, the timely restoration of the disturbed areas and monitoring of restoration progress and soil erosion would also mitigate potential adverse effects to receptors.

5.5.10 Costs

The table below summarizes the approximate costs associated with the implementation and execution of the RAP (based on surficial debris removal at AEC 1C and debris removal at AEC 1B) through to site closure. Costs provided are exclusive of taxes. A detailed cost breakdown is provided in Table 7 following the report text.

Table G
Cost Estimate – Remediation of AEC 1B and AEC 1C (Surficial Debris Only)

Task	Cost Breakdown	Estimated Cost
1A - Permits/Approvals	Labour (SLR fees)	$5000
1B – Tender Specification Development	Labour (SLR fees)	$8750
	Direct Expenses (Subcontractors)	$4000
1C – Surveys and Field Activities	Labour	$13360
	Travel and Living	$3965
	Direct Expenses (Subcontractors)	$5035
1D – Finalize Tender Specifications	Labour	$5625
	Travel and Living	$915
2A – AEC 1B Remediation	Labour	$13860
	Travel and Living	$3965
	Direct Expenses (Subcontractors)	$93290
2B – AEC 1C (Surficial Debris) Remediation	Labour	$16070
	Travel and Living	$4975
	Direct Expenses (Subcontractors)	$145310
3A – Site Restoration	Labour	$6000
	Travel and Living	$1985
	Direct Expenses (Subcontractors)	$25000
3B – Post-Remedial Monitoring	Labour	$21600
	Travel and Living	$8880
	Direct Expenses (Subcontractors)	$35
3C – Complete AEC 1A/1C SSHHERA	Labour	$21805
3D – Reporting and Site Closure Requirements	Labour	$16600
	Total	$426025
	20% Contingency	$85205
	Total Including Contingency	$511230

The cost estimate above assumes the following:

- Permits and approvals would be obtained from regulators and/or stakeholders prior to Fall 2014.
- Any additional wildlife permits (if required following wildlife surveys) would be readily obtained and would not delay the project schedule.
- The volume of materials at AEC 1B and AEC 1C are as estimated.
- The density of debris is approximately two tonnes per cubic metre.
- Sufficient ice would be present on the marsh to support the weight of the necessary equipment.
- Spider-type excavators would be able to remove the debris in the marsh.
- The debris from the marsh would need to be transported to the staging area using helicopters.
- Helicopters could move approximately 6.5 tonnes of debris per hour from the marsh to the staging area.
- Transport of the surficial debris at AEC 1C would require additional measures (e.g. crane) if improvements cannot be made to the existing trail.
- The debris could be disposed at the Regional District of East Kootenay Columbia Valley landfill at the rates quoted in this RAP.
- The surficial debris at AEC 1C could be readily removed manually or by a spider-type excavator and would not result in extensive soil disturbance.
- The Environmental and Geotechnical Monitors would not identify any hazards or risks to receptors which requires a work stoppage.
- The coconut fibre mat cover and re-seeding would be sufficient to prevent soil erosion and allow the establishment of native plant communities on the slope within a period of three years following remediation.
- Post-remedial surface water quality would return to baseline conditions.
- SLR field personnel would work on an approximate nine day changeover cycle.

5.5.11 Uncertainties

The primary uncertainties associated with the RAP include the following:

- Issuance of permits/approvals from regulators/stakeholders.
- Estimate of the density of the debris at AEC 1C.
- Approval to conduct improvements to the access trail to transport surficial debris from AEC 1C to the staging area.
- Potential for increases in landfill tipping fees prior to completing remediation.
- Long-term restoration of remediated slopes at AEC 1C.

5.6 Remediation Strategy – Surficial Debris Removal at AEC 1C Only

SLR has also developed a remediation strategy based on the removal of surficial debris in AEC 1C only; no removal of debris at AEC 1B would be conducted. Key components of the remediation strategy are described and a conceptual schedule is presented. Costs to execute the remediation strategy are also provided.

5.6.1 Remediation Objectives

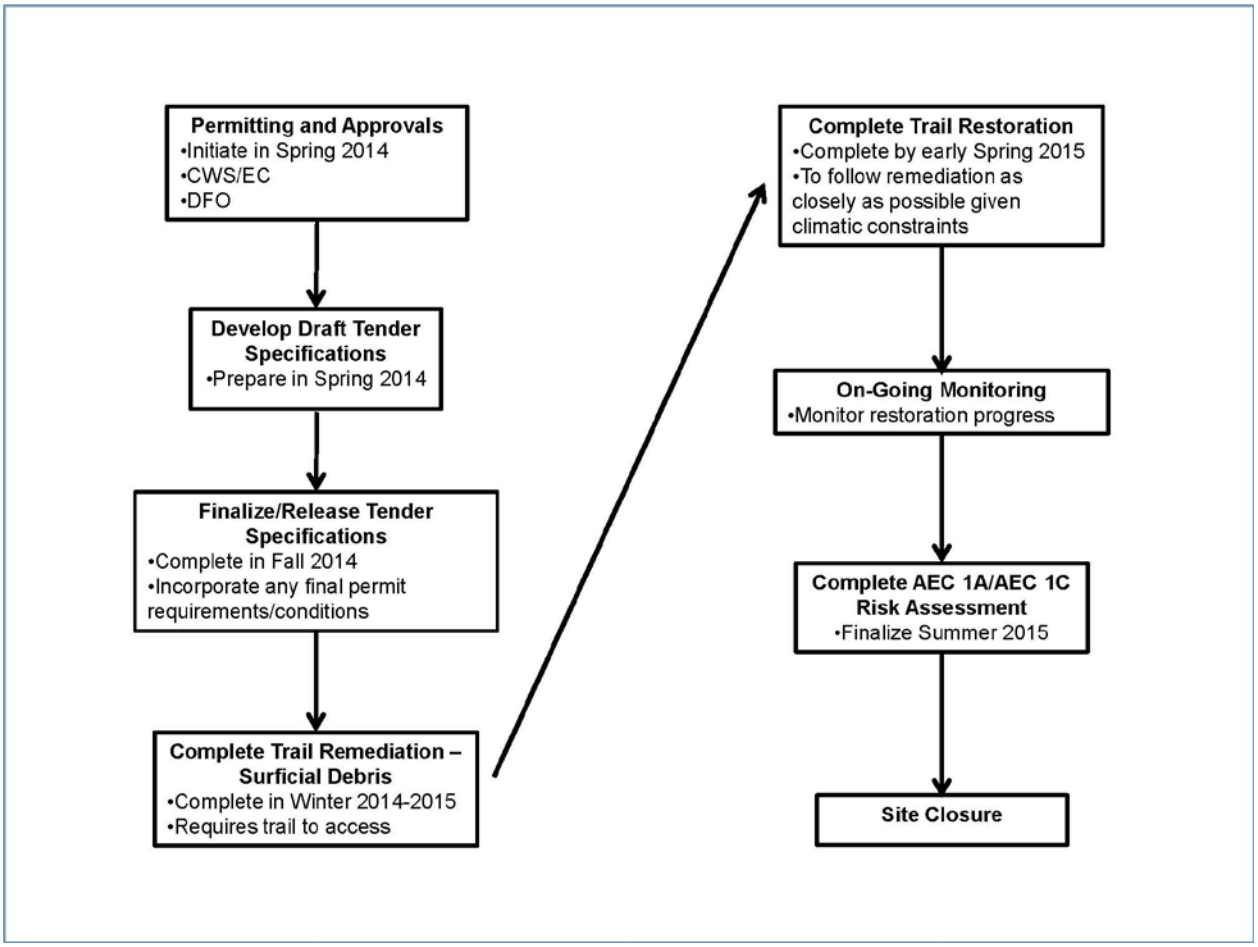
The objective of the selected remediation option is to reduce the uncertainty associated with risk assessment of the contamination at the Site through the removal of readily accessible sources of potential future soil contamination at AEC 1C (i.e. surficial debris).

5.6.2 Regulatory Requirements

As no work would be conducted in the marsh under this strategy, it is anticipated that the regulatory requirements would be limited to the issuance of a permit from CWS and issuance of provincial wildlife permits (if required). However, previous works in the trail area have customarily included discussions with FOC and it is recommended that this approach be taken for the proposed work program. Discussions with EC regarding SAR at the Site are also recommended. It is unlikely that approval to use the portion of the trail that is located on the adjacent provincial land will be required for the work program.

5.6.3 Strategy Overview

The components of the remediation strategy are depicted in the flowchart below.



5.6.4 Conceptual Remediation Program

The following sections discuss in further detail the components listed in the previous flowchart.

Remediation Preparation

Two tasks comprise the remediation preparation component of the project:

- Application for permits/approvals and liaison with stakeholders and regulators.
- Preparation of tender specifications (draft and final versions).

It is recommended that the permitting and approval component of the project be initiated early in Spring 2014. The preparation of draft NMS tender specifications for the project works should be initiated in Spring 2014 to allow for any supplementary remediation planning information to be collected in Summer 2014 and facilitate any modifications to the tender specifications that may result. The tender specifications for the project would be finalized in Fall 2014.

No pre-remediation field activities would be conducted as previous environmental monitoring of the trail area has not identified issues in the proposed work areas; it is anticipated that wildlife surveying can be conducted immediately prior to the debris removal program.

AEC 1C (Trail Area) Remediation

The remediation of AEC 1C would be limited to the removal of surficial debris across the AEC. It is recommended that the remediation activities at AEC 1C be conducted in Winter 2014-2015 to reduce disturbance and due to general slope stability concerns.

The geotechnical implications of remedial excavation activities at AEC 1C have been discussed in Section 5.3.4.

The remediation works at AEC 1C would involve the use of specialized equipment (i.e. spider-type hoes) to remove the surficial debris areas. Additional measures (i.e. crane) would be required to move surficial debris at AEC 1C to the staging area if significant improvements cannot be made to the existing trail.

Debris removed from AEC 1C would be transported for disposal from the designated staging area to the Regional District of East Kootenay Columbia Valley landfill via Westside Road.

Post-Remediation Work

The post-remediation components of the project would be limited to restoration activities, post-remediation monitoring and completion of the SSHHERA for AEC 1A and AEC 1C. Erosion and sediment control measures would only be implemented in areas where surficial debris removal has resulted in soil disturbance. Details of the post-remediation monitoring program are detailed in Section 5.6.6.

5.6.5 Post-Remediation Sediment and Erosion Control and Other Restoration Activities

The creation of surface roughness to control erosion at AEC 1C following debris removal is strongly recommended. Specifically, surface roughness should be created through the installation of coconut fibre mat cover and/or deposition of coarse woody debris. Details of the

surface roughness measures are provided in Section 5.3.5. It is assumed that sediment and erosion control measures at AEC 1C would be limited to a total area of 500 m^2.

Additional restoration measures include seeding disturbed areas with a native grass mix in the spring following the remediation activities. Other measures that may be considered include the spot-treatment of any observed weed species with a soil contact herbicide.

5.6.6 Remediation and Post-Remediation Monitoring

Wildlife and wildlife tree surveys would be conducted immediately prior to the remediation activities. An environmental monitor for wildlife considerations would also be required for the duration of the remediation activities.

Geotechnical monitoring of the remediation activities in AEC 1C would be required based on general slope stability concerns and to provide technical advice regarding sediment and erosion control measures following debris removal.

The removal of the surficial debris at AEC 1C would be monitored visually during the work program.

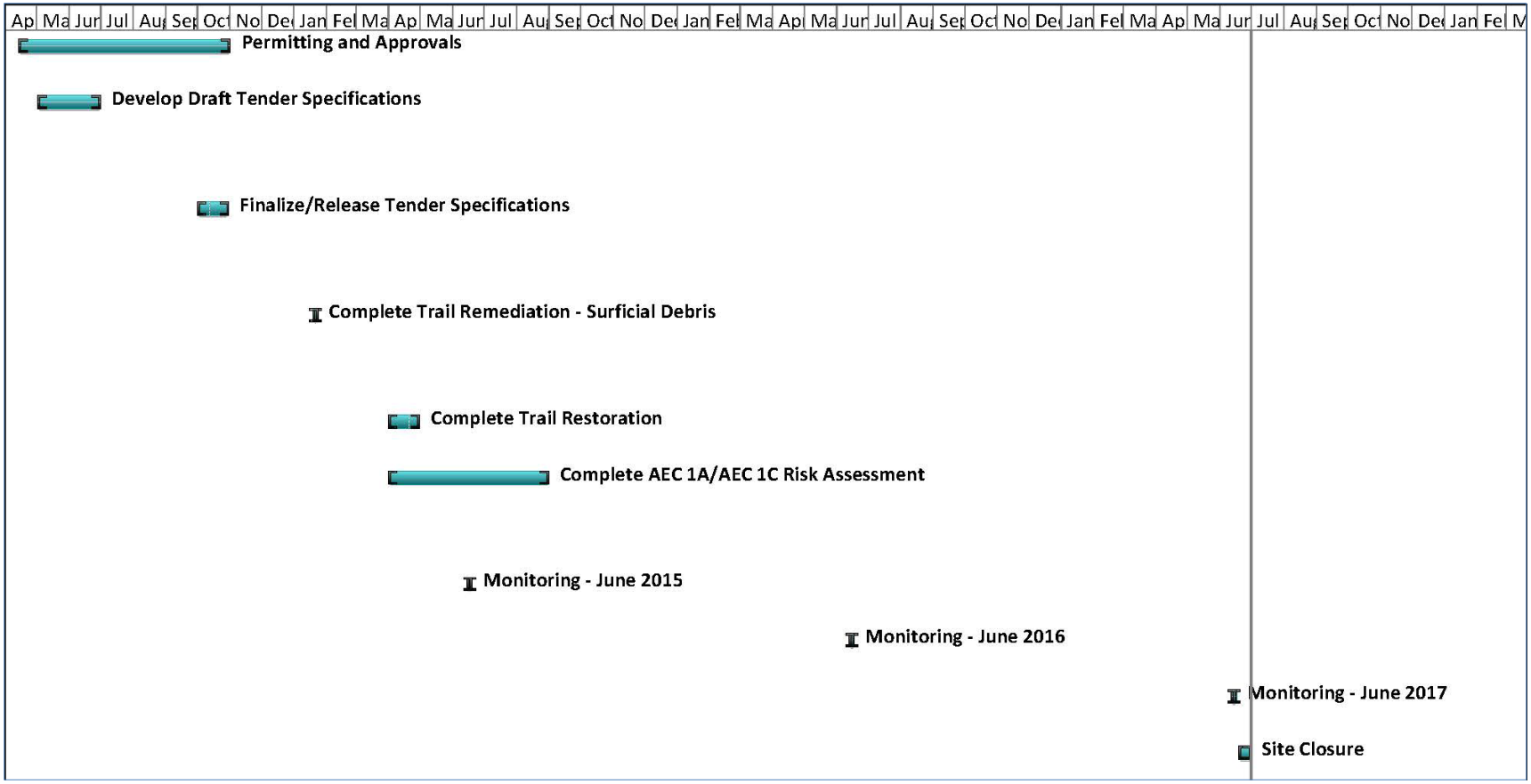
Sediment and erosion control measures and other restoration activities would be required in areas of soil disturbance following the surficial debris removal at AEC 1C. Monitoring of post-remediation restoration progress (i.e. establishment of native grasses/plants) and surface erosion should be conducted annually during non-frozen ground conditions for at least three years following the remediation works. Since no excavation of the slope would be conducted under this strategy, it is assumed that a geotechnical monitor would not be required to evaluate slope stability.

The metrics for evaluating compliance with the remediation objectives at AEC 1C include the following:

- Visual confirmation that all large debris has been removed.
- Visual confirmation that grasses/plants are re-establishing in disturbed areas and that there is no evidence of significant erosion.

5.6.7 Conceptual Schedule

The conceptual schedule for the implementation of the RAP is summarized in the Gantt chart on the following page. Key components of the RAP are identified, including post-remediation monitoring.


Permitting and Approvals
Develop Draft Tender Specifications
Finalize/Release Tender Specifications
Complete Trail Remediation - Surficial Debris
Complete Trail Restoration
Complete AEC 1A/AEC 1C Risk Assessment
Monitoring - June 2015
Monitoring - June 2016
Monitoring - June 2017
Site Closure

5.6.8 Communication Strategy

The implementation of the communication strategy discussed in Section 5.3.8 is recommended.

5.6.9 Contingency Plans

Contingency measures to mitigate potential adverse effects to receptors have been incorporated into the remediation strategy discussed above. Limiting the work program in AEC 1C to the removal of surficial debris will minimize the total area of disturbance and reduce impacts to slope stability.

Following remediation, the timely restoration of the disturbed areas and monitoring of restoration progress and soil erosion would also mitigate potential adverse effects to receptors.

5.6.10 Costs

The table below summarizes the approximate costs associated with the implementation and execution of the RAP (based on surficial debris removal at AEC 1C only) through to site closure. Costs provided are exclusive of taxes. A detailed cost breakdown is provided in Table 8 following the report text.

Table H
Cost Estimate – Remediation of AEC 1C (Surficial Debris Only)

Task	Cost Breakdown	Estimated Cost
1A - Permits/Approvals	Labour (SLR fees)	$3125
1B – Tender Specification Development	Labour (SLR fees)	$5000
	Direct Expenses (Subcontractors)	$4000
1C – Finalize Tender Specifications	Labour	$5625
	Travel and Living	$915
2 – AEC 1C (Surficial Debris) Remediation	Labour	$16070
	Travel and Living	$4975
	Direct Expenses (Subcontractors)	$152310
3A – Site Restoration	Labour	$6000
	Travel and Living	$1980
	Direct Expenses (Subcontractors)	$25000
3B – Post-Remedial Monitoring	Labour	$10800
	Travel and Living	$4440
3C – Complete AEC 1A/1C SSHHERA	Labour	$21805
3D – Reporting and Site Closure Requirements	Labour	$10020
	Total	$272065
	20% Contingency	$54415
	Total Including Contingency	$326480

The cost estimate above assumes the following:

- Permits and approvals would be obtained from regulators and/or stakeholders prior to Fall 2014.
- Wildlife permits are likely not required based on previous observations in the trail area.
- The volume of material at AEC 1C is as estimated.
- The density of debris is approximately two tonnes per cubic metre.

- Transport of the surficial debris at AEC 1C would require additional measures (e.g. crane) if improvements cannot be made to the existing trail.
- The debris could be disposed at the Regional District of East Kootenay Columbia Valley landfill at the rates quoted in this RAP.
- The surficial debris at AEC 1C could be readily removed manually or by a spider-type excavator and would not result in extensive soil disturbance.
- The Environmental and Geotechnical Monitors would not identify any hazards or risks to receptors which requires a work stoppage.
- The coconut fibre mat cover and re-seeding would be sufficient to prevent soil erosion and allow the establishment of native plant communities on the slope within a period of three years following remediation.
- SLR field personnel would work on an approximate nine day changeover cycle.

5.6.11 Uncertainties

The primary uncertainties associated with the RAP include the following:

- Issuance of permits/approvals from regulators/stakeholders.
- Estimate of the density of the debris at AEC 1C.
- Approval to conduct improvements to the access trail to transport surface debris from AEC 1C to the staging area.
- Potential for increases in landfill tipping fees prior to completing remediation.
- Long-term restoration of remediated slopes at AEC 1C.

5.7 Remediation Strategy – Risk Assessment Only

The following section has been prepared to allow comparison of the previous remediation strategies to a baseline which does not include any further removal of debris or soil at the Site.

5.7.1 Remediation Objectives

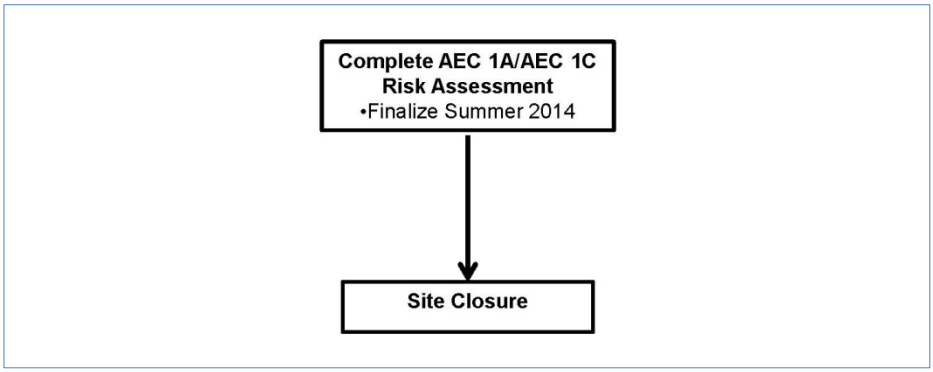
The objective of this strategy is to provide site closure without conducting any additional debris removal at the Site. No reduction in risk assessment uncertainties would be achieved under this strategy.

5.7.2 Regulatory Requirements

No permits would be required under this strategy. However, approval of the landowner (i.e. CWS) and other stakeholders to implement this strategy to achieve site closure would be required.

5.7.3 Strategy Overview

The components of the remediation strategy are depicted in the flowchart below.



5.7.4 Conceptual Remediation Program

The remediation program would consist of the completion of a SSHHERA for AEC 1A and AEC 1C and the SCT to demonstrate site closure.

5.7.5 Post-Remediation Sediment and Erosion Control and Other Restoration Activities

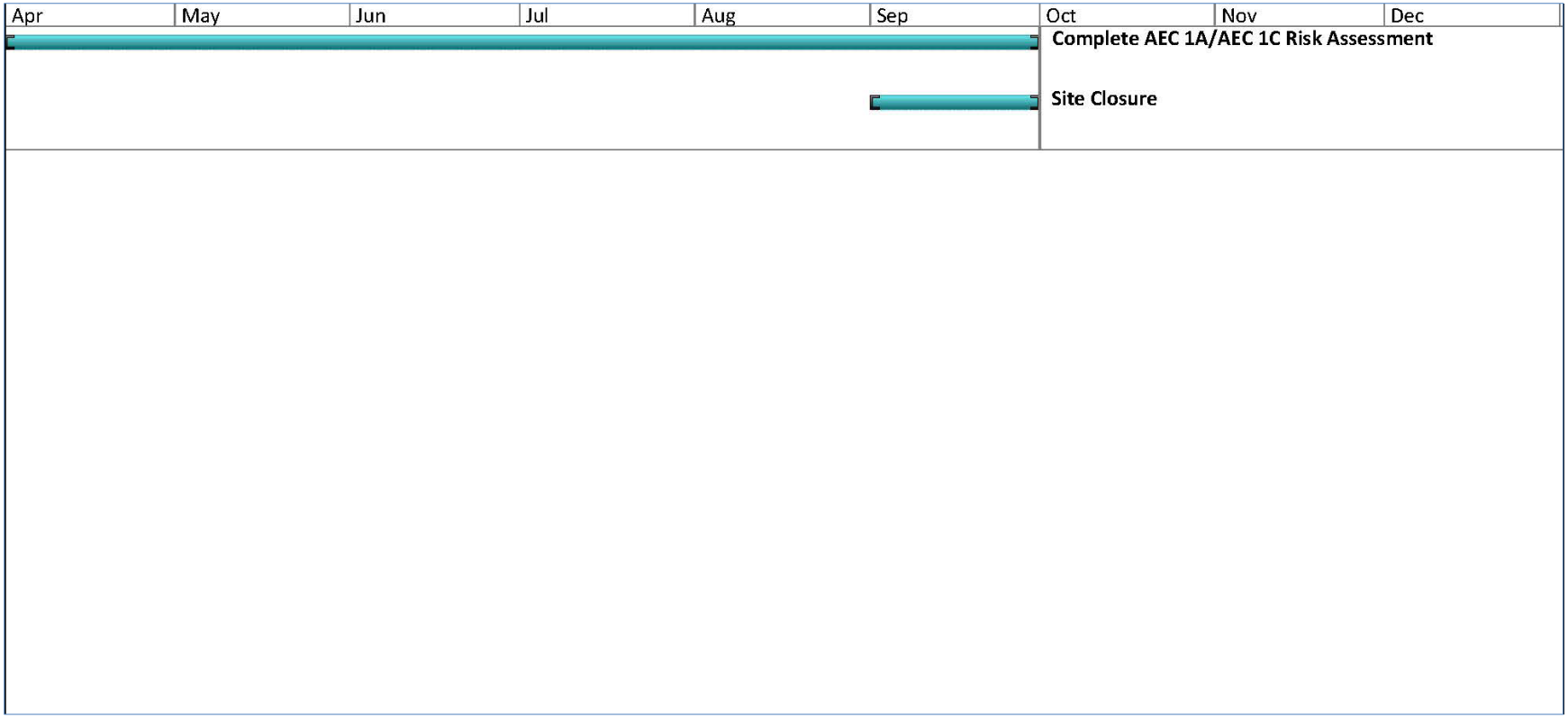
No post-remediation activities would be required.

5.7.6 Remediation and Post-Remediation Monitoring

As no active remediation would be conducted, no monitoring activities would be required.

5.7.7 Conceptual Schedule

The conceptual schedule for the implementation of the RAP is summarized in the Gantt chart on the following page. Key components of the RAP are identified.


Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Complete AEC 1A/AEC 1C Risk Assessment
Site Closure

5.7.8 Communication Strategy

A communication strategy would not be required.

5.7.9 Contingency Plans

Contingency plans would not be required.

5.7.10 Costs

The table below summarizes the approximate costs associated with the implementation and execution of the RAP (based on no debris/soil removal) through to site closure. Costs provided are exclusive of taxes. A detailed cost breakdown is provided in Table 9 following the report text.

Table I
Cost Estimate – Risk Assessment Only

Task	Cost Breakdown	Estimated Cost
1 – Complete AEC 1A/1C SSHHERA and Site Closure Requirements	Labour	$27755
	Total	$27755
	20% Contingency	$5550
	Total Including Contingency	$33305

The cost estimate above assumes the following:

- Approval to implement the strategy to achieve site closure would be obtained from regulators and/or stakeholders.
- The uncertainties associated with the SSHHERA would not preclude site closure.

5.7.11 Uncertainties

The primary uncertainties associated with the RAP include the following:

- Acceptance of the strategy by regulators/stakeholders.
- Long-term impact of the presence of debris and potential on-going contaminant sources at AEC 1B and AEC 1C.
- The natural instability of the glacio-lacustrine silt slopes and the uncertainty regarding the probable future soil concentrations and future spatial extent of impacts both horizontally and vertically.

6.0 ADDITIONAL ENVIRONMENT CANADA POLICY REQUIREMENTS

As part of the 2013-2014 site works, SLR completed the Federal Contaminated Sites Inventory (FCSI) input form, updated the Conceptual Site Model (CSM) prepared previously for the Site and completed all applicable parts of the Site Closure Tool (SCT). The FCSI input form is included in Appendix E, the updated CSM has been included as Drawing 6 and the SCT is included in Appendix F.

7.0 CLOSURE

SLR's liability is specified in the contract with PWGSC. Copyright in the Material shall vest in Canada.

This report has been prepared and the work referred to in this report has been undertaken by SLR for PWGSC. It is intended for the sole and exclusive use of PWGSC and its authorized agents for the purpose(s) set out in this report. Any use of, reliance on or decision made based on this report by any person other than PWGSC for any purpose, or by PWGSC for a purpose other than the purpose(s) set out in this report, is the sole responsibility of such other person or PWGSC. PWGSC and SLR make no representation or warranty to any other person with regard to this report and the work referred to in this report and they accept no duty of care to any other person or any liability or responsibility whatsoever for any losses, expenses, damages, fines, penalties or other harm that may be suffered or incurred by any other person as a result of the use of, reliance on, any decision made or any action taken based on this report or the work referred to in this report.

This report has been prepared for specific application to this site and is based on the interpretation of data collected from field investigations and the results of laboratory analyses, which were limited to the quantification in select samples of those substances specifically identified in the report. Unless otherwise stated, the findings set out in this report cannot be extended to previous or future site conditions; portions of the Site which were unavailable for direct investigation; subsurface locations which were not investigated directly; or chemical parameters, materials or analysis which were not addressed. Substances other than those addressed by the investigation described in this report may exist within the Site; substances addressed by the investigation may exist in areas of the Site not investigated and concentrations of substances addressed which are different than those reported may exist in areas other than the locations from which samples were taken. SLR expresses no warranty with respect to the accuracy of the laboratory analyses, methodologies used, or presentation of analytical results by the laboratory. Actual concentrations of the substances identified in the samples submitted may vary according to the extraction and testing procedures used.

As the evaluation and conclusions reported herein do not preclude the existence of other chemical compounds and/or that variations of conditions within the site may be possible, this report should be used for informational purposes only and should absolutely not be construed as a comprehensive hydrogeological or chemical characterization of the site. If site conditions change or if any additional information becomes available at a future date, modifications to the findings, conclusions and recommendations in this report may be necessary.

Nothing in this report is intended to constitute or provide a legal opinion. SLR makes no representation as to the requirements of or compliance with environmental laws, rules, regulations or policies established by federal, provincial or local government bodies. Revisions to the regulatory standards referred to in this report may be expected over time. As a result, modifications to the findings, conclusions and recommendations in this report may be necessary.

TABLES

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008

TABLE 1: SOIL CHEMISTRY RESULTS - PETROLEUM HYDROCARBON CONSTITUENTS AND MTBE (mg/kg)

Sample ID	Date	Depth (m)	HSVL (ppmv)	Benzene	Ethylbenzene	Toluene	Xylenes	MTBE	F1 (C6-10)	F2 (C10-16)	F3 (C16-34)	F4 (C34-50+)
RA1	30-Oct-2013	0.5	5	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
DUP C (Dup RA1)	30-Oct-2013	0.5	---	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
RA2	30-Oct-2013	0.5	LTDL	---	---	---	---	---	---	< 30	< 50	< 50
RA3	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
RA4	30-Oct-2013	0.5	LTDL	---	---	---	---	---	---	< 30	< 50	< 50
RA5	30-Oct-2013	0.3	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	68	< 50
RA6	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	67	188
RA7	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
RA8	30-Oct-2013	0.5	LTDL	---	---	---	---	---	---	< 30	< 50	< 50
TP1-1	29-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP1-2	29-Oct-2013	1.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP1-4	29-Oct-2013	3.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP2-1	29-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP2-2	29-Oct-2013	1.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP2-3	29-Oct-2013	2.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP2-4	29-Oct-2013	3.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP2-5	29-Oct-2013	4.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP3-1	29-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP3-2	29-Oct-2013	1.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP4-1	29-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP5-1	29-Oct-2013	0.5	10	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP6-1	29-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP7-1	29-Oct-2013	0.5	10	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP7-2	29-Oct-2013	1.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
DUP A (Dup TP7-2)	29-Oct-2013	1.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP7-3	29-Oct-2013	2.0	---	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP7-4	29-Oct-2013	3.0	15	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	170	84
TP7-5	29-Oct-2013	4.0	10	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	64	< 50
TP8-1	29-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP8-2	29-Oct-2013	1.0	5	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP8-3	29-Oct-2013	2.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP8-4	29-Oct-2013	3.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP8-5	29-Oct-2013	4.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP10-1	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP11-1	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP11-2	30-Oct-2013	1.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
DUP B (Dup TP11-2)	30-Oct-2013	1.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP11-3	30-Oct-2013	2.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP12-1	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP13-1	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP14-1	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
DUP D (Dup TP14-1)	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
CCME ALfgs		ns	ns	0.0068	0.018	0.08	2.4	ns	---	---	---	---
CCME ALfg		ns	ns	0.0068	0.018	0.08	2.4	ns	---	---	---	---
CCME ALfvs		ns	ns	---	---	---	---	---	610	3100	ns	ns
CCME ALfvb		ns	ns	---	---	---	---	---	710	3600	ns	ns
CCME ALgwf		ns	ns	---	---	---	---	---	170	230	ns	ns
CCME ALml		ns	ns	---	---	---	---	---	800	1000	3500	10000
CCME ALescf		ns	ns	---	---	---	---	---	210	150	1300	5600
CCME ALfdc		ns	ns	---	---	---	---	---	12000	6800	15000	21000
						RPD (%)						
DUPA/TP7-2				n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c
DUPB/TP11-2				n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.
DUPC/RA1				n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.
DUPD/TP14-1				n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.

Notes:
m - metres
mg/kg - milligrams per kilogram
HSVL (ppmv) - headspace vapour level (parts per million by volume)
LTDL - Less than instrument detection limit
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
MTBE - methyl tert-butyl ether
VPHs - volatile petroleum hydrocarbons (C6-10), excluding benzene, ethylbenzene, toluene, xylenes
ns - no standard listed
CCME ALfgs: CCME Canadian Soil Quality Guidelines for BTEX, Agricultural Fine-grained Sub-surface (lowest human and environmental health guidelines)
CCME ALfg: CCME Canadian Soil Quality Guidelines for BTEX, Agricultural Fine-grained Surface (lowest human and environmental health guidelines)
CCME ALfvs: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Vapour Inhalation (indoor, slab-on-grade)
CCME ALfvb: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Vapour Inhalation (indoor, basement)
CCME ALgwf: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Protection of Potable GW
CCME ALml: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Management Limit
CCME ALescf: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Eco Soil Contact
CCME ALfdc: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Direct Contact

TABLE 2: SOIL CHEMISTRY RESULTS - PAH PARAMETERS (mg/kg)

Sample ID	Date	Depth (m)	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	IACR	Benzo(a)pyrene Equivalency
RA1	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
DUP C (Dup RA1)	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
RA2	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
RA3	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
RA4	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
RA5	30-Oct-2013	0.3	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	0.018	< 0.01	< 0.01	0.014	< 0.005	0.019	< 0.01	< 0.01	< 0.01	< 0.01	0.025	0.020	0.19	< 0.02
RA6	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
RA7	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
RA8	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP1-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP1-2	29-Oct-2013	1.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	0.013	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.011	0.16	< 0.02
TP1-4	29-Oct-2013	3.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP2-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP2-2	29-Oct-2013	1.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP2-3	29-Oct-2013	2.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP2-4	29-Oct-2013	3.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP2-5	29-Oct-2013	4.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP3-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP3-2	29-Oct-2013	1.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP4-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP5-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP6-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP7-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP7-2	29-Oct-2013	1.0	< 0.02	< 0.02	< 0.02	< 0.02	0.028	0.037	0.031	< 0.02	0.025	< 0.02	< 0.02	< 0.02	0.021	< 0.02	< 0.02	< 0.02	0.023	0.47	0.046
DUP A (Dup TP7-2)	29-Oct-2013	1.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP7-3	29-Oct-2013	2.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP7-4	29-Oct-2013	3.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	0.015	< 0.01	< 0.01	< 0.01	< 0.005	0.010	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.013	0.17	< 0.02
TP7-5	29-Oct-2013	4.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP8-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	0.011	0.023	< 0.01	< 0.01	0.012	< 0.005	< 0.01	< 0.01	0.011	< 0.01	< 0.01	< 0.01	< 0.01	0.24	< 0.02
TP8-2	29-Oct-2013	1.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP8-3	29-Oct-2013	2.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP8-4	29-Oct-2013	3.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP8-5	29-Oct-2013	4.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP10-1	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP11-1	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP11-2	30-Oct-2013	1.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
DUP B (Dup TP11-2)	30-Oct-2013	1.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP11-3	30-Oct-2013	2.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP12-1	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP13-1	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP14-1	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
DUP D (Dup TP14-1)	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
CCME TPE/IACR		ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	1	5.3
CCME ALpw		ns	ns	ns	ns	see IACR	see IACR	see IACR	see IACR	see IACR	see IACR	see IACR	ns	ns	see IACR	ns	ns	ns	ns	ns	ns
CCME ALdh		ns	ns	ns	ns	see TPE	see TPE	see TPE	see TPE	see TPE	see TPE	see TPE	ns	ns	see TPE	ns	ns	ns	ns	ns	ns
CCME ALsc		ns	ns	ns	2.5	ns	20	ns	ns	ns	ns	ns	50	ns	ns	ns	ns	ns	ns	ns	ns
CCME ALi		ns	21.5	ns	61.5	6.2	0.6	6.2	ns	6.2	6.2	ns	15.4	15.4	ns	ns	8.8	43	7.7	ns	ns
CCME ALfl		ns	0.28	320	ns	ns	8800	ns	ns	ns	ns	ns	ns	0.25	ns	ns	0.013	0.046	ns	ns	ns
CCME ALi		ns	ns	ns	ns	0.1	ns	0.1	ns	0.1	ns	0.1	ns	ns	0.1	ns	ns	0.1	0.1	ns	ns
CCME ALe		ns	ns	ns	2.5	ns	20	ns	ns	ns	ns	ns	50	ns	ns	ns	0.6	ns	ns	ns	ns
										RPD (%)											
DUPA/TP7-2			n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.
DUPB/TP11-2			n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.
DUPC/RA1			n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.
DUPD/TP14-1			n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.

Notes:
m - metres
PAH - polycyclic aromatic hydrocarbons
TPE - Total Potency Equivalency (1X10-5). This is only applicable in the top 1.5m
IACR - Index of Additive Cancer Risk (for the protection of potable water)
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard/guideline listed
Exceeds CCME ALpw: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Human Health guidelines, Protection of Potable Water
Exceeds CCME ALdh: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Human Health guidelines, Direct Contact
Exceeds CCME ALsc: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Environmental Health guidelines, Soil Contact
Exceeds CCME ALi: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Environmental Health guidelines, Soil and Food Ingestion
Exceeds CCME ALfl: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Environmental Health guidelines, Protection of Freshwater Life
Exceeds CCME ALi: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Environmental Health guidelines, Interim Soil Quality Criteria (CCME 1991)
Exceeds CCME ALe: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Environmental Health guidelines, Environmental Health
Exceeds CCME TPE/IACR: CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health - TPE and IACR Calculations

TABLE 3: SOIL CHEMISTRY RESULTS - METALS PARAMETERS (mg/kg)

Sample ID	Date	Depth (m)	pH	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium (+6)	Chromium (total)	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Tin	Uranium	Vanadium	Zinc
RA1	30-Oct-2013	0.5	---	8	---	---	---	---	< 0.1	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DUP C (Dup RA1)	30-Oct-2013	0.5	---	---	---	---	---	---	< 0.1	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RA3	30-Oct-2013	0.5	**9.34**	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	< 2	---	---	---
RA4	30-Oct-2013	0.5	**9.43**	---	---	---	---	< 0.050	---	---	---	---	7.46	0.0149	---	---	---	---	---	< 2	---	---	31.6
RA5	30-Oct-2013	0.3	**8.08**	1.13	6.18	200	0.28	**1.94**	0.23	27.6	7.54	26.1	**72.8**	**7.26**	0.74	19.2	< 0.2	4.02	< 0.05	3.9	0.391	10.6	**285**
RA6	30-Oct-2013	0.5	**8.16**	4.90	7.56	136	0.21	0.796	0.10	16.7	8.31	46.0	30.4	0.218	1.25	18.8	0.26	0.15	< 0.05	**50.8**	0.558	8.39	**1020**
RA7	30-Oct-2013	0.5	**9.14**	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	< 2	---	---	52.4
TP1-1	29-Oct-2013	0.5	**8.84**	0.47	6.05	122	0.27	0.140	< 0.1	16.8	8.25	15.4	17.9	0.0196	< 0.5	20.1	< 0.2	< 0.1	< 0.05	2.9	0.803	10.9	65.2
TP1-2	29-Oct-2013	1.0	**8.33**	0.97	6.23	128	0.28	0.371	---	18.2	9.06	18.4	24.9	0.0199	0.54	22.0	< 0.2	< 0.1	< 0.05	4.5	0.696	11.6	111
TP1-3	29-Oct-2013	2.0	**8.46**	---	---	---	---	0.073	---	---	---	---	9.34	---	---	18.6	---	---	---	< 2	---	---	42.7
TP1-4	29-Oct-2013	3.0	**8.90**	0.29	5.78	94.7	0.21	0.054	---	14.1	7.96	13.9	8.10	0.0090	< 0.5	18.4	< 0.2	< 0.1	< 0.05	< 2	0.727	9.35	37.7
TP2-1	29-Oct-2013	0.5	**8.57**	0.44	6.17	111	0.31	0.163	< 0.1	18.4	8.97	16.1	17.3	0.0163	< 0.5	25.0	< 0.2	< 0.1	< 0.05	< 2	0.636	12.3	70.5
TP2-2	29-Oct-2013	1.0	**8.56**	0.43	5.88	107	0.25	0.175	---	16.3	8.43	16.5	18.3	0.0166	< 0.5	19.9	< 0.2	< 0.1	< 0.05	< 2	0.569	10.3	69.5
TP2-3	29-Oct-2013	2.0	**8.32**	1.21	6.58	152	0.30	1.01	---	21.5	9.07	24.4	40.2	0.0190	0.74	21.7	< 0.2	0.11	< 0.05	**7.7**	0.527	11.3	168
TP2-4	29-Oct-2013	3.0	**8.13**	0.31	5.85	107	0.25	0.114	---	14.7	8.12	14.3	9.39	0.0119	< 0.5	18.2	< 0.2	< 0.1	< 0.05	< 2	0.360	10.9	43.6
TP2-5	29-Oct-2013	4.0	**8.25**	1.00	6.96	143	0.24	0.920	---	19.2	8.61	38.3	47.1	0.0208	1.04	21.9	< 0.2	< 0.1	< 0.05	**69.4**	0.512	11.0	179
TP3-1	29-Oct-2013	0.5	**8.86**	0.30	5.56	86.6	0.26	0.071	< 0.1	17.3	8.70	14.2	10.3	0.0211	< 0.5	21.4	< 0.2	< 0.1	< 0.05	< 2	0.686	11.1	46.6
TP3-2	29-Oct-2013	1.0	**8.64**	0.30	5.89	86.5	0.26	0.067	---	17.5	9.47	14.3	9.38	0.0133	0.52	21.5	< 0.2	< 0.1	< 0.05	< 2	0.696	10.8	45.8
TP4-1	29-Oct-2013	0.5	**9.01**	0.40	5.94	107	0.26	0.107	---	16.6	8.27	14.8	13.0	0.0138	< 0.5	19.8	< 0.2	< 0.1	< 0.05	< 2	0.649	11.0	50.4
TP5-1	29-Oct-2013	0.5	**9.16**	0.37	7.14	145	0.25	0.064	---	14.4	8.00	15.4	9.37	0.0198	< 0.5	18.7	< 0.2	< 0.1	< 0.05	< 2	0.739	9.70	37.2
TP6-1	29-Oct-2013	0.5	**8.67**	0.74	5.75	110	0.24	0.101	---	12.1	7.28	14.3	10.6	0.0085	< 0.5	16.6	< 0.2	< 0.1	< 0.05	< 2	0.641	9.04	42.7
TP7-1	29-Oct-2013	0.5	**8.88**	0.39	6.02	101	0.28	0.127	< 0.1	16.8	8.69	15.2	14.9	0.0162	< 0.5	20.9	< 0.2	< 0.1	< 0.05	< 2	0.610	11.2	96.2
TP7-2	29-Oct-2013	1.0	**8.21**	1.40	6.49	138	0.27	0.783	---	18.5	9.06	27.5	45.5	0.0220	0.90	**70.4**	< 0.2	< 0.1	0.053	**25.5**	0.641	10.8	**306**
DUP A (Dup TP7-2)	29-Oct-2013	1.0	**8.25**	1.00	6.04	132	0.28	1.11	---	18.5	8.76	26.6	**76.0**	0.0243	0.72	**72.0**	< 0.2	0.14	< 0.05	**14.8**	0.450	10.0	**251**
TP7-3	29-Oct-2013	2.0	**8.09**	2.94	6.97	173	0.30	0.973	---	18.9	8.69	28.1	**81.4**	0.0302	0.80	21.2	< 0.2	0.16	< 0.05	**10.7**	0.598	11.7	**288**
TP7-4	29-Oct-2013	3.0	7.75	1.47	7.10	159	0.24	**15.6**	---	18.8	8.67	36.8	**127**	0.0245	1.32	22.3	< 0.2	0.11	< 0.05	**13.8**	0.452	9.57	**493**
TP7-5	29-Oct-2013	4.0	**8.45**	1.06	6.13	112	0.24	0.614	---	17.2	8.53	21.1	42.0	0.0435	0.65	21.9	< 0.2	< 0.1	< 0.05	**6.5**	0.559	9.96	**213**
TP8-1	29-Oct-2013	0.5	**8.26**	0.54	6.16	108	0.25	0.283	< 0.1	17.0	8.42	16.4	14.9	0.0190	< 0.5	20.1	< 0.2	< 0.1	< 0.05	< 2	0.604	10.4	61.0
TP8-2	29-Oct-2013	1.0	**8.73**	0.48	6.00	105	0.27	0.212	---	16.0	8.43	16.7	17.5	0.0149	< 0.5	19.7	< 0.2	< 0.1	< 0.05	< 2	0.595	10.5	70.9
TP8-3	29-Oct-2013	2.0	**8.38**	0.90	6.07	138	0.26	0.599	---	17.0	8.25	24.3	41.8	0.0175	0.69	20.2	< 0.2	< 0.1	< 0.05	**9.7**	0.535	10.4	177
TP8-4	29-Oct-2013	3.0	**8.39**	0.50	5.97	121	0.25	0.333	---	14.7	7.79	16.9	24.7	0.0238	< 0.5	18.9	< 0.2	< 0.1	< 0.05	2.1	0.491	9.60	86.9
TP8-5	29-Oct-2013	4.0	**8.41**	0.56	5.93	112	0.24	0.404	---	14.3	7.81	17.2	23.9	0.0261	< 0.5	18.3	< 0.2	< 0.1	< 0.05	3.8	0.510	9.74	158
TP10-1	30-Oct-2013	0.5	**8.49**	0.36	6.30	85.7	0.29	0.085	---	15.9	8.58	14.9	12.9	0.0129	< 0.5	20.9	< 0.2	< 0.1	< 0.05	< 2	0.472	10.7	46.4
TP11-1	30-Oct-2013	0.5	**9.01**	0.29	5.70	70.7	0.27	0.075	< 0.1	16.3	8.09	13.5	9.03	0.0086	< 0.5	20.8	< 0.2	< 0.1	< 0.05	< 2	0.417	10.4	42.7
TP11-2	30-Oct-2013	1.0	**8.50**	0.31	5.76	89.9	0.27	0.064	---	17.3	8.52	14.3	9.92	0.0098	< 0.5	21.1	< 0.2	< 0.1	< 0.05	< 2	0.427	11.2	46.5
DUP B (Dup TP11-2)	30-Oct-2013	1.0	**8.50**	0.31	5.69	86.7	0.29	0.095	---	17.3	8.67	14.6	12.8	0.0213	< 0.5	21.0	< 0.2	< 0.1	< 0.05	< 2	0.434	11.0	54.6
TP11-3	30-Oct-2013	2.0	**9.36**	0.31	6.15	86.6	0.27	0.070	---	17.5	8.47	13.7	9.84	0.0085	< 0.5	21.4	< 0.2	< 0.1	< 0.05	< 2	0.670	11.2	44.9
TP12-1	30-Oct-2013	0.5	**8.46**	0.33	5.79	87.5	0.24	0.071	< 0.1	14.7	7.44	13.6	11.2	0.0156	< 0.5	18.2	< 0.2	< 0.1	< 0.05	< 2	0.478	10.3	43.6
TP13-1	30-Oct-2013	0.5	**8.76**	0.49	5.88	114	0.25	0.184	< 0.1	15.8	8.16	16.3	19.6	0.0298	< 0.5	19.5	< 0.2	< 0.1	< 0.05	2.9	0.626	10.7	72.5
TP14-1	30-Oct-2013	0.5	**8.94**	0.31	6.13	69.1	0.29	0.077	---	20.6	9.91	14.9	12.8	0.0250	< 0.5	25.0	< 0.2	< 0.1	< 0.05	< 2	0.707	12.4	58.5
DUP D (Dup TP14-1)	30-Oct-2013	0.5	**8.96**	0.30	5.91	68.1	0.28	0.066	---	19.8	9.54	14.9	11.1	0.0159	< 0.5	24.0	< 0.2	< 0.1	< 0.05	< 2	0.690	11.7	52.2
CCME AL		ns	>6<8	20	12	750	4	1.4	0.4	64	40	63	70	6.6	5	50	1	20	1	5	23	130	200
RPD (%)																							
DUPA/TP7-2			0.5	33.3	7.2	4.4	n.c.	34.5	---	0.0	3.4	3.3	50.2	n.c.	n.c.	2.2	n.c.	n.c.	n.c.	53.1	35.0	7.7	19.7
DUPB/TP11-2			0.0	n.c.	1.2	3.6	n.c.	n.c.	---	0.0	1.7	2.1	25.4	n.c.	n.c.	0.5	n.c.	n.c.	n.c.	n.c.	1.6	1.8	16.0
DUPC/RA1			---	---	---	---	---	---	n.c.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DUPD/TP14-1			0.2	n.c.	3.7	1.5	n.c.	n.c.	---	4.0	3.8	0.0	14.2	n.c.	n.c.	4.1	n.c.	n.c.	n.c.	n.c.	2.4	5.8	11.4

Notes:
m - metres
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
Exceeds CCME AL: CCME Canadian Environmental Quality Guidelines, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Agricultural

TABLE 4: CHEMISTRY RESULTS - SOIL TEXTURE AND TOTAL ORGANIC CARBON

Sample ID	Date	Particle size > 75µm (%)	Organic Carbon, Total (%)
RA2	30-Oct-2013	26.2	1.26
RA4	30-Oct-2013	55.0	0.33
RA7	30-Oct-2013	0.15	0.32
TP1-1	29-Oct-2013	8.07	0.55
TP2-2	29-Oct-2013	7.28	0.48
TP3-2	29-Oct-2013	1.50	0.40
TP4-1	29-Oct-2013	7.74	0.68
TP5-1	29-Oct-2013	0.12	0.32
TP7-3	29-Oct-2013	12.5	1.54
TP8-1	29-Oct-2013	9.87	0.69
TP10-1	30-Oct-2013	4.41	1.48
TP14-1	30-Oct-2013	0.29	0.28
DUP D (Dup TP14-1)	30-Oct-2013	0.10	0.12
CCME AL		ns	ns
RPD (%)			
DUP D (Dup TP14-1)		-	nc

Notes:
mg/kg - milligrams per kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
Exceeds CCME AL: CCME Canadian Environmental Quality Guidelines, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Agricultural

TABLE 5: REMEDIAL ACTION PLAN (COMPLETE EXCAVATION) - DETAILED COST BREAKDOWN

BUDGET ASSUMPTIONS:

Task 1: Obtain permits, develop and finalize tender specifications, conduct field work in support of remedial planning, prepare draft SSHHERA for AEC 1A/1C
Task 2: Conduct remediation at AEC 1B and AEC 1C
Task 3: Post-remediation site restoration, monitoring and reporting (site works, AEC 1A/1C SSHHERA, SCT, etc).

Item	Task 1 - Remediation Preparation					Task 2 - Remediation Program				Task 3 - Post-Remediation Program				Total Units	Rates
	Task 1A	Task 1B	Task 1C	Task 1D	Task 1E	Task 2A	Task 2B	Task 2C	Task 2D	Task 3A	Task 3B	Task 3C	Task 3D		
	Permiting & Approvals	Develop Tender Specifications	Surveys and Field Activities	AEC1A/1C SSHHERA and SSRTs	Finalize Tender Specifications	AEC 1B Remediation	AEC 1C (Area 3) Remediation	AEC 1C (Surficial Debris) Remediation	AEC 1C (Main Zone) Remediation	Site Restoration	Post-Remedial Monitoring	Finalize AEC1A/1C SSHHERA	Reporting and Site Closure Requirements		
Labour															
Senior Program Coordinator		20			8									28	$ 125.00
Senior Environmental Scientist/Engineer	50	80	10	10	50	14	12	4	60	50	50		40	430	$ 125.00
Senior Risk Assessor				25								10		35	$ 125.00
Intermediate Environmental Scientist/Engineer			70			70	100	30	440	360	360		40	1470	$ 95.00
Intermediate Risk Assessor				60								20		80	$ 95.00
Junior Environmental Scientist/Engineer			70			70	100	30	440				80	790	$ 78.00
Junior Risk Assessor				80								20		100	$ 78.00
CADD				10									20	30	$ 78.00
														Labour Subtotal	
Travel and Living Expenses															
meals & incidentals (Travel Directive, Apr 1, 2014, $90.95 incl. taxes)			14		3	14	20	6	88	36	36			217	$ 86.62
accommodation (PWGSC 2014 Accomodation Search, Invermere)			12		2	12	18	6	80	33	24			187	$ 109.99
mileage (Travel Directive, Apr 1, 2014, BC, $0.48/km incl. taxes)			950		950	475	950	475	3800					7600	$ 0.46
flights (from Grande Prairie)			1			0.5	1	0.5	4	3	12			22	$ 600.00
rental vehicle			1			0.5	1	0.5	4	3	12			22	$ 250.00
fuel			1			0.5	1	0.5	4	3	12			22	$ 150.00
														Travel and Living Subtotal	
Direct Expenses															
Geotechnical Consultant		1												1	$ 4,000.00
Geotechnical Monitor							9	3	44		9			65	$ 1,350.00
Erosion Control Contractor (pre remediation)			1											1	$ 5,000.00
Remediation Contractor						54250	64000	8500	350000					476750	$ 1.00
EM Surveyor						1								1	$ 5,000.00
RDEKCV landfill tipping fees (debris) (in tonnes)						100	1200	400	9800					11500	$ 200.00
RDEKCV landfill tipping fees (soil < HW) (in tonnes)									6600					6600	$ 100.00
Trucking fees						4	48	16	656					724	$ 135.00
Restoration Contractor (post remediation)										1				1	$ 420,000.00
Laboratory Analysis (ALS in Vancouver/Calgary)															
Soil															
CCME PAH							10		100					110	$ 110.00
CCME Metals							10		100					110	$ 71.00
CCME BTEX and F1							10		100					110	$ 56.50
CCME F2-F4							10		100					110	$ 67.50
Grain size distribution							2		10					12	$ 22.50
Water															
Total Suspended Solids			2								2			4	$ 9.00
Total Dissolved Solids			2								2			4	$ 9.00
														Lab Subtotal	
														Direct Expenses Subtotal	
SUMMARY														**Task Total**	
TOTAL COST (INCLUDING CONTINGENCY)															

Item	Task 1 - Remediation Preparation					Task 2 - Remediation Program				Task 3 - Post-Remediation Program				TOTAL
	Task 1A	Task 1B	Task 1C	Task 1D	Task 1E	Task 2A	Task 2B	Task 2C	Task 2D	Task 3A	Task 3B	Task 3C	Task 3D	
	Permiting & Approvals	Develop Tender Specifications	Surveys and Field Activities	AEC1A/1C SSHHERA and SSRTs	Finalize Tender Specifications	AEC 1B Remediation	AEC 1C (Area 3) Remediation	AEC 1C (Surficial Debris) Remediation	AEC 1C (Main Zone) Remediation	Site Restoration	Post-Remedial Monitoring	Finalize AEC1A/1C SSHHERA	Reporting and Site Closure Requirements	
Labour														
Senior Program Coordinator	$ -	$ 2,500.00	$ -	$ -	$ 1,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,500.00
Senior Environmental Scientist/Engineer	$ 6,250.00	$ 10,000.00	$ 1,250.00	$ 1,250.00	$ 6,250.00	$ 1,750.00	$ 1,500.00	$ 500.00	$ 7,500.00	$ 6,250.00	$ 6,250.00	$ -	$ 5,000.00	$ 53,750.00
Senior Risk Assessor	$ -	$ -	$ -	$ 3,125.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,250.00	$ -	$ 4,375.00
Intermediate Environmental Scientist/Engineer	$ -	$ -	$ 6,650.00	$ -	$ -	$ 6,650.00	$ 9,500.00	$ 2,850.00	$ 41,800.00	$ 34,200.00	$ 34,200.00	$ -	$ 3,800.00	$ 139,650.00
Intermediate Risk Assessor	$ -	$ -	$ -	$ 5,700.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,900.00	$ -	$ 7,600.00
Junior Environmental Scientist/Engineer	$ -	$ -	$ 5,460.00	$ -	$ -	$ 5,460.00	$ 7,800.00	$ 2,340.00	$ 34,320.00	$ -	$ -	$ -	$ 6,240.00	$ 61,620.00
Junior Risk Assessor	$ -	$ -	$ -	$ 6,240.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,560.00	$ -	$ 7,800.00
CADD	$ -	$ -	$ -	$ 780.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,560.00	$ 2,340.00
Labour Subtotal	**$ 6,250.00**	**$ 12,500.00**	**$ 13,360.00**	**$ 17,095.00**	**$ 7,250.00**	**$ 13,860.00**	**$ 18,800.00**	**$ 5,690.00**	**$ 83,620.00**	**$ 40,450.00**	**$ 40,450.00**	**$ 4,710.00**	**$ 16,600.00**	**$ 280,635.00**
Travel and Living Expenses														
meals & incidentals (Travel Directive, Apr 1, 2014, $90.95 incl. taxes)	$ -	$ -	$ 1,212.67	$ -	$ 259.86	$ 1,212.67	$ 1,732.38	$ 519.71	$ 7,622.48	$ 3,118.29	$ 3,118.29	$ -	$ -	$ 18,796.33
accommodation (PWGSC 2014 Accomodation Search, Invermere)	$ -	$ -	$ 1,319.88	$ -	$ 219.98	$ 1,319.88	$ 1,979.82	$ 659.94	$ 8,799.20	$ 3,629.67	$ 2,639.76	$ -	$ -	$ 20,568.13
mileage (Travel Directive, Apr 1, 2014, BC, $0.48/km incl. taxes)	$ -	$ -	$ 434.29	$ -	$ 434.29	$ 217.14	$ 434.29	$ 217.14	$ 1,737.14	$ -	$ -	$ -	$ -	$ 3,474.29
flights (from Grande Prairie)	$ -	$ -	$ 600.00	$ -	$ -	$ 300.00	$ 600.00	$ 300.00	$ 2,400.00	$ 1,800.00	$ 7,200.00	$ -	$ -	$ 13,200.00
rental vehicle	$ -	$ -	$ 250.00	$ -	$ -	$ 125.00	$ 250.00	$ 125.00	$ 1,000.00	$ 750.00	$ 3,000.00	$ -	$ -	$ 5,500.00
fuel	$ -	$ -	$ 150.00	$ -	$ -	$ 75.00	$ 150.00	$ 75.00	$ 600.00	$ 450.00	$ 1,800.00	$ -	$ -	$ 3,300.00
Travel and Living Subtotal	**$ -**	**$ -**	**$ 3,966.83**	**$ -**	**$ 914.12**	**$ 3,249.69**	**$ 5,146.49**	**$ 1,896.80**	**$ 22,158.82**	**$ 9,747.96**	**$ 17,758.05**	**$ -**	**$ -**	**$ 64,838.75**
Direct Expenses														
Geotechnical Consultant	$ -	$ 4,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,000.00
Geotechnical Monitor	$ -	$ -	$ -	$ -	$ -	$ -	$ 12,150.00	$ 4,050.00	$ 59,400.00	$ -	$ 12,150.00	$ -	$ -	$ 87,750.00
Erosion Control Contractor (pre remediation)	$ -	$ -	$ 5,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,000.00
Remediation Contractor	$ -	$ -	$ -	$ -	$ -	$ 54,250.00	$ 64,000.00	$ 8,500.00	$ 350,000.00	$ -	$ -	$ -	$ -	$ 476,750.00
EM Surveyor	$ -	$ -	$ -	$ -	$ -	$ 5,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,000.00
RDEKCV landfill tipping fees (debris) (in tonnes)	$ -	$ -	$ -	$ -	$ -	$ 20,000.00	$ 240,000.00	$ 80,000.00	$ 1,960,000.00	$ -	$ -	$ -	$ -	$ 2,300,000.00
RDEKCV landfill tipping fees (soil < HW) (in tonnes)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 660,000.00	$ -	$ -	$ -	$ -	$ 660,000.00
Trucking fees	$ -	$ -	$ -	$ -	$ -	$ 540.00	$ 6,480.00	$ 2,160.00	$ 88,560.00	$ -	$ -	$ -	$ -	$ 97,740.00
Restoration Contractor (post remediation)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 420,000.00	$ -	$ -	$ -	$ 420,000.00
Laboratory Analysis (ALS in Vancouver/Calgary)														
Soil														
CCME PAH	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,100.00	$ -	$ 11,000.00	$ -	$ -	$ -	$ -	$ 12,100.00
CCME Metals	$ -	$ -	$ -	$ -	$ -	$ -	$ 710.00	$ -	$ 7,100.00	$ -	$ -	$ -	$ -	$ 7,810.00
CCME BTEX and F1	$ -	$ -	$ -	$ -	$ -	$ -	$ 565.00	$ -	$ 5,650.00	$ -	$ -	$ -	$ -	$ 6,215.00
CCME F2-F4	$ -	$ -	$ -	$ -	$ -	$ -	$ 675.00	$ -	$ 6,750.00	$ -	$ -	$ -	$ -	$ 7,425.00
Grain size distribution	$ -	$ -	$ -	$ -	$ -	$ -	$ 45.00	$ -	$ 225.00	$ -	$ -	$ -	$ -	$ 270.00
Water														
Total Suspended Solids	$ -	$ -	$ 18.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 18.00	$ -	$ -	$ 36.00
Total Dissolved Solids	$ -	$ -	$ 18.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 18.00	$ -	$ -	$ 36.00
Lab Subtotal	$ -	$ -	$ 36.00	$ -	$ -	$ -	$ 3,095.00	$ -	$ 30,725.00	$ -	$ 36.00	$ -	$ -	$ 33,892.00
Direct Expenses Subtotal	**$ -**	**$ 4,000.00**	**$ 5,036.00**	**$ -**	**$ -**	**$ 79,790.00**	**$ 325,725.00**	**$ 94,710.00**	**$ 3,148,685.00**	**$ 420,000.00**	**$ 12,186.00**	**$ -**	**$ -**	**$ 4,090,132.00**
Task Total	**$ 6,250.00**	**$ 16,500.00**	**$ 22,362.83**	**$ 17,095.00**	**$ 8,164.12**	**$ 96,899.69**	**$ 349,671.49**	**$ 102,296.80**	**$ 3,254,463.82**	**$ 470,197.96**	**$ 70,394.05**	**$ 4,710.00**	**$ 16,600.00**	**$ 4,435,605.75**
20 % Contingency														**$ 887,121.15**
TOTAL COST (INCLUDING CONTINGENCY)														**$ 5,322,726.90**

Assumptions:

Task 1 C: Assumes 1 day for wildlife surveys, 2 days to flag debris AEC 1B/AEC 1C, 1 day to collect baseline water samples, 1 day additional time to oversee sediment curtain installation, 2 day mob/demob. Field day = 10 hr/day. Assumes mobilization of intermediate scientist/environmental monitor from Grande Prairie and junior scientist from Kelowna. Installation of 120 m long sediment curtain by local/regional contractor.

Task 1E: Includes attendance at bidder's meeting which assumes 2 days mob/demob and 1 day on-site. Field day = 10 hrs/day. Assumes attendance by senior scientist only, mobilization from Kelowna, BC.

Task 2A: Assumes 5 days work to cut ice holes, remove debris and transport upslope, 1 day kick off and site prep, 1 day mob to site (i.e. split mob/demob between Task 2A and 2C). Field day = 10 hr/day. Assumes mobilization of intermediate scientist/environmental monitor from Grande Prairie and junior scientist from Kelowna. Assumes EM survey by contractor based in Calgary, Alberta. Assumes 50 m^3 of debris removed from marsh. Assumes portion of total contractor mob/demob, H&S, site prep costs ($3500). Assumes 5 days spider hoe time at $250/hr and 10 hrs/day. Assumes 8 days total foreman time at $150/hr and 10 hrs/day (including live out). Assumes helicopter removal cost of $525/$m^3$. Assumes 12.5 m^3 per truck and pup load to landfill, one hour r.t. and trucking cost of $135/hr.

Task 2B: Assumes 8 days to excavate and backfill and recontour, 2 day mob/demob for field cycle/personnel change. Geotechnical monitor assumed to be 8 days on site plus 1 day mobilization (split mobilization with Task 2C). Assumes all soil being re-used as backfill. Remediation contractor cost assumes portion of mob/demob/H&S/site prep costs ($4000), $33/$m^3$ to excavate soil, transport debris to top of slope and recontour/backfill and $7/$m^3$ to screen and separate debris and soil. Soil plus debris is 1000 m^3 (400 m^3 soil and 600 m^3 debris). Recontouring to makeup backfill may involve an additional 500 m^3 of material. Assumes that access to area can be constructed along trail. Assumes 12.5 m^3 per truck and pup load to landfill, one hour r.t. and trucking cost of $135/hr.

Task 2C: Assumes 2 days to review debris removal, 1 day demob (split with Task 2A). Geotechnical monitor assumed to be 2 days on site plus 1 day demobilization (split mobilization with Task 2A). Remediation contractor cost assumes portion of mob/demob/H&S/site prep costs ($500), 2 days spider hoe time at $250/hr and 10 hrs/day, 2 days total foreman time at $150/hr and 10 hrs/day (including live out). Debris is 200 m^3. Assumes 12.5 m^3 per truck and pup load to landfill, one hour r.t. and trucking cost of $135/hr.

Task 2D: Assumes 36 days to excavate and terrace, 8 days mob/demob for field cycle/personnel change. Intermediate staff from Grande Prairie and junior staff from Kelowna. Geotechnical monitor assumed to be 36 days on site plus 8 day mob/demob for changeover. Assumes no backfilling. Remediation contractor cost assumes portion of mob/demob/H&S/site prep costs ($22000), $33/$m^3$ to excavate soil, transport debris to top of slope and terrace and $7/$m^3$ to screen and separate debris and soil. Soil plus debris is 8200 m^3 (3300 m^3 soil and 4900 m^3 debris). Assumes that access to area can be constructed. Assumes 12.5 m^3 per truck and pup load to landfill, one hour r.t. and trucking cost of $135/hr.

Task 3A: Assumes 30 days field supervision by Environmental Monitor and 6 days mob/demob. Assume 3 personnel cycles from Grande Prairie. Restoration contractor estimate based on 8400 m^2 of area to be addressed (3500 m^2 in main debris area, 3300 m^2 Impact Area 3 and 1600 m^2 additional areas i.e. roads), installation and supply cost of $50/$m^2$.

Task 3B: Assumes 4 trips per year by Environmental Monitor from Grande Prairie for 3 years. One day field time and 2 day mob/demob for each trip (i.e. 36 days total). Assumes one trip per year by Geotechnical Monitor from Kelowna for 3 years to evaluate slope stability. One day field time and 2 days mob/demob per trip (9 days total).

TABLE 6: REMEDIAL ACTION PLAN (PARTIAL EXCAVATION) - DETAILED COST BREAKDOWN

BUDGET ASSUMPTIONS:

Task 1: Obtain permits, develop and finalize tender specifications, conduct field work in support of remedial planning, prepare draft SSHHERA for AEC 1A/1C
Task 2: Conduct remediation at AEC 1B and AEC 1C
Task 3: Post-remediation site restoration, monitoring and reporting (site works, AEC 1A/1C SSHHERA, SCT, etc).

Item	Task 1 - Remediation Preparation					Task 2 - Remediation Program				Task 3 - Post-Remediation Program				Total Units	Rates	Task 1 - Remediation Preparation					Task 2 - Remediation Program				Task 3 - Post-Remediation Program				TOTAL
	Task 1A	Task 1B	Task 1C	Task 1D	Task 1E	Task 2A	Task 2B	Task 2C	Task 2D	Task 3A	Task 3B	Task 3C	Task 3D			Task 1A	Task 1B	Task 1C	Task 1D	Task 1E	Task 2A	Task 2B	Task 2C	Task 2D	Task 3A	Task 3B	Task 3C	Task 3D	
	Permiting & Approvals	Develop Tender Specifications	Surveys and Field Activities	AEC1A/1C SSHHERA and SSRTs	Finalize Tender Specifications	AEC 1B Remediation	AEC 1C (Area 3) Remediation	AEC 1C (Surficial Debris) Remediation	AEC 1C (Main Zone) Remediation	Site Restoration	Post-Remedial Monitoring	Finalize AEC1A/1C SSHHERA	Reporting and Site Closure Requirements			Permiting & Approvals	Develop Tender Specifications	Surveys and Field Activities	AEC1A/1C SSHHERA and SSRTs	Finalize Tender Specifications	AEC 1B Remediation	AEC 1C (Area 3) Remediation	AEC 1C (Surficial Debris) Remediation	AEC 1C (Main Zone) Remediation	Site Restoration	Post-Remedial Monitoring	Finalize AEC1A/1C SSHHERA	Reporting and Site Closure Requirements	
Labour																													
Senior Program Coordinator		20			8									28	$ 125.00	$ -	$ 2,500.00	$ -	$ -	$ 1,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,500.00
Senior Environmental Scientist/Engineer	50	80	10	10	50	14	12	4	30	50	50		40	400	$ 125.00	$ 6,250.00	$ 10,000.00	$ 1,250.00	$ 1,250.00	$ 6,250.00	$ 1,750.00	$ 1,500.00	$ 500.00	$ 3,750.00	$ 6,250.00	$ 6,250.00	$ -	$ 5,000.00	$ 50,000.00
Senior Risk Assessor				25								10		35	$ 125.00	$ -	$ -	$ -	$ 3,125.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,250.00	$ -	$ 4,375.00
Intermediate Environmental Scientist/Engineer			70			70	100	30	120	360	360		40	1150	$ 95.00	$ -	$ -	$ 6,650.00	$ -	$ -	$ 6,650.00	$ 9,500.00	$ 2,850.00	$ 11,400.00	$ 34,200.00	$ 34,200.00	$ -	$ 3,800.00	$ 109,250.00
Intermediate Risk Assessor				60								20		80	$ 95.00	$ -	$ -	$ -	$ 5,700.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,900.00	$ -	$ 7,600.00
Junior Environmental Scientist/Engineer			70			70	100	30	120				80	470	$ 78.00	$ -	$ -	$ 5,460.00	$ -	$ -	$ 5,460.00	$ 7,800.00	$ 2,340.00	$ 9,360.00	$ -	$ -	$ -	$ 6,240.00	$ 36,660.00
Junior Risk Assessor				80								20		100	$ 78.00	$ -	$ -	$ -	$ 6,240.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,560.00	$ -	$ 7,800.00
CADD				10									20	30	$ 78.00	$ -	$ -	$ -	$ 780.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,560.00	$ 2,340.00
															Labour Subtotal	**$ 6,250.00**	**$ 12,500.00**	**$ 13,360.00**	**$ 17,095.00**	**$ 7,250.00**	**$ 13,860.00**	**$ 18,800.00**	**$ 5,690.00**	**$ 24,510.00**	**$ 40,450.00**	**$ 40,450.00**	**$ 4,710.00**	**$ 16,600.00**	**$ 221,525.00**
Travel and Living Expenses																													
meals & incidentals (Travel Directive, Apr 1, 2014, $90.95 incl. taxes)			14		3	14	20	6	24	36	36			153	$ 86.62	$ -	$ -	$ 1,212.67	$ -	$ 259.86	$ 1,212.67	$ 1,732.38	$ 519.71	$ 2,078.86	$ 3,118.29	$ 3,118.29	$ -	$ -	$ 13,252.71
accommodation (PWGSC 2014 Accomodation Search, Invermere)			12		2	12	18	6	22	33	24			129	$ 109.99	$ -	$ -	$ 1,319.88	$ -	$ 219.98	$ 1,319.88	$ 1,979.82	$ 659.94	$ 2,419.78	$ 3,629.67	$ 2,639.76	$ -	$ -	$ 14,188.71
mileage (Travel Directive, Apr 1, 2014, BC, $0.48/km incl. taxes)			950		950	475	950	475	950					4750	$ 0.46	$ -	$ -	$ 434.29	$ -	$ 434.29	$ 217.14	$ 434.29	$ 217.14	$ 434.29	$ -	$ -	$ -	$ -	$ 2,171.43
flights (from Grande Prairie)			1			0.5	1	0.5	1	3	12			19	$ 600.00	$ -	$ -	$ 600.00	$ -	$ -	$ 300.00	$ 600.00	$ 300.00	$ 600.00	$ 1,800.00	$ 7,200.00	$ -	$ -	$ 11,400.00
rental vehicle			1			0.5	1	0.5	1	3	12			19	$ 250.00	$ -	$ -	$ 250.00	$ -	$ -	$ 125.00	$ 250.00	$ 125.00	$ 250.00	$ 750.00	$ 3,000.00	$ -	$ -	$ 4,750.00
fuel			1			0.5	1	0.5	1	3	12			19	$ 150.00	$ -	$ -	$ 150.00	$ -	$ -	$ 75.00	$ 150.00	$ 75.00	$ 150.00	$ 450.00	$ 1,800.00	$ -	$ -	$ 2,850.00
															Travel and Living Subtotal	**$ -**	**$ -**	**$ 3,966.83**	**$ -**	**$ 914.12**	**$ 3,249.69**	**$ 5,146.49**	**$ 1,896.80**	**$ 5,932.92**	**$ 9,747.96**	**$ 17,758.05**	**$ -**	**$ -**	**$ 48,612.85**
Direct Expenses																													
Geotechnical Consultant		1												1	$ 4,000.00	$ -	$ 4,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,000.00
Geotechnical Monitor							9	3	12		9			33	$ 1,350.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 12,150.00	$ 4,050.00	$ 16,200.00	$ -	$ 12,150.00	$ -	$ -	$ 44,550.00
Erosion Control Contractor (pre remediation)			1											1	$ 5,000.00	$ -	$ -	$ 5,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,000.00
Remediation Contractor						57250	124200	20300	101500					303250	$ 1.00	$ -	$ -	$ -	$ -	$ -	$ 57,250.00	$ 124,200.00	$ 20,300.00	$ 101,500.00	$ -	$ -	$ -	$ -	$ 303,250.00
EM Surveyor						1								1	$ 5,000.00	$ -	$ -	$ -	$ -	$ -	$ 5,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,000.00
RDEKCV landfill tipping fees (debris) (in tonnes)						100	1200	400	1620					3320	$ 200.00	$ -	$ -	$ -	$ -	$ -	$ 20,000.00	$ 240,000.00	$ 80,000.00	$ 324,000.00	$ -	$ -	$ -	$ -	$ 664,000.00
RDEKCV landfill tipping fees (soil < HW) (in tonnes)									1080					1080	$ 100.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 108,000.00	$ -	$ -	$ -	$ -	$ 108,000.00
Trucking fees						4	48	16	108					176	$ 135.00	$ -	$ -	$ -	$ -	$ -	$ 540.00	$ 6,480.00	$ 2,160.00	$ 14,580.00	$ -	$ -	$ -	$ -	$ 23,760.00
Restoration Contractor (post remediation)										1				1	$ 327,500.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 327,500.00	$ -	$ -	$ -	$ 327,500.00
Laboratory Analysis (ALS in Vancouver/Calgary)																													
Soil																													
CCME PAH			15				10		51					76	$ 110.00	$ -	$ -	$ 1,650.00	$ -	$ -	$ -	$ 1,100.00	$ -	$ 5,610.00	$ -	$ -	$ -	$ -	$ 8,360.00
CCME Metals			15				10		51					76	$ 71.00	$ -	$ -	$ 1,065.00	$ -	$ -	$ -	$ 710.00	$ -	$ 3,621.00	$ -	$ -	$ -	$ -	$ 5,396.00
CCME BTEX and F1			15				10		51					76	$ 56.50	$ -	$ -	$ 847.50	$ -	$ -	$ -	$ 565.00	$ -	$ 2,881.50	$ -	$ -	$ -	$ -	$ 4,294.00
CCME F2-F4			15				10		51					76	$ 67.50	$ -	$ -	$ 1,012.50	$ -	$ -	$ -	$ 675.00	$ -	$ 3,442.50	$ -	$ -	$ -	$ -	$ 5,130.00
Grain size distribution							2		6					8	$ 22.50	$ -	$ -	$ -	$ -	$ -	$ -	$ 45.00	$ -	$ 135.00	$ -	$ -	$ -	$ -	$ 180.00
Water																													
Total Suspended Solids			2								2			4	$ 9.00	$ -	$ -	$ 18.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 18.00	$ -	$ -	$ 36.00
Total Dissolved Solids			2								2			4	$ 9.00	$ -	$ -	$ 18.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 18.00	$ -	$ -	$ 36.00
															Lab Subtotal	**$ -**	**$ -**	**$ 4,611.00**	**$ -**	**$ -**	**$ -**	**$ 3,095.00**	**$ -**	**$ 15,690.00**	**$ -**	**$ 36.00**	**$ -**	**$ -**	**$ 23,432.00**
															Direct Expenses Subtotal	**$ -**	**$ 4,000.00**	**$ 9,611.00**	**$ -**	**$ -**	**$ 82,790.00**	**$ 385,925.00**	**$ 106,510.00**	**$ 579,970.00**	**$ 327,500.00**	**$ 12,186.00**	**$ -**	**$ -**	**$ 1,508,492.00**
SUMMARY															**Task Total**	**$ 6,250.00**	**$ 16,500.00**	**$ 26,937.83**	**$ 17,095.00**	**$ 8,164.12**	**$ 99,899.69**	**$ 409,871.49**	**$ 114,096.80**	**$ 610,412.92**	**$ 377,697.96**	**$ 70,394.05**	**$ 4,710.00**	**$ 16,600.00**	**$ 1,778,629.85**
																												20 % Contingency	**$ 355,725.97**
TOTAL COST (INCLUDING CONTINGENCY)																													**$ 2,134,355.82**

Assumptions:
Task 1 C: Assumes 1 day for wildlife surveys, 2 days to flag debris AEC 1B/AEC 1C, 1 day to collect baseline water samples and test potential backfill source, 1 day additional time to oversee sediment curtain installation, 2 day mob/demob. Field day = 10 hr/day. Assumes mobilization of intermediate scientist/environmental monitor from Grande Prairie and junior scientist from Kelowna. Installation of 120 m long sediment curtain by local/regional contractor.
Task 1E: Includes attendance at bidder's meeting which assumes 2 days mob/demob and 1 day on-site. Field day = 10 hrs/day. Assumes attendance by senior scientist only, mobilization from Kelowna, BC.

Task 2A: Assumes 5 days work to cut ice holes, remove debris and transport upslope, 1 day kick off and site prep, 1 day mob to site (i.e. split mob/demob between Task 2A and 2C). Field day = 10 hr/day. Assumes mobilization of intermediate scientist/environmental monitor from Grande Prairie and junior scientist from Kelowna. Assumes EM survey by contractor based in Calgary, Alberta. Assumes 50 m^3 of debris removed from marsh. Assumes portion of total contractor mob/demob, H&S, site prep costs ($6500). Assumes 5 days spider hoe time at $250/hr and 10 hrs/day. Assumes 8 days total foreman time at $150/hr and 10 hrs/day (including live out). Assumes helicopter removal cost of $525/$m^3$. Assumes 12.5 m^3 per truck and pup load to landfill, one hour r.t. and trucking cost of $135/hr.

Task 2B: Assumes 8 days to excavate and backfill and recontour, 2 day mob/demob for field cycle/personnel change. Geotechnical monitor assumed to be 8 days on site plus 1 day mobilization (split mobilization with Task 2C). Assumes all soil being re-used as backfill. Remediation contractor cost assumes portion of mob/demob/H&S/site prep costs ($14,200), $33/$m^3$ to excavate soil, transport debris to top of slope and recontour/backfill and $7/$m^3$ to screen and separate debris and soil. Soil plus debris is 1000 m^3 (400 m^3 soil and 600 m^3 debris). Recontouring to makeup backfill may involve an additional 500 m^3 of material. Assumes that additional $50,000 required to facilitate transport of debris to staging area (e.g. crane). Assumes 12.5 m^3 per truck and pup load to landfill, one hour r.t. and trucking cost of $135/hr.

Task 2C: Assumes 2 days to review debris removal, 1 day demob (split with Task 2A). Geotechnical monitor assumed to be 2 days on site plus 1 day demobilization (split mobilization with Task 2A). Remediation contractor cost assumes portion of mob/demob/H&S/site prep costs ($2300), 2 days spider hoe time at $250/hr and 10 hrs/day, 2 days total foreman time at $150/hr and 10 hrs/day (including live out). Assumes additional $10,000 to facilitate transport of debris to staging area (e.g. crane). Debris is 200 m^3. Assumes 12.5 m^3 per truck and pup load to landfill, one hour r.t. and trucking cost of $135/hr.

Task 2D: Assumes 10 days to excavate and backfill and terrace, 2 days mob/demob. Intermediate staff from Grande Prairie and junior staff from Kelowna. Geotechnical monitor assumed to be 10 days on site plus 2 day mob/demob. Assumes local backfill source. Remediation contractor cost assumes portion of mob/demob/H&S/site prep costs ($7000), $33/$m^3$ to excavate soil, transport debris to top of slope, $7/$m^3$ to screen and separate debris and soil and $50/$m^3$ to supply, place and contour/terrace backfill. Soil plus debris is 1350 m^3 (540 m^3 soil and 810 m^3 debris). Assumes all excavated soil disposed at landfill. Assumes 12.5 m^3 per truck and pup load to landfill, one hour r.t. and trucking cost of $135/hr.

Task 3A: Assumes 30 days field supervision by Environmental Monitor and 6 days mob/demob. Assume 3 personnel cycles from Grande Prairie. Restoration contractor estimate based on 6550 m^2 of area to be addressed (1650 m^2 in main debris area, 3300 m^2 Impact Area 3 and 1600 m^2 additional areas i.e. roads), installation and supply cost of $50/$m^2$.

TABLE 7: REMEDIAL ACTION PLAN (DEBRIS REMOVAL AT AEC 1B AND SURFICIAL DEBRIS REMOVAL AT AEC 1C) - DETAILED COST BREAKDOWN

BUDGET ASSUMPTIONS:

Task 1: Obtain permits, develop and finalize tender specifications, conduct field work in support of remedial planning
Task 2: Conduct remediation at AEC 1B and AEC 1C (surficial debris only)
Task 3: Post-remediation site restoration, monitoring and reporting (site works, AEC 1A/1C SSHHERA, SCT, etc).

Item	Task 1 - Remediation Preparation				Task 2 - Remediation Program		Task 3 - Post-Remediation Program				Total Units	Rates	Task 1 - Remediation Preparation				Task 2 - Remediation Program		Task 3 - Post-Remediation Program				TOTAL
	Task 1A	Task 1B	Task 1C	Task 1D	Task 2A	Task 2B	Task 3A	Task 3B	Task 3C	Task 3D			Task 1A	Task 1B	Task 1C	Task 1D	Task 2A	Task 2B	Task 3A	Task 3B	Task 3C	Task 3D	
	Permiting & Approvals	Develop Tender Specifications	Surveys and Field Activities	Finalize Tender Specifications	AEC 1B Remediation	AEC 1C (Surficial Debris) Remediation	Site Restoration	Post-Remedial Monitoring	Complete AEC1A/1C SSHHERA	Reporting and Site Closure Requirements			Permiting & Approvals	Develop Tender Specifications	Surveys and Field Activities	Finalize Tender Specifications	AEC 1B Remediation	AEC 1C (Surficial Debris) Remediation	Site Restoration	Post-Remedial Monitoring	Complete AEC1A/1C SSHHERA	Reporting and Site Closure Requirements	
Labour																							
Senior Program Coordinator		10		5							15	$ 125.00	$ -	$ 1,250.00	$ -	$ 625.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,875.00
Senior Environmental Scientist/Engineer	40	60	10	40	14	4	10	36	10	40	264	$ 125.00	$ 5,000.00	$ 7,500.00	$ 1,250.00	$ 5,000.00	$ 1,750.00	$ 500.00	$ 1,250.00	$ 4,500.00	$ 1,250.00	$ 5,000.00	$ 33,000.00
Senior Risk Assessor									35		35	$ 125.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,375.00	$ -	$ 4,375.00
Intermediate Environmental Scientist/Engineer			70		70	90	50	180		40	500	$ 95.00	$ -	$ -	$ 6,650.00	$ -	$ 6,650.00	$ 8,550.00	$ 4,750.00	$ 17,100.00	$ -	$ 3,800.00	$ 47,500.00
Intermediate Risk Assessor									80		80	$ 95.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 7,600.00	$ -	$ 7,600.00
Junior Environmental Scientist/Engineer			70		70	90				80	310	$ 78.00	$ -	$ -	$ 5,460.00	$ -	$ 5,460.00	$ 7,020.00	$ -	$ -	$ -	$ 6,240.00	$ 24,180.00
Junior Risk Assessor									100		100	$ 78.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 7,800.00	$ -	$ 7,800.00
CADD									10	20	30	$ 78.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 780.00	$ 1,560.00	$ 2,340.00
												Labour Subtotal	**$ 5,000.00**	**$ 8,750.00**	**$ 13,360.00**	**$ 5,625.00**	**$ 13,860.00**	**$ 16,070.00**	**$ 6,000.00**	**$ 21,600.00**	**$ 21,805.00**	**$ 16,600.00**	**$ 128,670.00**
Travel and Living Expenses																							
meals & incidentals (Travel Directive, Apr 1, 2014, $90.95 incl. taxes)			14	3	14	18	5	18			72	$ 86.62	$ -	$ -	$ 1,212.67	$ 259.86	$ 1,212.67	$ 1,559.14	$ 433.10	$ 1,559.14	$ -	$ -	$ 6,236.57
accommodation (PWGSC 2014 Accomodation Search, Invermere)			12	2	12	18	5	12			61	$ 109.99	$ -	$ -	$ 1,319.88	$ 219.98	$ 1,319.88	$ 1,979.82	$ 549.95	$ 1,319.88	$ -	$ -	$ 6,709.39
mileage (Travel Directive, Apr 1, 2014, BC, $0.48/km incl. taxes)			950	950	950	950					3800	$ 0.46	$ -	$ -	$ 434.29	$ 434.29	$ 434.29	$ 434.29	$ -	$ -	$ -	$ -	$ 1,737.14
flights (from Grande Prairie)			1		1	1	1	6			10	$ 600.00	$ -	$ -	$ 600.00	$ -	$ 600.00	$ 600.00	$ 600.00	$ 3,600.00	$ -	$ -	$ 6,000.00
rental vehicle			1		1	1	1	6			10	$ 250.00	$ -	$ -	$ 250.00	$ -	$ 250.00	$ 250.00	$ 250.00	$ 1,500.00	$ -	$ -	$ 2,500.00
fuel			1		1	1	1	6			10	$ 150.00	$ -	$ -	$ 150.00	$ -	$ 150.00	$ 150.00	$ 150.00	$ 900.00	$ -	$ -	$ 1,500.00
												Travel and Living Subtotal	**$ -**	**$ -**	**$ 3,966.83**	**$ 914.12**	**$ 3,966.83**	**$ 4,973.25**	**$ 1,983.05**	**$ 8,879.02**	**$ -**	**$ -**	**$ 24,683.10**
Direct Expenses																							
Geotechnical Consultant		1									1	$ 4,000.00	$ -	$ 4,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,000.00
Geotechnical Monitor						9					9	$ 1,350.00	$ -	$ -	$ -	$ -	$ -	$ 12,150.00	$ -	$ -	$ -	$ -	$ 12,150.00
Erosion Control Contractor (pre remediation)			1								1	$ 5,000.00	$ -	$ -	$ 5,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,000.00
Remediation Contractor					67750	51000					118750	$ 1.00	$ -	$ -	$ -	$ -	$ 67,750.00	$ 51,000.00	$ -	$ -	$ -	$ -	$ 118,750.00
EM Surveyor					1						1	$ 5,000.00	$ -	$ -	$ -	$ -	$ 5,000.00	$ -	$ -	$ -	$ -	$ -	$ 5,000.00
RDEKCV landfill tipping fees (debris) (in tonnes)					100	400					500	$ 200.00	$ -	$ -	$ -	$ -	$ 20,000.00	$ 80,000.00	$ -	$ -	$ -	$ -	$ 100,000.00
RDEKCV landfill tipping fees (soil < HW) (in tonnes)											0	$ 100.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Trucking fees					4	16					20	$ 135.00	$ -	$ -	$ -	$ -	$ 540.00	$ 2,160.00	$ -	$ -	$ -	$ -	$ 2,700.00
Restoration Contractor (post remediation)							1				1	$ 25,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 25,000.00	$ -	$ -	$ -	$ 25,000.00
Laboratory Analysis (ALS in Vancouver/Calgary)																							
Soil																							
CCME PAH											0	$ 110.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
CCME Metals											0	$ 71.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
CCME BTEX and F1											0	$ 56.50	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
CCME F2-F4											0	$ 67.50	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grain size distribution											0	$ 22.50	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Water																							
Total Suspended Solids			2					2			4	$ 9.00	$ -	$ -	$ 18.00	$ -	$ -	$ -	$ -	$ 18.00	$ -	$ -	$ 36.00
Total Dissolved Solids			2					2			4	$ 9.00	$ -	$ -	$ 18.00	$ -	$ -	$ -	$ -	$ 18.00	$ -	$ -	$ 36.00
												Lab Subtotal	**$ -**	**$ -**	**$ 36.00**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 36.00**	**$ -**	**$ -**	**$ 72.00**
												Direct Expenses Subtotal	**$ -**	**$ 4,000.00**	**$ 5,036.00**	**$ -**	**$ 93,290.00**	**$ 145,310.00**	**$ 25,000.00**	**$ 36.00**	**$ -**	**$ -**	**$ 272,672.00**
SUMMARY												**Task Total**	**$ 5,000.00**	**$ 12,750.00**	**$ 22,362.83**	**$ 6,539.12**	**$ 111,116.83**	**$ 166,353.25**	**$ 32,983.05**	**$ 30,515.02**	**$ 21,805.00**	**$ 16,600.00**	**$ 426,025.10**
																						20 % Contingency	**$ 85,205.02**
TOTAL COST (INCLUDING CONTINGENCY)																							**$ 511,230.13**

Assumptions:
Task 1 C: Assumes 1 day for wildlife surveys, 2 days to flag debris AEC 1B/AEC 1C, 1 day to collect baseline water samples, 1 day additional time to oversee sediment curtain installation, 2 day mob/demob. Field day = 10 hr/day. Assumes mobilization of intermediate scientist/environmental monitor from Grande Prairie and junior scientist from Kelowna. Installation of 120 m long sediment curtain by local/regional contractor.
Task 1D: Includes attendance at bidder's meeting which assumes 2 days mob/demob and 1 day on-site. Field day = 10 hrs/day. Assumes attendance by senior scientist only, mobilization from Kelowna, BC.

Task 2A: Assumes 5 days work to cut ice holes, remove debris and transport upslope, 1 day kick off and site prep, 1 day mob to site (i.e. split mob/demob between Task 2A and 2C). Field day = 10 hr/day. Assumes mobilization of intermediate scientist/environmental monitor from Grande Prairie and junior scientist from Kelowna. Assumes EM survey by contractor based in Calgary, Alberta. Assumes 50 m^3 of debris removed from marsh. Assumes portion of total contractor mob/demob, H&S, site prep costs ($17000). Assumes 5 days spider hoe time at $250/hr and 10 hrs/day. Assumes 8 days total foreman time at $150/hr and 10 hrs/day (including live out). Assumes helicopter removal cost of $525/$m^3$. Assumes 12.5 m^3 per truck and pup load to landfill, one hour r.t. and trucking cost of $135/hr.

Task 2B: Assumes 1 day prep, 6 days to review debris removal, 2 day mob/demob. Geotechnical monitor assumed to be 7 days on site plus 2 day mob/demob. Remediation contractor cost assumes mob/demob/H&S/site prep costs ($13000), 7 days spider hoe time at $250/hr and 10 hrs/day, 7 days total foreman time at $150/hr and 10 hrs/day (including live out). Assumes additional $10,000 to facilitate transport of debris to staging area (e.g. crane). Debris is 200 m^3. Assumes 12.5 m^3 per truck and pup load to landfill, one hour r.t. and trucking cost of $135/hr.

Task 3A: Assumes 3 days field supervision by Environmental Monitor and 2 days mob/demob. Restoration contractor estimate based on 500 m^2 of area to be addressed, installation and supply cost of $50/$m^2$.
Task 3B: Assumes 2 trips per year by Environmental Monitor from Grande Prairie for 3 years. One day field time and 2 day mob/demob for each trip (i.e. 18 days total).

TABLE 8: REMEDIAL ACTION PLAN (SURFICIAL DEBRIS REMOVAL AT AEC 1C ONLY) - DETAILED COST BREAKDOWN

BUDGET ASSUMPTIONS:

Task 1: Obtain permits, develop and finalize tender specifications for debris removal
Task 2: Remove surficial debris at AEC 1C
Task 3: Post-remediation site restoration, monitoring and reporting (site works, AEC 1A/1C SSHHERA, SCT, etc).

Item	Task 1 - Remediation Preparation			Task 2 - Debris Removal	Task 3 - Post-Remediation Program				Total Units	Rates	Task 1 - Remediation Preparation			Task 2 - Debris Removal	Task 3 - Post-Remediation Program				TOTAL
	Task 1A	Task 1B	Task 1C	Task 2	Task 3A	Task 3B	Task 3C	Task 3D			Task 1A	Task 1B	Task 1C	Task 2	Task 3A	Task 3B	Task 3C	Task 3D	
	Permiting & Approvals	Develop Tender Specifications	Finalize Tender Specifications	AEC 1C (Surficial Debris) Remediation	Site Restoration	Post-Remedial Monitoring	Complete AEC1A/1C SSHHERA	Reporting and Site Closure Requirements			Permiting & Approvals	Develop Tender Specifications	Finalize Tender Specifications	AEC 1C (Surficial Debris) Remediation	Site Restoration	Post-Remedial Monitoring	Complete AEC1A/1C SSHHERA	Reporting and Site Closure Requirements	
Labour																			
Senior Program Coordinator		5	5						10	$ 125.00	$ -	$ 625.00	$ 625.00	$ -	$ -	$ -	$ -	$ -	$ 1,250.00
Senior Environmental Scientist/Engineer	25	35	40	4	10	18	10	40	182	$ 125.00	$ 3,125.00	$ 4,375.00	$ 5,000.00	$ 500.00	$ 1,250.00	$ 2,250.00	$ 1,250.00	$ 5,000.00	$ 22,750.00
Senior Risk Assessor							35		35	$ 125.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,375.00	$ -	$ 4,375.00
Intermediate Environmental Scientist/Engineer				90	50	90		20	250	$ 95.00	$ -	$ -	$ -	$ 8,550.00	$ 4,750.00	$ 8,550.00	$ -	$ 1,900.00	$ 23,750.00
Intermediate Risk Assessor							80		80	$ 95.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 7,600.00	$ -	$ 7,600.00
Junior Environmental Scientist/Engineer				90				30	120	$ 78.00	$ -	$ -	$ -	$ 7,020.00	$ -	$ -	$ -	$ 2,340.00	$ 9,360.00
Junior Risk Assessor							100		100	$ 78.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 7,800.00	$ -	$ 7,800.00
CADD							10	10	20	$ 78.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 780.00	$ 780.00	$ 1,560.00
										Labour Subtotal	**$ 3,125.00**	**$ 5,000.00**	**$ 5,625.00**	**$ 16,070.00**	**$ 6,000.00**	**$ 10,800.00**	**$ 21,805.00**	**$ 10,020.00**	**$ 78,445.00**
Travel and Living Expenses																			
meals & incidentals (Travel Directive, Apr 1, 2014, $90.95 incl. taxes)			3	18	5	9			35	$ 86.62	$ -	$ -	$ 259.86	$ 1,559.14	$ 433.10	$ 779.57	$ -	$ -	$ 3,031.67
accommodation (PWGSC 2014 Accomodation Search, Invermere)			2	18	5	6			31	$ 109.99	$ -	$ -	$ 219.98	$ 1,979.82	$ 549.95	$ 659.94	$ -	$ -	$ 3,409.69
mileage (Travel Directive, Apr 1, 2014, BC, $0.48/km incl. taxes)			950	950					1900	$ 0.46	$ -	$ -	$ 434.29	$ 434.29	$ -	$ -	$ -	$ -	$ 868.57
flights (from Grande Prairie)				1	1	3			5	$ 600.00	$ -	$ -	$ -	$ 600.00	$ 600.00	$ 1,800.00	$ -	$ -	$ 3,000.00
rental vehicle				1	1	3			5	$ 250.00	$ -	$ -	$ -	$ 250.00	$ 250.00	$ 750.00	$ -	$ -	$ 1,250.00
fuel				1	1	3			5	$ 150.00	$ -	$ -	$ -	$ 150.00	$ 150.00	$ 450.00	$ -	$ -	$ 750.00
										Travel and Living Subtotal	**$ -**	**$ -**	**$ 914.12**	**$ 4,973.25**	**$ 1,983.05**	**$ 4,439.51**	**$ -**	**$ -**	**$ 12,309.93**
Direct Expenses																			
Geotechnical Consultant		1							1	$ 4,000.00	$ -	$ 4,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,000.00
Geotechnical Monitor				9					9	$ 1,350.00	$ -	$ -	$ -	$ 12,150.00	$ -	$ -	$ -	$ -	$ 12,150.00
Remediation Contractor				58000					58000	$ 1.00	$ -	$ -	$ -	$ 58,000.00	$ -	$ -	$ -	$ -	$ 58,000.00
RDEKCV landfill tipping fees (debris) (in tonnes)				400					400	$ 200.00	$ -	$ -	$ -	$ 80,000.00	$ -	$ -	$ -	$ -	$ 80,000.00
Trucking fees				16					16	$ 135.00	$ -	$ -	$ -	$ 2,160.00	$ -	$ -	$ -	$ -	$ 2,160.00
Restoration Contractor (post remediation)					1				1	$ 25,000.00	$ -	$ -	$ -	$ -	$ 25,000.00	$ -	$ -	$ -	$ 25,000.00
										Direct Expenses Subtotal	**$ -**	**$ 4,000.00**	**$ -**	**$ 152,310.00**	**$ 25,000.00**	**$ -**	**$ -**	**$ -**	**$ 181,310.00**
SUMMARY										**Task Total**	**$ 3,125.00**	**$ 9,000.00**	**$ 6,539.12**	**$ 173,353.25**	**$ 32,983.05**	**$ 15,239.51**	**$ 21,805.00**	**$ 10,020.00**	**$ 272,064.93**
																		20 % Contingency	**$ 54,412.99**
TOTAL COST (INCLUDING CONTINGENCY)																			**$ 326,477.91**

Assumptions:
Task 1C: Includes attendance at bidder's meeting which assumes 2 days mob/demob and 1 day on-site. Field day = 10 hrs/day. Assumes attendance by senior scientist only, mobilization from Kelowna, BC.
Task 2: Assumes 1 day kickoff, 6 days to review debris removal, 2 day mob/demob. Geotechnical monitor assumed to be 7 days on site plus 2 day mob/demob. Remediation contractor cost assumes mob/demob/H&S/site prep costs ($20000), 7 days spider hoe time at $250/hr and 10 hrs/day, 7 days total foreman time at $150/hr and 10 hrs/day (including live out). Assumes additional $10,000 to facilitate transport of debris to staging area (e.g. crane). Debris is 200 m^3. Assumes 12.5 m^3 per truck and pup load to landfill, one hour r.t. and trucking cost of $135/hr.

Task 3A: Assumes 3 days field supervision by Environmental Monitor and 2 days mob/demob. Restoration contractor estimate based on 500 m^2 of area to be addressed, installation and supply cost of $50/$m^2$.
Task 3B: Assumes 1 trip per year by Environmental Monitor from Grande Prairie for 3 years. One day field time and 2 day mob/demob for each trip (i.e. 9 days total).

TABLE 9: REMEDIAL ACTION PLAN (NO DEBRIS REMOVAL/EXCAVATION) - DETAILED COST BREAKDOWN

BUDGET ASSUMPTIONS:	Task 1: Incorporate AEC 1C into uplands SSHHERA and update with new investigation info from AEC 1A/1C. Complete SCT.

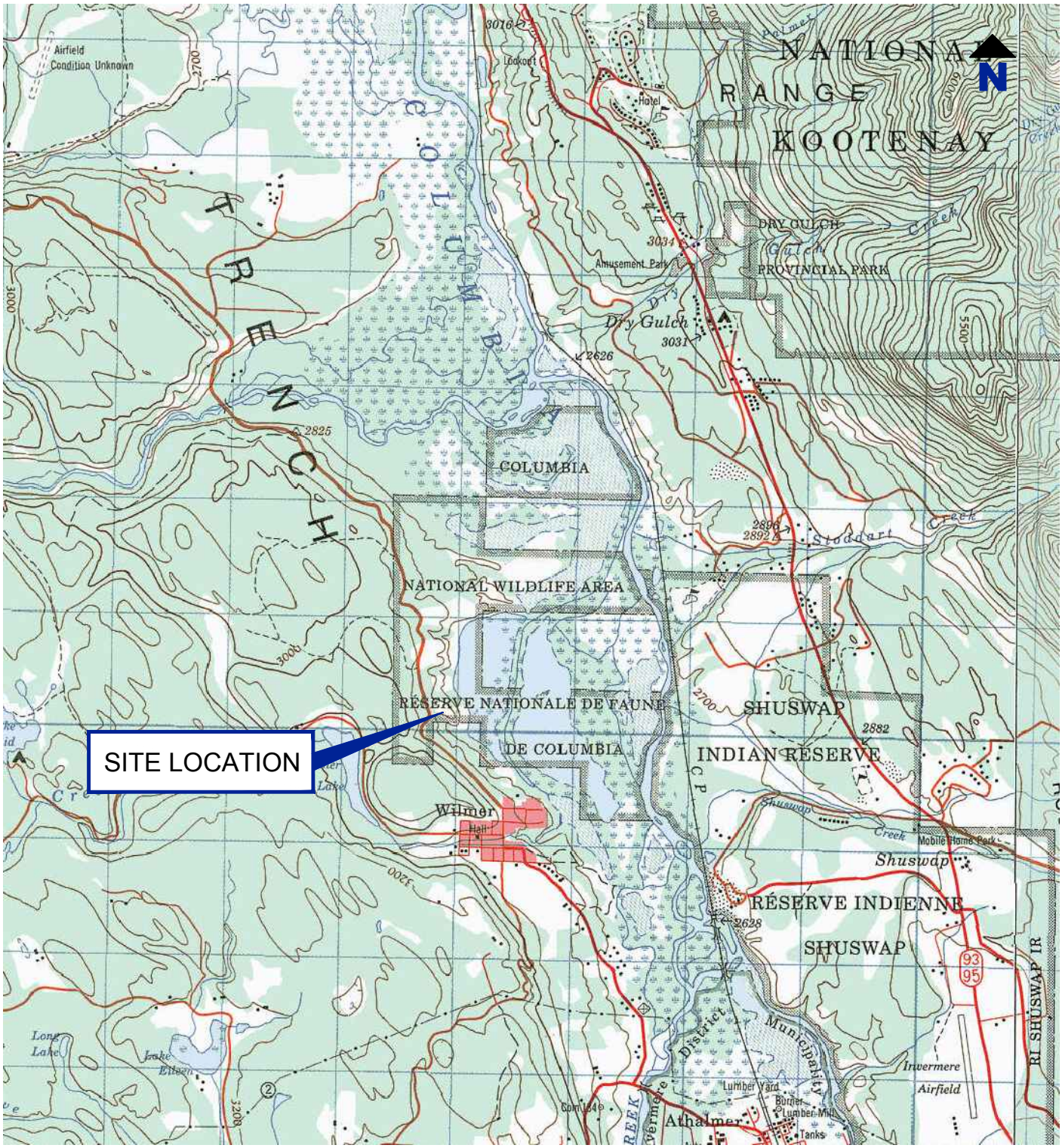
Item	Task 1 - SSHHERA of AEC 1A/1C AEC1A/1C SSHHERA and SCT	Total Units	Rates	Task 1 - SSHHERA of AEC 1A/1C AEC1A/1C SSHHERA and SCT	TOTAL
Labour					
Senior Program Coordinator	0	0	$ 125.00	$ -	$ -
Senior Environmental Scientist/Engineer	50	50	$ 125.00	$ 6,250.00	$ 6,250.00
Senior Risk Assessor	35	35	$ 125.00	$ 4,375.00	$ 4,375.00
Intermediate Environmental Scientist/Engineer	10	10	$ 95.00	$ 950.00	$ 950.00
Intermediate Risk Assessor	80	80	$ 95.00	$ 7,600.00	$ 7,600.00
Junior Environmental Scientist/Engineer	0	0	$ 78.00	$ -	$ -
Junior Risk Assessor	100	100	$ 78.00	$ 7,800.00	$ 7,800.00
CADD	10	10	$ 78.00	$ 780.00	$ 780.00
			Labour Subtotal	**$ 27,755.00**	**$ 27,755.00**
SUMMARY			**Task Total**	**$ 27,755.00**	**$ 27,755.00**
				20 % Contingency	**$ 5,551.00**
TOTAL COST (INCLUDING CONTINGENCY)					**$ 33,306.00**

DRAWINGS

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008



REFERENCED FROM : ETOPO MAP SYSTEM
NTS MAP 82 K/09

SCALE 1:50,000
WHEN PLOTTED AT 8.5 x 11 PAGE SIZE

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THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

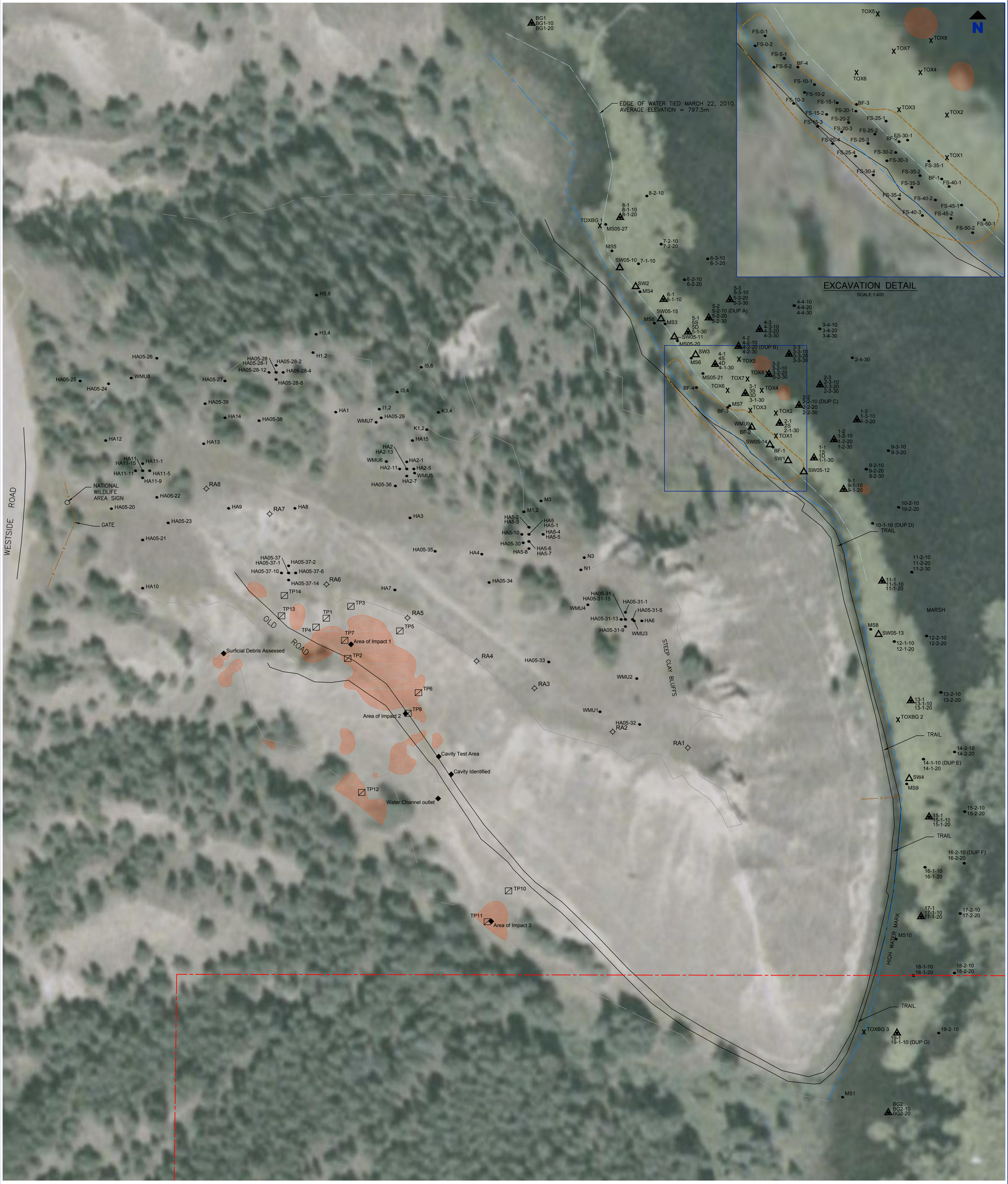
SLR

PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT, COLUMBIA NWA
WILMER, BC

Report
2013/2014 PROJECT WORKS SUMMARY AND REMEDIAL ACTION PLAN

Drawing
SITE LOCATION MAP

Date February 25, 2014	Scale AS SHOWN	Drawing No. 1
File Name S_219-05112-00008-D1	Project No. 219.05112.00008	


EDGE OF WATER TIED MARCH 22, 2010.
AVERAGE ELEVATION = 797.5m
EXCAVATION DETAIL
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WESTSIDE ROAD
OLD ROAD
STEEP CLAY BLUFFS
HIGH WATER MARK
MARSH
TRAIL
NATIONAL WILDLIFE AREA SIGN
GATE
Surficial Debris Assessed
Area of Impact 1
Area of Impact 2
Area of Impact 3
Cavity Test Area
Cavity Identified
Water Channel outlet
BG1
BG1-10
BG1-20
TOXBG 1
TOXBG 2
TOXBG 3
BG2
BG2-10
BG2-20
MS05-27
SW05-10
SW05-11
SW05-12
SW05-13
SW05-14
SW05-15
MS1
MS2
MS3
MS4
MS5
MS6
MS7
MS8
MS9
MS10
MS05-20
MS05-21
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SW2
SW3
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BF-4
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NOTES
DRAWING COMPILED FROM SURVEY PLAN FROM FOCUS (ACAD2004)\03400548-102-TP1-R1, DATE MARCH 28, 2010 AND ORTHOPHOTO FROM IMAGE PARKS CANADA
LEGEND
PROVINCIAL – FEDERAL BOUNDARY
TEST PIT LOCATION
SEDIMENT/SOIL SAMPLE LOCATION
SEDIMENT SAMPLE LOCATION FOR TOXICITY TESTS
SURFACE WATER SAMPLE LOCATION
RISK ASSESSMENT SOIL SAMPLE LOCATION
LIMITS OF EXCAVATION
EDGE OF WATER
HIGH WATER MARK
SAMPLE LABELS
H1–6, I1–6, K1–4, M1–3, N1 +3 SEDIMENT/SOIL SAMPLES COLLECTED 2010
HA05–20 TO HA05–39 SEDIMENT/SOIL SAMPLES COLLECTED 2005
HA1–14 SEDIMENT/SOIL SAMPLES COLLECTED 2003
WMU SEDIMENT/SOIL SAMPLE COLLECTED AUGUST 2002
MS SEDIMENT/SOIL SAMPLES COLLECTED NOVEMBER 2003
MS05 SEDIMENT/SOIL SAMPLES COLLECTED OCTOBER 2005
1S,1D ETC. SEDIMENT/SOIL SAMPLES COLLECTED FEBRUARY 2010
1–1– SEDIMENT/SOIL SAMPLES COLLECTED AUGUST 2010
FS–10–1 FORESHORE SOIL/SEDIMENT EXCAVATION LIMIT SAMPLES COLLECTED FEBRUARY/MARCH 2011
WMU SURFACE WATER SAMPLE COLLECTED AUGUST 2002
SW1–4 SURFACE WATER SAMPLES COLLECTED NOVEMBER 2003
SW05– SURFACE WATER SAMPLES COLLECTED 2005
1–1 SURFACE WATER SAMPLES COLLECTED AUGUST 2010
BG BACKGROUND SAMPLE LOCATIONS AUGUST 2010 – SEDIMENT/SOIL AND SURFACE WATER
TOX SEDIMENT SAMPLES FOR TOXICITY TESTING COLLECTED AUGUST 2011
THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.
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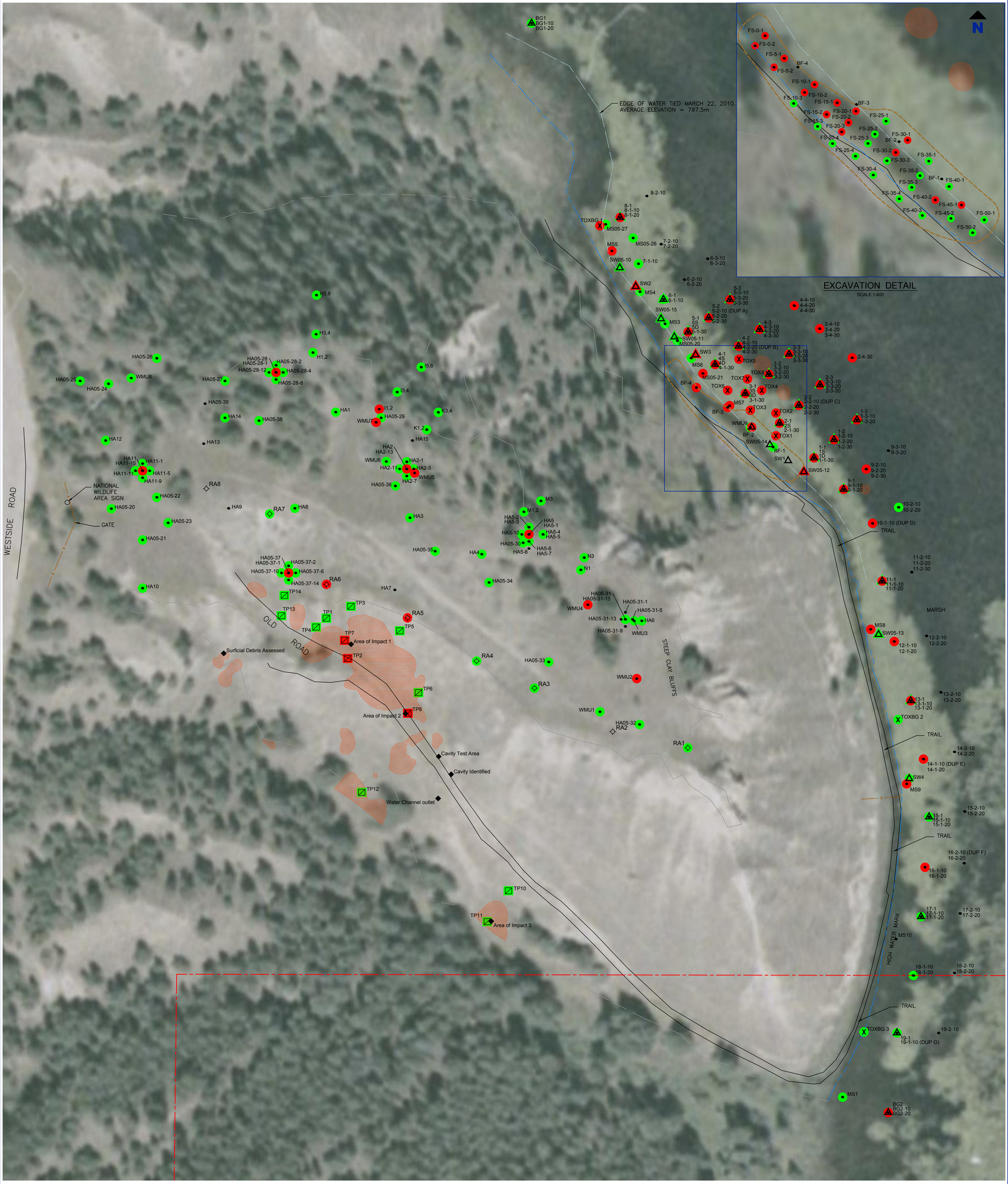
PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT COLUMBIA NWA
WILMER, BC
Report
2013/2014 PROJECT WORKS SUMMARY AND REMEDIAL ACTION PLAN
Drawing
SURROUNDING LAND USE PLAN
Date February 25, 2014
Scale AS SHOWN
Drawing No. 2
File Name S_219-05112-00008-D2
Project No. 219.05112.00008
SLR



NOTES

DRAWING COMPILED FROM SURVEY PLAN FROM FOCUS (ACAD2004)03400548-102-TP1-R1, DATE MARCH 28, 2010 AND ORTHOPHOTO FROM IMAGE PARKS CANADA

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- PROVINCIAL – FEDERAL BOUNDARY
- TEST PIT LOCATION
- SEDIMENT/SOIL SAMPLE LOCATION
- X SEDIMENT SAMPLE LOCATION FOR TOXICITY TESTS
- SURFACE WATER SAMPLE LOCATION
- RISK ASSESSMENT SOIL SAMPLE LOCATION
- LIMITS OF EXCAVATION
- EDGE OF WATER
- HIGH WATER MARK

SAMPLE LABELS

H1–6 I1–6 K1–4 M1–3 N1 +3	SEDIMENT/SOIL SAMPLES COLLECTED 2010
HA05–20 TO HA05–39	SEDIMENT/SOIL SAMPLES COLLECTED 2005
HA1–14	SEDIMENT/SOIL SAMPLES COLLECTED 2003
WMU	SEDIMENT/SOIL SAMPLE COLLECTED AUGUST 2002
MS	SEDIMENT/SOIL SAMPLES COLLECTED NOVEMBER 2003
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1S,1D ETC.	SEDIMENT/SOIL SAMPLES COLLECTED FEBRUARY 2010
1–1–	SEDIMENT/SOIL SAMPLES COLLECTED AUGUST 2010
FS–10–1	FORESHORE SOIL/SEDIMENT EXCAVATION LIMIT SAMPLES COLLECTED FEBRUARY/MARCH 2011
WMU	SURFACE WATER SAMPLE COLLECTED AUGUST 2002
SW1–4	SURFACE WATER SAMPLES COLLECTED NOVEMBER 2003
SW05–	SURFACE WATER SAMPLES COLLECTED 2005
1–1	SURFACE WATER SAMPLES COLLECTED AUGUST 2010
BG	BACKGROUND SAMPLE LOCATIONS AUGUST 2010 – SEDIMENT/SOIL AND SURFACE WATER
TOX	SEDIMENT SAMPLES FOR TOXICITY TESTING COLLECTED AUGUST 2011
▲ ●	LESS THAN OR EQUAL TO CCME GUIDELINES
▲ ●	GREATER THAN CCME GUIDELINES

SCALE 1:750
WHEN PLOTTED AT 24 x 24 PAGE SIZE
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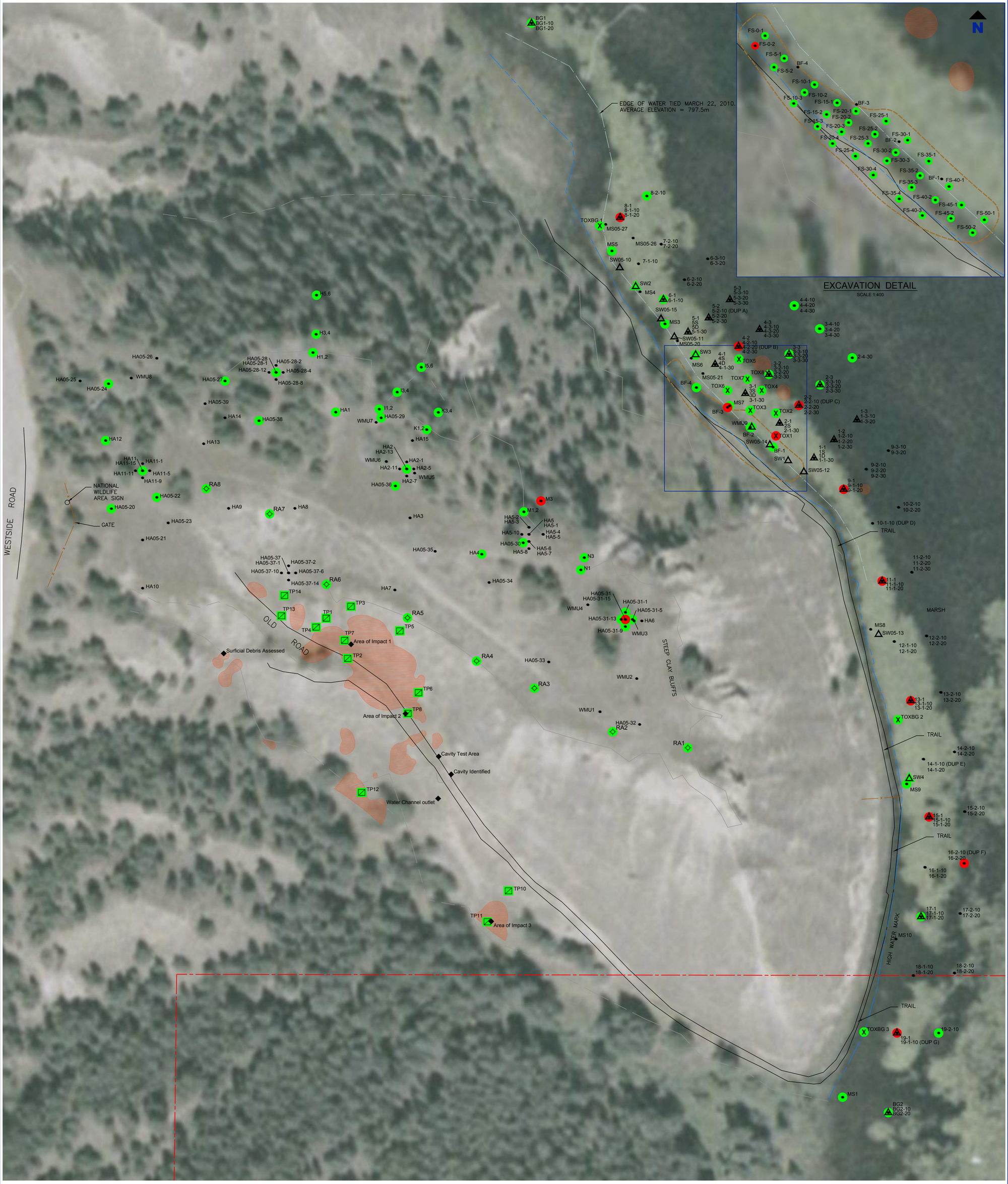
PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT COLUMBIA NWA
WILMER, BC

Report
2013/2014 PROJECT WORKS SUMMARY AND REMEDIAL ACTION PLAN

Drawing
SITE CHEMISTRY RESULTS - METALS

Date February 28, 2014	Scale AS SHOWN	Drawing No. 3
File Name S_219-05112-00008-D4-1	Project No. 219.05112.00008	

SLR



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NOTES

DRAWING COMPILED FROM SURVEY PLAN FROM FOCUS (ACAD2004)03400548-102-TP1-R1, DATE MARCH 28, 2010 AND ORTHOPHOTO FROM IMAGE PARKS CANADA

LEGEND

- PROVINCIAL – FEDERAL BOUNDARY
- TEST PIT LOCATION
- SEDIMENT/SOIL SAMPLE LOCATION
- SEDIMENT SAMPLE LOCATION FOR TOXICITY TESTS
- SURFACE WATER SAMPLE LOCATION
- RISK ASSESSMENT SOIL SAMPLE LOCATION
- LIMITS OF EXCAVATION
- EDGE OF WATER
- HIGH WATER MARK

SAMPLE LABELS

H1–6 I1–6 K1–4 M1–3 N1 +3	SEDIMENT/SOIL SAMPLES COLLECTED 2010
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WMU	SEDIMENT/SOIL SAMPLE COLLECTED AUGUST 2002
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1–1	SURFACE WATER SAMPLES COLLECTED AUGUST 2010
BG	BACKGROUND SAMPLE LOCATIONS AUGUST 2010 – SEDIMENT/SOIL AND SURFACE WATER
TOX	SEDIMENT SAMPLES FOR TOXICITY TESTING COLLECTED AUGUST 2011
▲ ●	LESS THAN OR EQUAL TO CCME GUIDELINES
▲ ●	GREATER THAN CCME GUIDELINES

PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT COLUMBIA NWA
WILMER, BC

Report
2013/2014 PROJECT WORKS SUMMARY AND REMEDIAL ACTION PLAN

Drawing
SITE CHEMISTRY RESULTS - PAHS

Date February 28, 2014
Scale AS SHOWN
Drawing No. 4
File Name S_219-05112-00008-D4-2
Project No. 219.05112.00008

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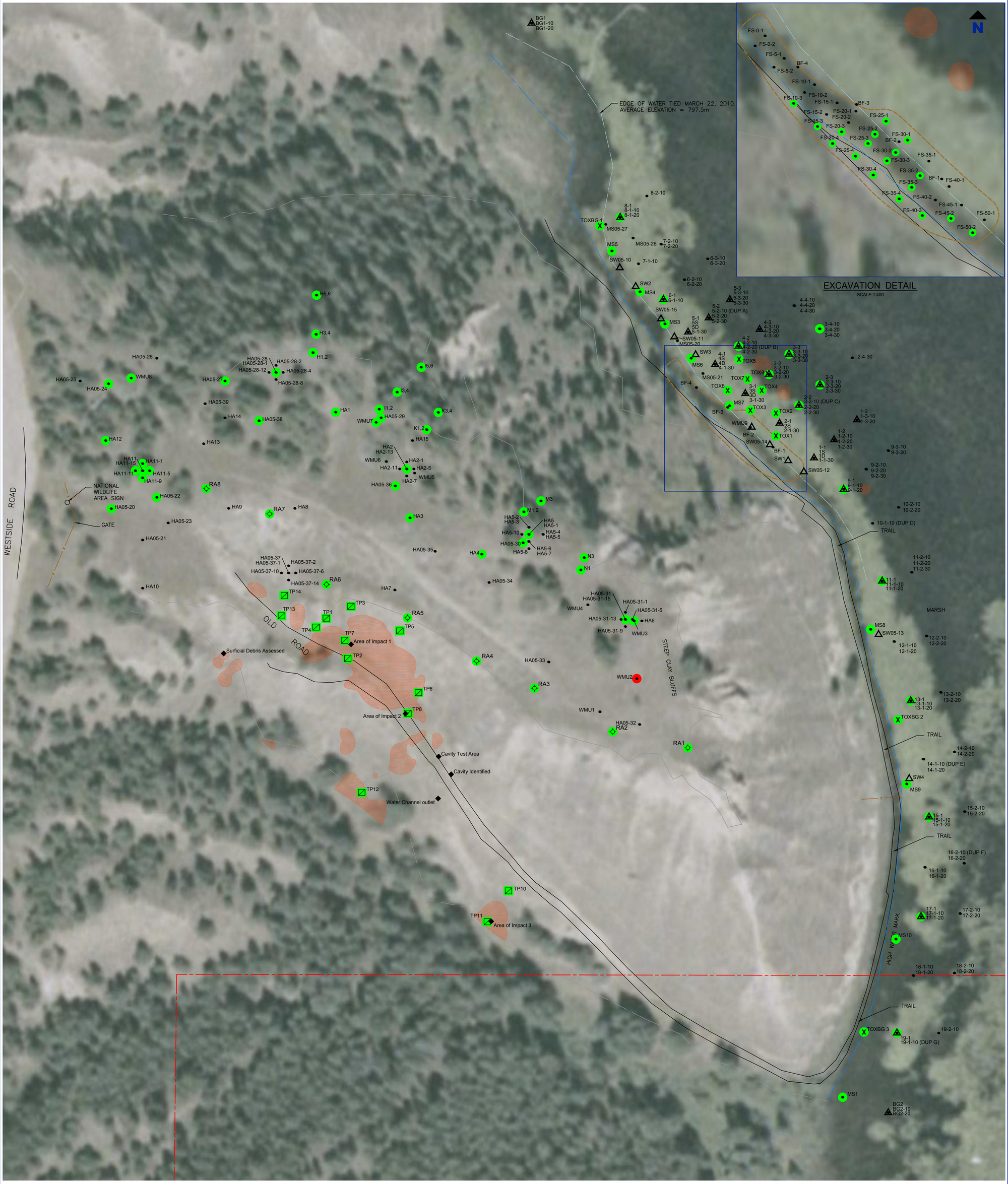

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LEGEND

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- TEST PIT LOCATION
- SEDIMENT/SOIL SAMPLE LOCATION
- X SEDIMENT SAMPLE LOCATION FOR TOXICITY TESTS
- SURFACE WATER SAMPLE LOCATION
- RISK ASSESSMENT SOIL SAMPLE LOCATION
- LIMITS OF EXCAVATION
- EDGE OF WATER
- HIGH WATER MARK

SAMPLE LABELS

H1–6 I1–6 K1–4 M1–3 N1 +3	SEDIMENT/SOIL SAMPLES COLLECTED 2010
HA05–20 TO HA05–39	SEDIMENT/SOIL SAMPLES COLLECTED 2005
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FS–10–1	FORESHORE SOIL/SEDIMENT EXCAVATION LIMIT SAMPLES COLLECTED FEBRUARY/MARCH 2011
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SW1–4	SURFACE WATER SAMPLES COLLECTED NOVEMBER 2003
SW05–	SURFACE WATER SAMPLES COLLECTED 2005
1–1	SURFACE WATER SAMPLES COLLECTED AUGUST 2010
BG	BACKGROUND SAMPLE LOCATIONS AUGUST 2010 – SEDIMENT/SOIL AND SURFACE WATER
TOX	SEDIMENT SAMPLES FOR TOXICITY TESTING COLLECTED AUGUST 2011
●	LESS THAN OR EQUAL TO CCME GUIDELINES
●	GREATER THAN CCME GUIDELINES

PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT COLUMBIA NWA
WILMER, BC

Report
2013/2014 PROJECT WORKS SUMMARY AND REMEDIAL ACTION PLAN

Drawing
SITE CHEMISTRY RESULTS - PHC

Date February 28, 2014
Scale AS SHOWN
Drawing No. 5
File Name S_219-05112-00008-D4-3
Project No. 219.05112.00008

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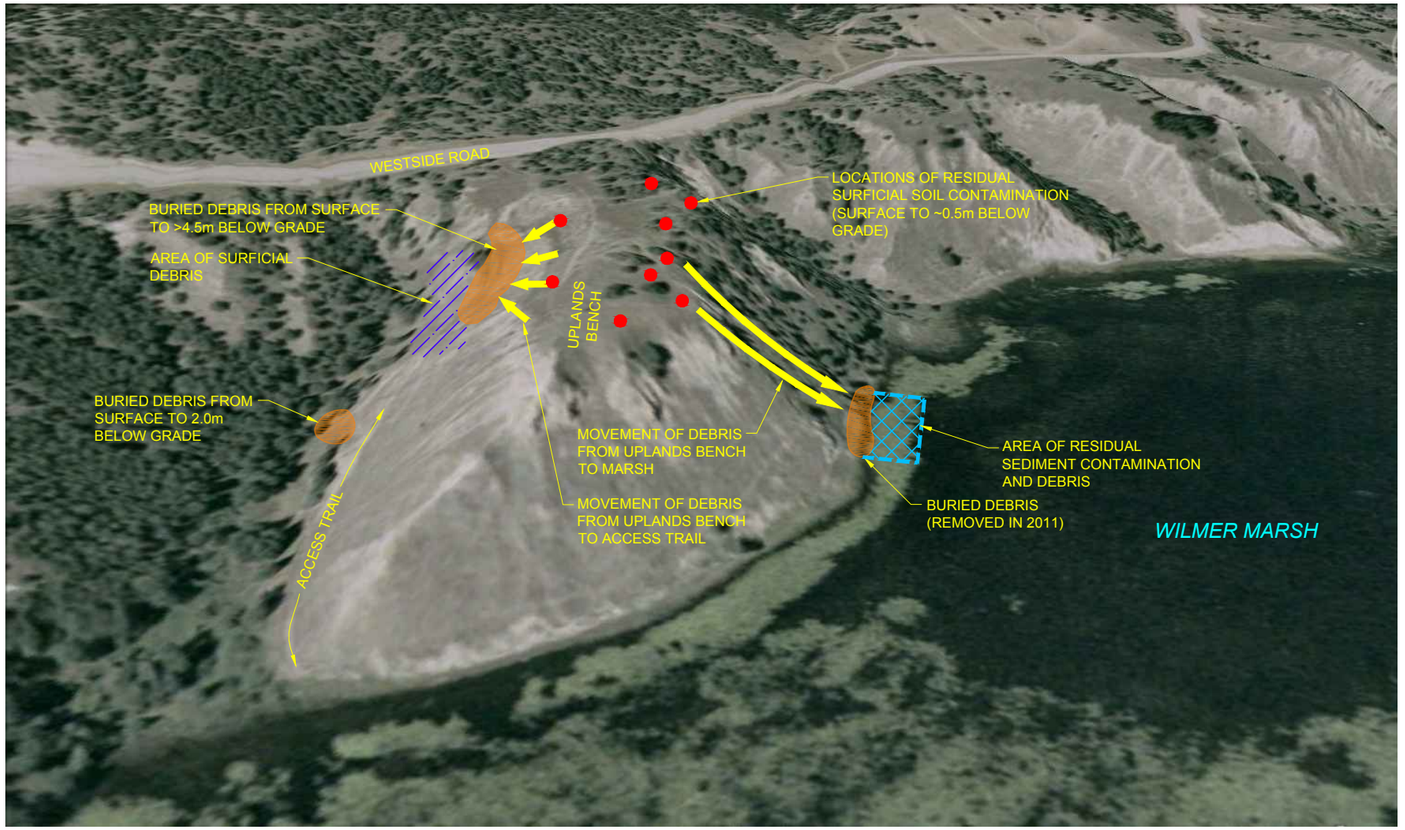
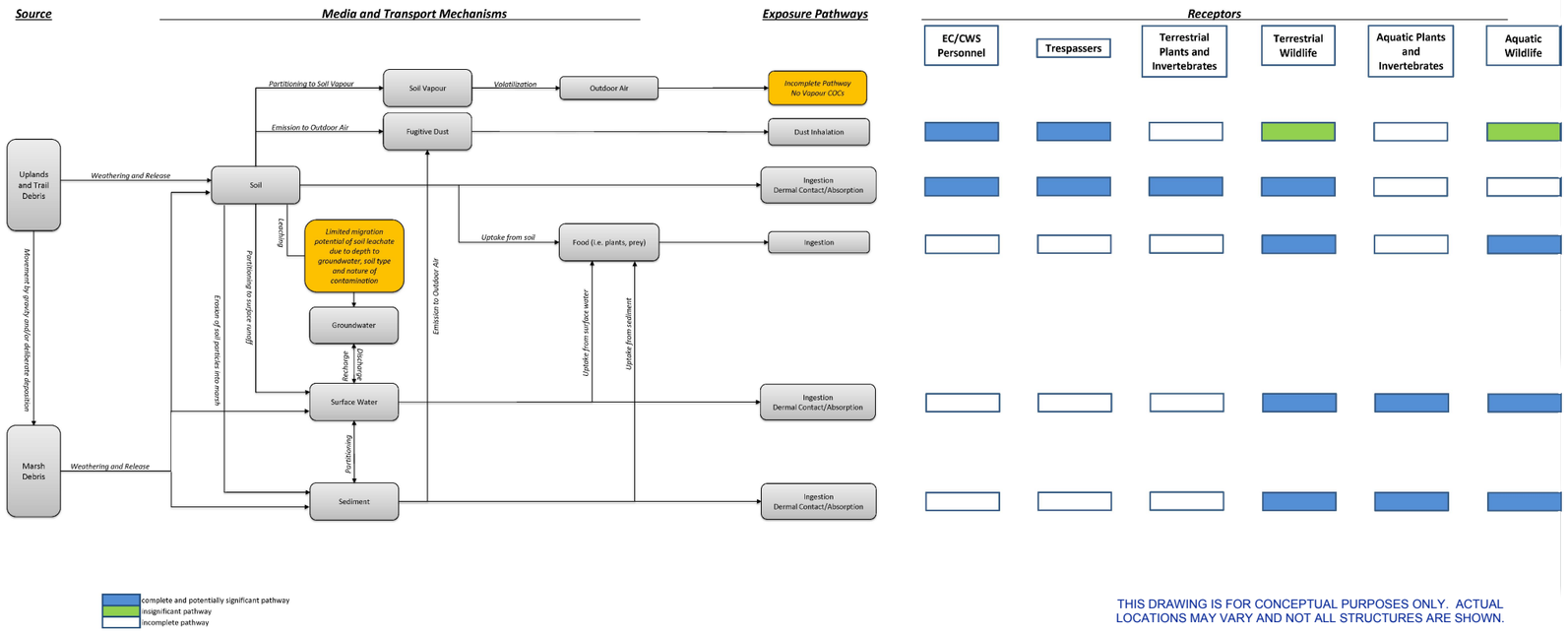




THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

NOTES

DRAWING COMPILED FROM IMAGE PARKS CANADA © 2013 GOOGLE EARTH

PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT COLUMBIA NWA
WILMER, BC

Report
2013/2014 PROJECT WORKS SUMMARY AND REMEDIAL ACTION PLAN

Drawing
CONCEPTUAL SITE MODEL

Date March 6, 2014	Scale NTS	Drawing No. 6
File Name S_219-05112-00008-D5	Project No. 219.05112.00008	

SLR

PHOTOPLATES

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008

Photo 1: Fence opened to allow for access of SPIDEX excavator.

Photo 2: Test Pit 1 (TP1) Location

Photo 3: TP1 – First scrape of surface material. Some minor debris observed.

Photo 4: TP1 – excavated to 3 m. No debris but soil is disturbed/fill material.

Photo 5: Test Pit 2 (TP2) - Location

Photo 6: TP2 – excavation through 2 m of cover material.

Photo 7: TP2 - Metal debris encountered at 2.5 m to 4.5 m.

Photo 8: TP2 – At 4 m metal debris still encountered.

Photo 9: Test Pit 3 (TP3) - Location

Photo 10: TP3 –Disturbed soil/fill noted to 1 m with native soil below. Minor debris to 1 m.

Photo 11: Test Pit 4 (TP4) - Location

Photo 12: TP4 – No debris noted in soil.

Photo 13: Test Pit 7 (TP7) – Location

Photo 14: TP7 – debris observed at 0.5 m.

Photo 15: TP7 - Metal debris observed throughout excavation.

Photo 16: TP 7 - Metal debris still present in excavation at 4 m.

Photo 17: Test Pit 5 (TP5) - Location

Photo 18: TP5 – No debris observed – native material.

Photo 19: Test Pits 6 and 8 (TP6 and TP8) – Locations

Photo 20: TP8 – Debris observed at 0.5 m.

Photo 21: TP8 – Debris encountered to 4 m.

Photo 22: Damaged portable toilet observed on morning of October 30, 2013.

Photo 23: Location along the trail where a cavity and sound of running water has been observed.

Photo 24: Excavation in area of cavity and water flow – found deep cavity in trail.

Photo 25: Excavation in area of cavity and water flow – found deep cavity in trail.

Photo 26: Located exit of cavity to south of trail flowing downslope .

Photo 27: Test Pit 10 (TP10) - Location

Photo 28: TP10 – Excavated test pit up to 3 m.

Photo 29: Test Pit 11 (TP11) - Location

Photo 30: TP11 – Debris removed from test pit.

Photo 31: Test Pit 12 (TP12) - Location

Photo 32: TP12 – Excavation revealed minimal debris.

Photo 33: TP12 – Looking upslope towards TP6 and TP8.

Photo 34: TP12 – Embedded metal debris in slope observed to have been used by wildlife in the past.

Photo 35: Gully Debris – metal surficial debris observed.

Photo 36: Test Pit 13 (TP13) - Location

Photo 37: Test Pit 14 (TP14) - Location

Photo 38: Re-contouring of disturbed test pit locations (TP1-7 in photograph).

Photo 39: Re-contouring of disturbed test pit locations (TP8-11 and cavity assessment).

Photo 40: Following re-contouring, flagging of test pits was conducted.

Photo 41: Site cleanup in 2011 - 0565811E 5600294N

Photo 42: Site condition in 2013.

Photo 43: Site cleanup in 2011 - 0565875E 5600301N

Photo 44: Site condition in 2013.

Photo 45: Site cleanup in 2011 - 0565018E 5601261N

Photo 46: Site condition 2013.

Photo 47 Area of car body removal downslope in 2011 - 0565876E 5600295N

Photo 48: Site condition in 2013.

Photo 49: Large gully cleanup in 2011 - 0565901E 5600278N

Photo 50: Site condition in 2013.

Photo 51: Small area of metal debris cleanup in 2011 - 0565809E 5600309N

Photo 52: Site condition in 2013.

Photo 53: Large gully cleanup in 2012 - 0565971E 5600234N

Photo 54: Site Condition in 2013.

Photo 55: Large gully cleanup in 2012 - 0565971E 5600234N

Photo 56: Site Condition in 2013.

Photo 57: Void outlet and saturated soil (March 2014)

Photo 58: Path of surface runoff from void, looking up lower trail (March 2014)

Photo 59: Surface runoff from void, looking down lower trail (March 2014)

Photo 60: Area of surface runoff pooling in gully (March 2014)

APPENDIX A

Project Permit- Canadian Wildlife Service

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008

Environment Canada | Environnement Canada

ENVIRONMENT CANADA - ENVIRONNEMENT CANADA
PERMIT – PERMIS

Digging of Test Pits	**BC-13-0041**
Permit for/Permis de pour	Permit no./ No. de permis
British Columbia / Colombie Britannique	**4**
province(s), territoires -la (les) provinces / territoires	Issued under section/Délivre en vertu de l'article

Name and address - Nom et adresse

SLR Consulting (Canada) Ltd.
Lindsay ~~Petersen~~ PATERSON
200-1475 Ellis Street
Kelowna BC V1Y 2A3

Wildlife Area Regulations
Règlement sur les réserves de la faune

Barry D Smith

Date of issue/ Date démission : **01 August 2013**
Date of expire /Date d'expiration; **31 March 2014**

For the minister/ Pour le ministre

Special Conditions / Conditions spéciales

Wilmer Marsh Unit Columbia National Wildlife Area
Test Pitting and Water Sampling
Project No.: 219.05112
Reference no: DFRP # 16096, ARMS # 00394, FCSI # 16096079

1. Permit must be signed to be valid.
2. This permit allows for work around migration in the area.
3. The purpose of the permit is to assess the extent of debris in the trail through the advancement of test pits and to evaluate the quality of any subsurface water that may be in contact with the debris through the installation of standpipe piezometers and/ or collection of surface runoff water samples.
4. SPIDEX All Terrain Excavating will dig approximately 40 test pits using the hoe. SPIDEX to visual inspect subsurface material in the trail are for the presence of debris. Test pits will be advanced to the maximum depth achievable based on geotechnical constraints where debris is observed to be extensive or the depth of the natural native soil all soil to be placed back into pits.
5. Any additional work to be carried out in accordance to permit application.
6. The issuance of this permit does not supersede the necessity to meet other legal requirements to acquire any federal, provincial or municipal licenses, permits or other authorizations required by law.
7. This permit is not transferable to any other person(s) or organisation(s).
8. Upon completion notify Courtney Albert so an inspection of site maybe conducted.

Sub-permit holder: Employee(s) of SLR Consulting, SPIDEX All Terrain Excavating Inc., 330-3104 30th Ave., Vernon, BC V1T 9M9

I declare that I have read and understand this Permit, including all the conditions attached.
Je déclare que j'ai lu et que je comprends le présent permis et toutes les conditions qui y sont prévues.

Signature of permit-holder(s)
Signature du détenteur du permis

Canada

APPENDIX B

Clarke Geoscience Ltd. Geotechnical Assessment and Monitoring Plan Report (September 2013)

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008

clarke geoscience ltd.

September 12, 2013

SLR Consulting (Canada) Ltd.
1475 Ellis Street, Suite 200
Kelowna, B.C.
V1Y 2A3

Attention: Lindsay Paterson, Project Manager

Dear Ms. Paterson,

RE: Geotechnical Assessment and Monitoring Plan
Wilmer Marsh Unit, Columbia National Wildlife Refuge, Wilmer, BC
(SLR Project No. 219.05112.01.0001)

Clarke Geoscience Ltd. (CGL) is pleased to submit the following geotechnical assessment and monitoring plan for a proposed test-pitting program to be completed by SLR Consulting (Canada) Ltd. (SLR). The work will be conducted along a steep slope within the Wilmer Marsh Unit of the Columbia National Wildlife Area (project site), located near Wilmer, BC.

The objectives of the geotechnical assessment are as follows:

a) assess slope stability along the access trail and adjacent slopes to update the 2010 geotechnical assessment;
b) assess the potential for slope instability resulting from the proposed test pitting investigation program;
c) provide recommendations regarding site access and site disturbance;
d) identify erosion and sediment control measures for the test pitting program; and,
e) prepare a geotechnical monitoring plan.

Background

As part of an on-going multi-year remediation program being completed on behalf of Public Works and Government Services Canada (PWGSC), SLR proposes additional investigation at the project site. Geophysical surveys indicate a potential for buried waste along the steep access trail at the site. To further define the nature and extent of the buried waste, SLR proposes a test-pitting program in the area. It is understood that approximately ten (10) test pits will be dug using a spider hoe excavator in the fall of 2013. Work is expected to be completed within 2 to 3 days.

5217 Benmore Ct.
Kelowna, British Columbia
V1W 4Z3
Phone/Cell: 250.826.4367
Email: clarke-geoscience@shaw.ca

Geotechnical Conditions

Stability conditions along the scarp slope and along the access trail were initially reported by Clarke Geoscience Ltd. (2010). In addition to these observations, a site inspection was conducted on August 12, 2013 by Ms. Clarke, accompanied by Ms. Paterson and Ms. Noel (SLR) and Mr. Frei (Spidex All Terrain Excavating). The site inspection, which focused on proposed test pit locations, provides updated information on site conditions with respect to slope stability.

The test pitting program will take place adjacent to a 15 to 20 m high silt bluff, which characterizes the area. It is understood that test pits will be located in three areas along the slope (see Figure 1), with the majority of test pits to be situated along the upper section of trail (Photo 1).

Where visible, soils comprising the bluff are stratified silts or clayey silt, with uniform grading, and few to no visible coarse clasts. The soils are compact and cemented enough to maintain near-vertical slopes while dry. However, these soils are prone to failure when wetted.

The rough access trail descends approximately 300 m from the level area adjacent to Westside Road down to the marsh at a grade of 16 to 20%. Along the upper section of trail, slopes are steep (60 to 75%) and are mantled with colluvium comprised of less consolidated silt, mixed organics, and waste debris. The colluvial slopes at the upper area of proposed test pitting are somewhat irregular in surface profile, reflective of previous soil slumping and/or buried waste (Photo 2). Nearby, there is evidence that the colluvial slopes at the project site are prone to shallow surface slides, rotational slumps, and surface erosion.

Near the top of the slope in an area previously identified as unstable there is fairly recent gully erosion stemming from surface runoff from the upper slopes and trail (see Figure 1). The gully erosion (Photo 3) is 0.75 m deep and extends from the slope crest into the adjacent valley. The erosion on the slope and along the trail is indicative of the extremely sensitive nature of the soils.

The two other test pit locations are situated further downslope along the trail (Figure 1; Photo 4). The sites are located just above the valley bottom and adjacent slopes are moderate (approx. 50%). Along the access trail nearby there is evidence of surface erosion and possibly sub-surface piping erosion indicated by a deep cavity (Photo 5). There is evidence that the areas upslope are subject to shallow landslides or rotational slumps but there is no evidence of instability in the immediate area of the proposed test pits.

Conclusions and Recommendations

It is concluded that the proposed test pit locations are situated within highly erodible soils in an area that is sensitive to shallow landslides, piping and shallow rotational slumping. Activities associated with the test pitting program, including repeated passage by heavy equipment has the potential to accelerate erosion and instability along the trail. Thus, considerations for safety and environmental protection are paramount.

Based on an inspection of the proposed test pit locations and based on an understanding that program timing and duration, it is concluded that the shallow excavations to determine nature and extent of buried waste are unlikely to compromise the stability of the slope.

To minimize the potential for impacts associated with slope instability or soil surface erosion during the test pitting program, the following recommendations are provided :

- Machine operator shall be familiar and experienced working on steep slopes and should inspect site conditions prior to accessing the site with heavy equipment;
- Test pitting shall take place during a period of dry weather at a time of year when soils are relatively dry (or frozen);
- The test pits shall not be left open for an extended period of time and shall be backfilled with native material and machine compacted;
- Disturbed soils along sloped areas, including the access trail, shall be graded in a manner that does not concentrate surface runoff;
- Upon completion, exposed soils shall be seeded using an appropriate dry-land native grass seed mixture; and,
- On-site monitoring is recommended during the test pitting program.

Geotechnical Monitoring Plan

On-site monitoring is recommended during the test pitting program. Monitoring, to be completed by a Qualified Professional, should include the following:

- Conduct a pre-work site inspection and tail-gate meeting with contractors to review site conditions;
- Provide on-site monitoring during the test pitting program. Work will include periodically inspecting the slope for indications of accelerated instability. Monitoring shall include providing guidance on excavation depths during the removal of waste and will include providing recommendations for backfill requirements; and,
- Address incidental stability or erosion control issues on-site and provide recommendations for impact mitigation. It is understood that work will be completed under the direction of the environmental consultant/monitor (SLR). The environmental consultant/monitor shall be responsible for the implementation of measures. However, where slope stability issues arise, or where collaborative efforts are required, the geotechnical monitor shall provide the necessary assistance.

We trust that this assessment meets your current requirements. If you have any questions or comments, please do not hesitate to contact the undersigned at 250-826-4367.

Respectfully submitted,

CLARKE GEOSCIENCE LTD.

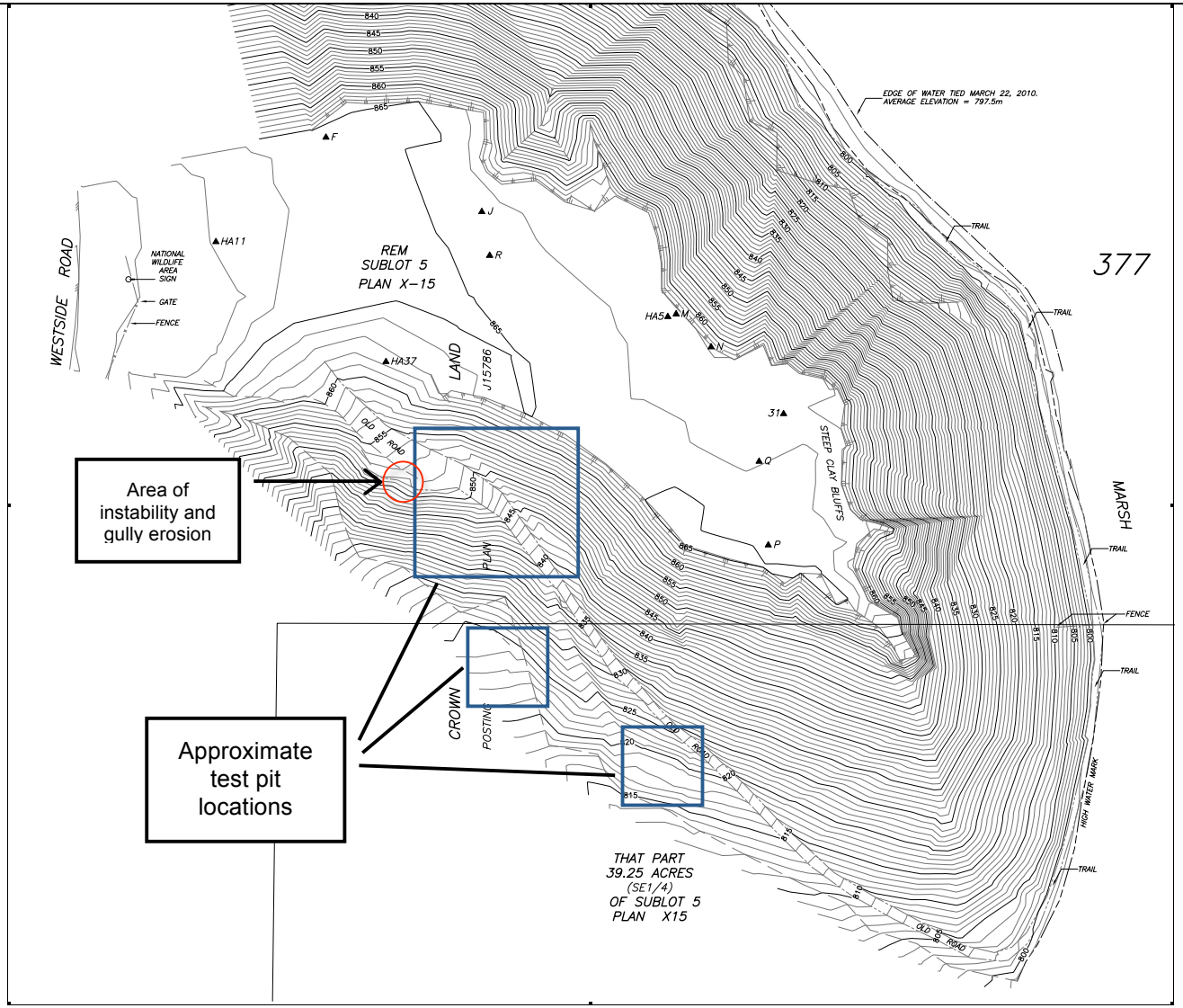
JC 9/12/13

Jennifer Clarke, M.Sc., P.Geo.
Geomorphologist

Encl.
Figure 1 Site Plan
Photographs 1 to 5

Reference:

Clarke Geoscience Ltd. 2010. Slope Stability Assessment and Recommendations for Remedial Action, Wilmer Marsh Unit, Columbia National Wildlife Refuge, Wilmer, BC (SLR Project No. 219.05112.01.0001). Report prepared for SLR (Canada) Consulting Ltd. Kelowna, BC.



Topographic base map obtained from SLR Consulting (Focus Corporation, 2010)

Project: Geotechnical Assessment and Monitoring Plan, Wilmer Marsh, Wilmer BC	
Date: September 12, 2013	Figure No.: 1
Title: Site Plan	

Clarke geoscience ltd.

Photo 1: View of Access Trail from top of slope

Photo 2: View downslope showing upper area of proposed test pits

Photo 3: Gully Erosion (0.75 m deep) extending downslope from slope crest

Photo 4: View of another area of proposed test pits, further downslope

Photo 5: View downslope trail towards other area of test pitting. Note exposed soils along cutslope and erosion along surface of trail (in area of piping cavity).

APPENDIX C

Clarke Geoscience Ltd. Geotechnical Monitoring Report (November 2013)

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008

Clarke Geoscience Ltd.

November 21, 2013

SLR Consulting (Canada) Ltd.
1475 Ellis Street, Suite 200
Kelowna, B.C.
V1Y 2A3

Attention: Lindsay Paterson, Project Manager

Dear Ms. Paterson,

RE: Geotechnical Monitoring Report
Wilmer Marsh Unit, Columbia National Wildlife Refuge, Wilmer, BC
(SLR Project No. 219.05112.01.0001)

Clarke Geoscience Ltd. (CGL) is pleased to submit the following geotechnical monitoring report. The report documents site conditions during a test-pitting program completed by SLR Consulting (Canada) Ltd. (SLR). The test-pitting program took place over two days (October 29-30, 20103) within an upland area of the Wilmer Marsh Unit of the Columbia National Wildlife Area (project site), located near Wilmer, BC.

Test-pitting was completed using a rubber tired spider hoe (Spidex All-Terrain Excavating) during clear, dry weather conditions. Temperatures ranged from approximately -5^{o}C to +5^{o}C during the day.

Fourteen (14) test pits were excavated to a maximum depth of 4.5 m in an effort to characterize the nature and extent of buried waste. The approximate distribution of test pits is shown on Figure 1. Monitoring for slope stability was conducted during test pitting and recommendations for erosion and sediment control were provided. Photographs taken during the program are included in this report.

Geotechnical Conditions

The majority of the test pits were situated along, or adjacent to, an access trail that extends 300 m from the level area adjacent to Westside Road to the marsh along a silt slope (photo 1).

Soils encountered within the test pits have a clayey-silt to sandy-silt texture, and are uniformly graded with no coarse clasts. Soil consolidation varies depending on the level of past disturbance. Native soils are consolidated glaciolacustrine silts, but where soils have been disturbed by waste burial (material pushed from slopes above), the soils are less consolidated.

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(250) 826-4367
jen@clarkegeoscience.com

The rough access trail has a grade of 16 to 20%. Slopes above the upper part of the trail are steep (60 to 75%) and somewhat irregular in surface profile (photo 2). A previously noted erosional gully extends from the edge of the trail near the top of the slope (photo 3) and is indicative of the sensitive nature of the soils.

As part of the test-pitting program, further investigation of a previously identified cavity was conducted along the trail. The investigation found that the cavity extends approximately 2 m below the surface where it opens up to a large void (approx. dimensions 2 m wide x 1 m high x 5 m long). The void extends downslope and daylights in the cut slope of a lower trail (photos 4 and 5). At the time of the inspection, the cavity was dry. However, water flow was audible during previous field visits conducted at different times of the year. Sinkholes, or voids, are caused by piping erosion along the joints and fractures of consolidated silt. Piping is a natural erosional process that, in this case, was likely exacerbated by surface water flowing down the trail.

Upon excavation, the silt-textured soils become loose and, without moisture, are difficult to consolidate. Test-pits were backfilled immediately and tamped down using the bucket of the excavator. The loose nature of the soils makes the disturbed areas, particularly those on sloping ground, susceptible to surface erosion. Test pits located on and above the upper part of the trail (TP#1 to 7) are considered more susceptible to erosion because of the slope.

Conclusions and Recommendations

Based on the geotechnical monitoring of the test-pitting program at Wilmer, it is concluded that no adverse effects associated with slope stability were experienced. Test-pitting was done efficiently and effectively during dry weather conditions using an appropriate type of excavator with an experienced operator.

From a stability perspective, there is a potential that the large void (approx. 10 m^3) located below the access trail may collapse. Future machine work, or machine access along the trail should take this into consideration.

There is a concern that soil disturbance on the steeper slopes and along the trail will lead to surface erosion and gullying along the sloping soil surfaces. It is unlikely that mobilized sediment will reach the Wilmer Marsh. However, undue gully erosion would be undesirable negative effect on the area.

Based on the assessment, erosion and sediment control recommendations were provided to SLR following the site visit by email. These recommendations are as follows:

- Test pits on the upper part of the slope are particularly sensitive and vulnerable to surface erosion from runoff and measures are recommended to prevent gully erosion that would affect undisturbed areas down slope.
- The affected areas are identified along the upper part of the access trail and area delineated on the attached photo 6. The total affected area is 135 m^2 and is comprised of the following areas:
    - Area A (Test pit 3) = 10 m^2 ; steep (70%) slope
    - Area B (Test pit 6) = 15 m^2 ; steep (70%) slope

  - Area C (Test pit 5) = 10 m^2 ; steep (70%) slope
  - Area D (Test pit 7) = 100 m^2 ; moderately steep (30%) slope

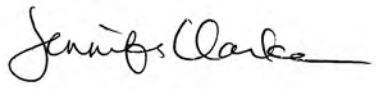
- To provide temporary cover to protect the slope from rain splash erosion and to check surface flow across the slope, a coconut fibre mat cover is recommended.
  - The matting would provide mulch and will protect surface soils under grasses establish.
  - The matting should be natural and biodegradable.
  - The mat should have good contact with the underlying surface (tamp down) and should be installed on the slope, top to bottom, with overlapping edges and pinned in place (install as per manufacturers recommendations). Due to the loose nature of the soils, the pins should be at least 50 cm long.
  - The uphill end of the mat should be buried in a trench at least 300 mm deep and the backfill should be compacted. This will help ensure that water flows over top of the mat and not underneath.
  - In addition, scatter coarse woody debris (CWD) over the surface. This will provide a rough surface to aid the establishment of vegetation cover, will reduce runoff velocity, increase surface infiltration and will trap sediment on the slope. CWD is not abundant at the site but there is some woody debris and some fallen branches in the nearby gully.

It is understood that the onset of winter conditions has prevented the immediate implementation of the above-listed measures. Installation in early spring (early March), prior to peak snow melt conditions will be suitable.

We trust that this assessment meets your current requirements. If you have any questions or comments, please do not hesitate to contact the undersigned at 250-826-4367.

Respectfully submitted,

CLARKE GEOSCIENCE LTD.



Jennifer Clarke, M.Sc., P.Geo.
Geomorphologist

Encl.
Figure 1 Site Plan
Photographs 1 to 6

Reference:

Clarke Geoscience Ltd. 2010. Slope Stability Assessment and Recommendations for Remedial Action, Wilmer Marsh Unit, Columbia National Wildlife Refuge, Wilmer, BC (SLR Project No. 219.05112.01.0001). Report prepared for SLR (Canada) Consulting Ltd. Kelowna, BC.

Photo 1: View of work progressing along the upper part of the access trail

Photo 2: View of test pit locations at the upper end of the trail and on adjacent slope.

Photo 3: Gully (0.75 m deep) extending downslope from slope crest

Photo 4: Upper view of void encountered along access trail

Photo 5: Lower view of void encountered along cutslope of lower trail

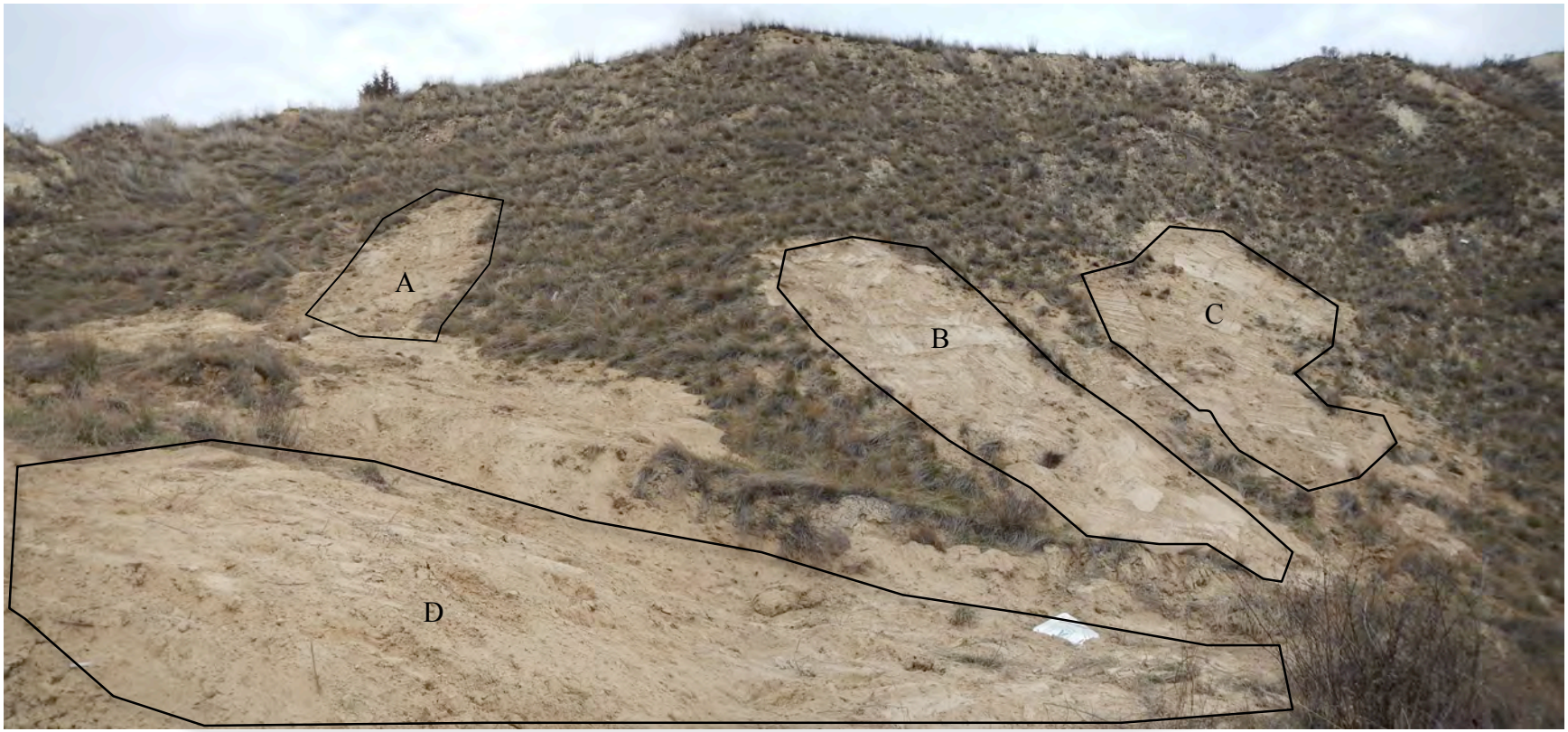
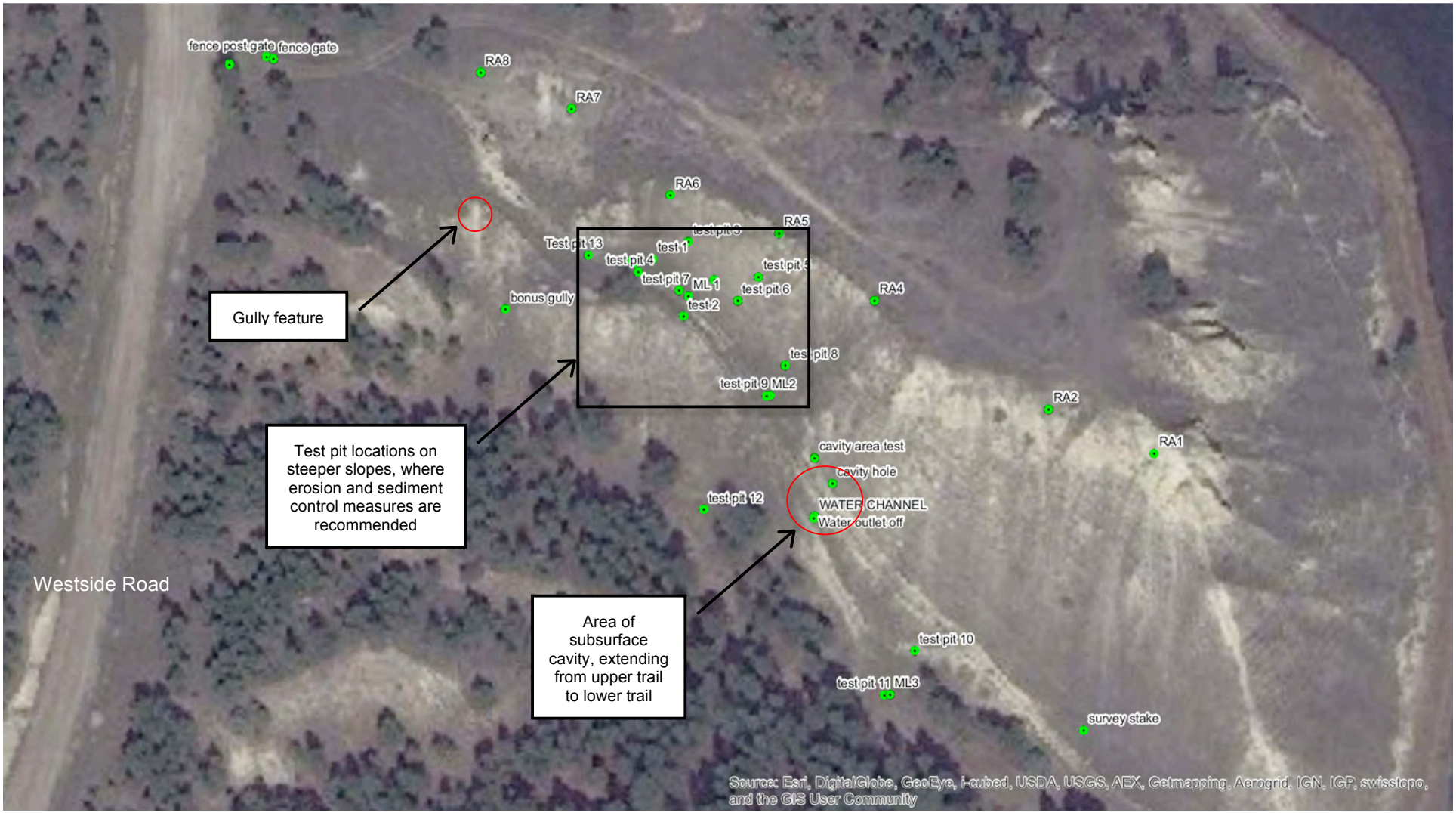


Photo 6: View of areas requiring erosion and sediment control measures at the Wilmer Remediation Site (Oct 30, 2013)

Area A (Test pit 3) = 10 m^2 ; steep (70%) slope
Area B (Test pit 6) = 15 m^2 ; steep (70%) slope
Area C (Test pit 5) = 10 m^2 ; steep (70%) slope
Area D (Test pit 7) = 100 m^2 ; moderately steep (30%) slope



Base map and georeferenced test pit locations obtained from SLR Consulting (Canada) Ltd.

Project: Geotechnical Monitoring Report, Wilmer Marsh, Wilmer BC	
Date: November 21, 2013	Figure No.: 1
Title: Site Plan	

clarke geoscience ltd.

APPENDIX D

SLR Environmental Monitoring Report

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008

15 November 2013

Lindsay Paterson, P.Ag.
200-1475 Ellis Street
Kelowna, BC V1Y 2A3

Project No.: 219.05112.00008

RE: ENVIRONMENTAL MONITORING NOTES – 2013 TEST PITTING

On October 29, 2013, two SLR Consulting (Canada) Ltd. (SLR) representatives (Ms. Kalina Noel, R.P.Bio. – Biologist, and Ms. Krystal Ashworth – Environmental Scientist), Ms. Jennifer Clarke, a Geomorphologist with Clarke Geoscience Ltd. (Clarke Geoscience), and Mr. Domenic Frei with Spidex All-Terrain Excavating (Spidex) met onsite at 8am. Following a health and safety meeting, SLR met with Mr. Eric Godlien of One Time Fencing, who was present onsite to open the fence to allow the Spidex excavator to pass through. SLR then met with Invermere Sales and Rentals for placement of a portable toilet at the gate. A sign was placed on the portable toilet indicating it was for use by workers on the site only.

Following these preliminary activities, the team along with the Spidex excavator moved down to the start of the trail leading down to the marsh. The excavator stayed on the previous disturbance areas and proceeded slowly to the first area of electro-magnetic response along the trail as determined by the EM31/38 survey conducted in February 2013.

SLR selected a number of test locations prior to leaving for the field work. These locations were accessed using the AKS Geoscience maps where suitable. At each test pit location the biologist and geomorphologist assessed the area for vegetation and slope disturbance.

Test pits (TP) 1-9 were completed on October 29. 2013. No loss of soil stability or disturbance of native vegetation occurred during the advancement of these test pits. Where disturbance was not possible to avoid (i.e. at TP3 and TP5 located along the slope above the trail), only disturbance vegetation such as crested wheatgrass was uprooted during the test pitting works. Test pits were kept small and deep and were filled in immediately following soil sampling and assessment. The geomorphologist determined if the slope was stable following descent of the excavator to the trail.

Observation of each test pit void was made to determine if any visible fluids were present around the metal debris such as oil staining. In addition, indications of groundwater were assessed. No fluids of any kind were observed at any of the test pits.

At the end of the day all test pits were ensured to be closed and stable.

On October 30, 2013, SLR, Clarke Geoscience and Spidex met at 8am onsite to continue test pitting. Upon arriving at the site it was noted that the portable toilet had been pushed over and moved towards the fence. Obvious damage was observed on the outside of the portable toilet. The SLR Project Manger and the owner of the portable toilet were informed of the incident.

Work was commenced with the expectation that a replacement portable toilet would be exchanged as soon as possible. No loss of toilet fluids were observed around the toilet on the ground.

Prior to continuation of test pitting, an area previously identified as having moving water under the ground and a large cavity present was excavated to determine the cause of the cavity. This cavity was found along a section of the trail but had not resulted in an area of EM31 response. The excavator removed soil at the location of the cavity until an obvious chamber was discovered on the south side of the trail. The chamber was further excavated and determined to flow north/south across the trail. The exit of the channel was located on downslope between the upper trail and the lower trail.

TP 10-14 were completed on October 30, 2013. These test pits were located near the bottom of the trail (TP10-11), on the south side of the trail, downslope (TP12), and finally at the top of the trail in an abnormal soil pile (TP 13-14).

Metal debris was observed on the slope north of TP12 up to the upper trail. Upon closer observation, it was noted that some of the large embedded debris in the slope had been used by wildlife in the past as dens. Bedding and tracks were observed in and around the debris cavities. No wildlife was noted before or during test pit works.

Following all excavations on October 30, 2014, soil excavated was replaced. Contouring of the disturbed soil was re-established and the geomorphologist assessed the disturbed areas for potential slumping or soil loss following rainfall and snow melt.

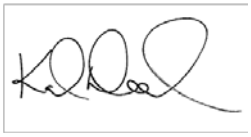
Upland Soil Sampling

Following test pitting, eight supplemental auger sites were established along the south upland edge of the bluff. Soil was collected on foot, by hand. The excavator was not permitted to enter this area due to sensitive vegetation that is present.

Review of Previous Work Areas

Where possible, areas of previous cleanup in 2011 and 2012 were located and photographed to determine re-establishment of vegetation and recovery following previous disturbance. In addition, activity by wildlife was incidentally assessed. As noted since 2011, a bald eagle nest located across the marsh was observed in 2013 for activity. A nesting pair and at least one fledgling was observed at the nest.

Yours sincerely,
SLR Consulting (Canada) Ltd.



Kalina Noel, B.Sc., M.E.Des., P.Biol. R.P.Bio.
Biologist

APPENDIX E

FCSI Input Form

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008

Federal Contaminated Sites Inventory Input Form

CONTAMINATED SITE TOMBSTONE DATA	
Federal Site Identifier	FCSI# 16096079
Property Number	DFRP # 16096
Latitude (Assessor)	50º 33' 0.78" N
Longitude (Assessor)	116º 4' 16.82" W
Estimated Cubic Meters Contaminated (Assessor)	Shoreline = 0 Marsh = 50 (debris) Uplands = 0 Trail = 9400 (5720 debris, 3680 soil) Total = 9450
Estimated Hectares Contaminated (Assessor)	Shoreline = 0 Marsh = 0.1 Uplands = 0 Trail = 0.4 Total = 0.5
Estimated Tons Contaminated (Assessor)	Shoreline = 0 Marsh = 100 (debris, assumed density of 2 t/cubic metre) Uplands = 0 Trail = 18800 (11440 debris, 7360 soil, assumed density of 2t/cubic metre) Total = 18900

CONTAMINATED SITE MANAGEMENT	
The approach used to manage the contaminated site project. Every site has one or more management types.	
Management Type (Assessor)	1) Remediation (debris and contamination removal) 2) Periodic monitoring (confirmatory sampling) 3) Additional assessment (risk assessment)

CONTAMINANT AND MEDIUM	
Contaminant Type (Assessor)	*The contaminant associated with a specific medium. A medium may have one or more contaminant types.* 11. PHCs (petroleum hydrocarbons) 13. PAHs (polycyclic aromatic hydrocarbons) 02. Heavy metals 21. Metal, metalloid, organometallic
Contaminant Medium Type (Assessor)	*The medium associated with a particular contaminant.* 1) Surface water (metals) 2) Sediment (metals, PAHs) 3) Surface soil (PHCs, PAHs, metals)

CONTAMINATED SITE FISCAL YEAR	
Fiscal Year	2013-2014
CCME Classification type (Assessor)	*The classification defined by the National Classification System of the Canadian Council of Ministers of the Environment.* Class type 1) Action required AEC 1 – Class 1 – High priority for action
CCME National Classification System Score (Assessor)	*The score of the site based on the version of the Federal Contaminated Sites Accelerated Action Plan (FCSAAP) program.* AEC 1 score 71.0, certainty 63% (not updated in 2013-2014)
FCSAAP National Classification System Score	*The score of the site based on the version of the CCME NCS protocol developed by the Environment Canada for the Federal Contaminated Sites Accelerated Action Plan (FCSAAP) program.*
Last Step Completed	01-Identify suspect sites 02-Historical review 03-Initial testing program 04-Classify contaminated site using the CCME NCS 05-Detailed testing program 06-Reclassify the site using the CCME NCS 07-Develop remediation/risk management strategy **08-Implement remediation/risk management strategy** 09-Confirmatory Sampling and Final Reporting 10-Long-term monitoring (optional)
Planned Completion Date for Step 7 (EC Officer)	The date planned for completion of step 7 of the ten step process.
Planned Completion Date for Step 8 (EC Officer)	The date planned for completion of step 8 of the ten step process.
Planned Completion Date for Step 9 (EC Officer)	The date planned for completion of step 9 of the ten step process.
Next Fiscal Year Budget (EC Officer)	The total expenditure planned for the site for the next fiscal year.
Estimate Quality (EC Officer)	I - Indicative S - Substantive
Opening Liability (EC Officer)	The opening liability for the site for the fiscal year being reported. This applies only to class 1 sites; class 2 sites; and also to class I sites if it is known that the government is likely obligated to remediate the site. This should always equal the closing liability of the previous year if a liability was booked for that year.

(Accounting) Liability (Assessor)	Based on complete excavation of trail area: Total $5,322,725 Based on partial excavation of trail area: Total $2,134,355 Based on debris removal at AEC 1B and surficial debris removal at AEC 1C Total $511,230 Based on surficial debris removal at AEC 1C only Total $326,480 Based on no debris removal/excavation Total $33,305
(Accounting) Contingent Liability (Assessor)	20% contingency included in above liabilities
Total Assessment Expenditure (EC Officer)	Total expenditure on assessment activities for the site during the fiscal year reported.
Total Remediation Expenditure (EC Officer)	Total expenditure on remediation activities for the site during the fiscal year reported.
Closing Liability (EC Officer)	The closing liability for the site for the fiscal year being reported. This applies only to class 1 sites; class 2 sites; and also to class 1 sites if it is known that the government is likely obligated to remediate the site.
Total Adjustment (EC Officer)	The total adjustment made to the closing liability (other than the expenditure reducing liability). The Total Adjustment may be a positive or negative number. NOTE (Closing Liability) = (Opening Liability) – (Total Expenditure Reducing Liability) + (Total Adjustment)
Reason For Adjustment Text (EC Officer)	If the opening liability less the total expenditure reducing liability is not equal to the closing liability, provide a brief description of the reason for the adjustment. NOTE: This field will not be published and may be supplied in either official language.
Actual Cubic Meters Remediated (Assessor)	729
Actual Hectares Remediated (Assessor)	*0.035*
Actual Tons Remediated (Assessor)	*1458 metric tonnes*

APPENDIX F

Site Closure Tool

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008

APPENDIX G

Clarke Geoscience Ltd. Geotechnical Implications of Remedial Excavation Work (February 2014)

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008

clarke geoscience ltd.

February 18, 2014

SLR Consulting (Canada) Ltd.
1475 Ellis Street, Suite 200
Kelowna, B.C.
V1Y 2A3

Attention: Lindsay Paterson, Project Manager

Dear Ms. Paterson,

RE: Geotechnical Implications of Remedial Excavation Work, Wilmer Marsh Unit, Columbia National Wildlife Refuge, Wilmer, BC (SLR Project No. 219.05112.01.0001)

Clarke Geoscience Ltd. (CGL) is pleased to submit the following information regarding the geotechnical implications of remedial excavation work across the Wilmer study area. The Wilmer study area is a former dump site within the Wilmer Marsh Unit of the Columbia National Wildlife Area, located near Wilmer, BC.

In October 2013, a test-pitting program was completed to characterize the nature and extent of buried waste across an upland area adjacent to the marsh. The location of fourteen (14) test pits was guided by the results of a geophysical (EM) survey, which identified buried metal debris (Figure 1). The results of the test pitting program will be used to determine remedial options, one of which is to excavate the buried waste. CGL has considered the potential geotechnical implications of excavation for the study site.

Site Conditions

Buried, and near-surface, waste across the site is largely comprised of metal car parts interbedded with the native clayey-silt to sandy-silt textured soils. The buried waste, which was historically dumped off the top of the terrace, is situated on a steep (60 to 75% gradient) slope that is bisected by a rough access trail.

Previous investigations by CGL have noted that the likelihood for large-scale failure or deep-seated instability along the terrace is moderate and that the fine-textured glaciolacustrine soils on site are very sensitive to surface erosion, gully erosion, and surficial slumping. Erosional features on site that demonstrate the soil sensitivity to surface water flow include: erosional gullies, shallow slump failures and silt falls in the consolidated native silts along the scarp face, and at least one subsurface erosional cavity (void) located on along the access trail.

5217 Benmore Court
Kelowna, BC V1W 4Z3
(250) 826-4367
www.clarkegeoscience.com

Soil sensitivity to erosion is largely dependant upon consolidation. Native glaciolacustrine silts are compact and weakly cemented and are able to maintain near vertical slopes when dry. It was noted during the test pitting program that some of the colluvial silts interbedded with debris are relatively consolidated. This suggests that, over a period of decades, the disturbed soils have regained some degree of consolidation. When wetted, or disturbed by vibration or excavation, the soils become loose and are then subject to erosional and gravitational forces.

The internal angle of friction (a parameter used to describe friction shear resistance of soil) for dense inorganic silt ranges from 30-35°, while loose inorganic silt has an internal angle of friction that ranges from 27-30°[1]. This reduction in frictional shear resistance demonstrates the sensitivity to disturbance.

Remedial Excavation Options

SLR has identified two area of interest, noted on Figure 1. Based on the preliminary results of the test pitting program, SLR has indicated that waste materials at Area 1 could be more than 4 m deep, while debris at Area 2 is approximately 2.5 m deep (L. Paterson, *personal communication*, 2014). For the purposes of this assignment, excavated depths up to 4 m were assumed in the mid-slope area within Area 1.

A profile of the slope, provided as Figure 2, shows the existing ground surface profile and an approximate excavation profile. Based on the excavation profile shown, the approximate volume of soil to be excavated, is estimated to be 80 to 120 m^3 per linear metre across the slope, which represents a volume of approximately 5600 to 8400 m^3..

Slope Stability and Soil Erosion Concerns

Based on shallow depth of debris and low slopes, there are no slope stability concerns associated with remedial activities within Area 2.

Slope stability and soil erosion concerns associated with the proposed excavation of buried debris within Area 1, and with general access activities for any machine work at the Wilmer site, include:

- Compaction, vibration and rutting caused by repeated access by heavy equipment will accelerate erosion and instability along the trail;
- Since waste is imbedded into the soils, some on-site sorting may be required, increasing the area of disturbance and resulting in unconsolidated soil spoil areas;
- When disturbed by machine access or excavation, the fine-textured soils become loose and are difficult to consolidate without moisture. The loose nature of the soils will make disturbed areas, particularly those on sloping ground, susceptible to surface erosion; and,
- Excavation to depths of 4 m will result in over-steepened slopes, removing the toe support along the slope. Over-steepened excavation cut slopes are more prone to surface erosion and slump failures. Consolidated native (undisturbed) silts can maintain near vertical (>1.5H:1V) grades on a short-term basis when dry. However, disturbed soils are more prone to erosion and instability and will require additional grading (3H:1V) or terracing to reduce the slope.

---

[1] Geotechdata.info, Angle of Friction, http://geotechdata.info/parameter/angle-of-friction.html (as of September 14.12.2013).

Conclusions and Recommendations for Slope Stability and Erosion Control Mitigation
Based on an assessment of site conditions and proposed remedial options for excavation, it is concluded that proposed excavation activities will accelerate surface erosion, gullying and slump failure across the site. Based on the distance (approx. 200 m) and topography between the excavation sites and Wilmer Marsh, it is judged that the risk of sediment delivery is considered low to moderate.

Adverse effects associated with surface erosion and slope instability are dependant upon the finalized areas and depths of excavation. Reduced excavation areas and depths will reduce the total area of disturbance and the height of potentially unstable cut slopes.

It is concluded that excavation activities may be completed in a safe and effective manner provided the following recommendations for mitigation are followed:

- Protect access routes to the work site by installing a 300 mm thick layer of well-graded, crushed angular gravel. The gravel layer shall be installed on a layer of filter fabric to prevent the migration of fines into the gravel and to facilitate decommissioning upon completion;
- Excavation work must be completed during extended periods of dry, or frozen weather;
- Excavation shall use a rubber-tired or spider hoe-type excavator as these machine types have a reduced potential for ground disturbance. The operator should also have experience working on steep slopes;
- Particular caution should be exercised by the machine operator working in the vicinity of the identified void (approx. 10 m^3) located along the access trail;
- Recommended measures for erosion and sediment control, outlined below, should be implemented; and,
- At least part-time geotechnical monitoring is recommended during excavation activities.

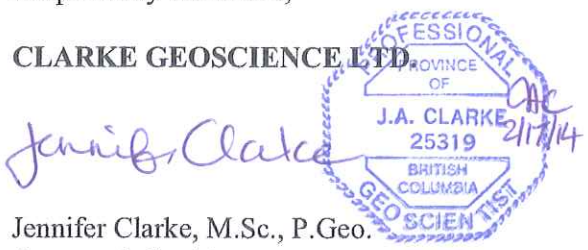
Due to the high potential for surface erosion and gullying along the sloping soil surfaces, measures for erosion and sediment control are recommended. Erosion and control measures, previously outlined in the 2013 monitoring report, are partly reiterated and expanded upon. Erosion and sediment control approaches shall include the following:

- Divert surface flow from the work area, by constructing cross-ditches across the access trail at the top of the slope;
- Upon completion, excavated areas should be backfilled with native silts and regraded;
- Construct cross-slope terraces along long sections of steep uniform slopes to break the slope and slow surface runoff along the slope. A schematic diagram of slope terracing is provided as Figure 3;
- Create surface roughness and provide temporary cover along disturbed slopes to protect soils from rain splash erosion and slow surface runoff along the slope. Surface roughening may be accomplished in a few different ways, including:
    - Install coconut fibre mat covering, and/or
    - Scatter coarse woody debris (CWD) across the soil surface.

We trust that this assessment meets your current requirements. If you have any questions or comments, please do not hesitate to contact the undersigned at 250-826-4367.

Respectfully submitted,

CLARKE GEOSCIENCE LTD.

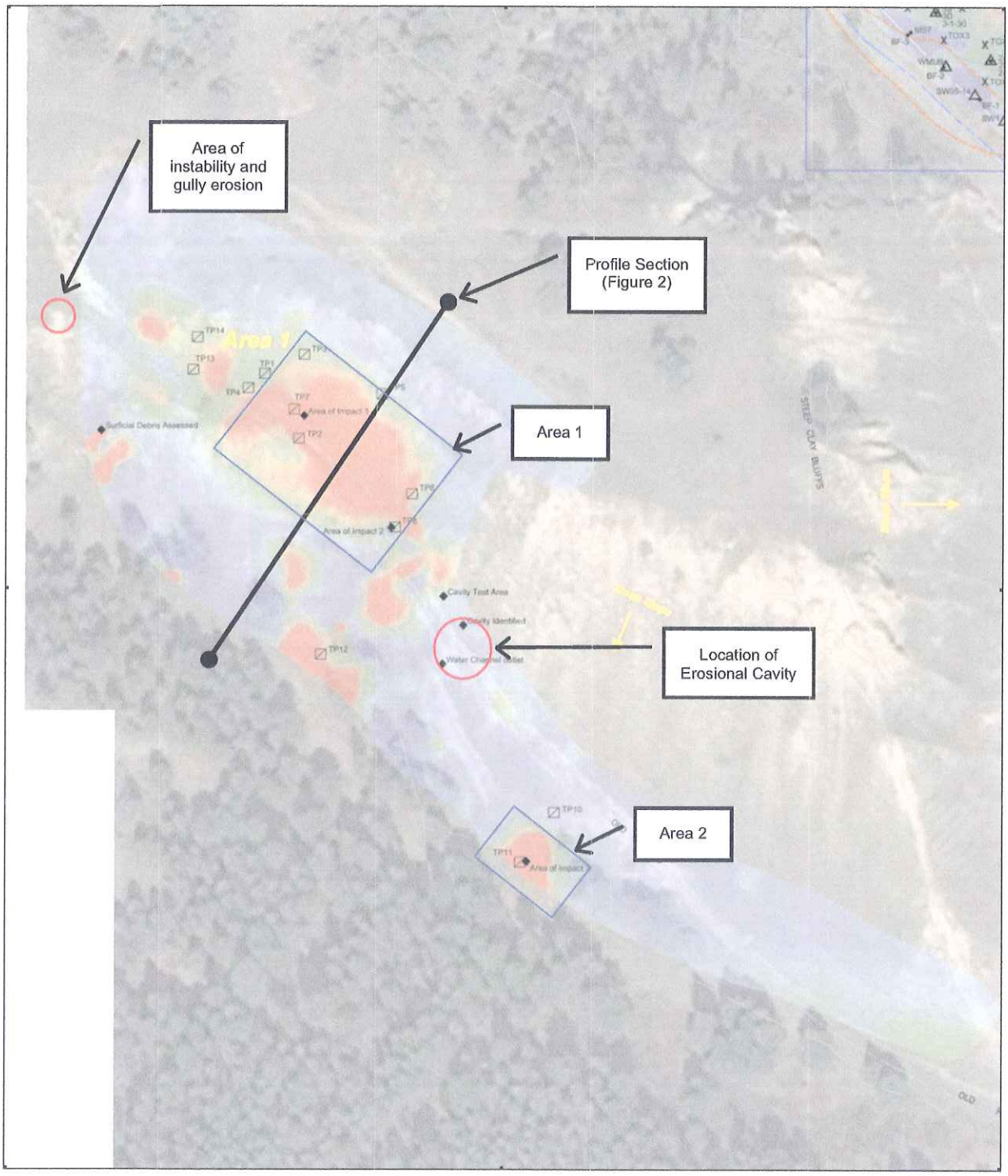


Jennifer Clarke, M.Sc., P.Geo.
Geomorphologist

Encl.
Figure 1 Site Plan
Figure 2 Slope Profile
Figure 3 Schematic of Terracing

Reference:

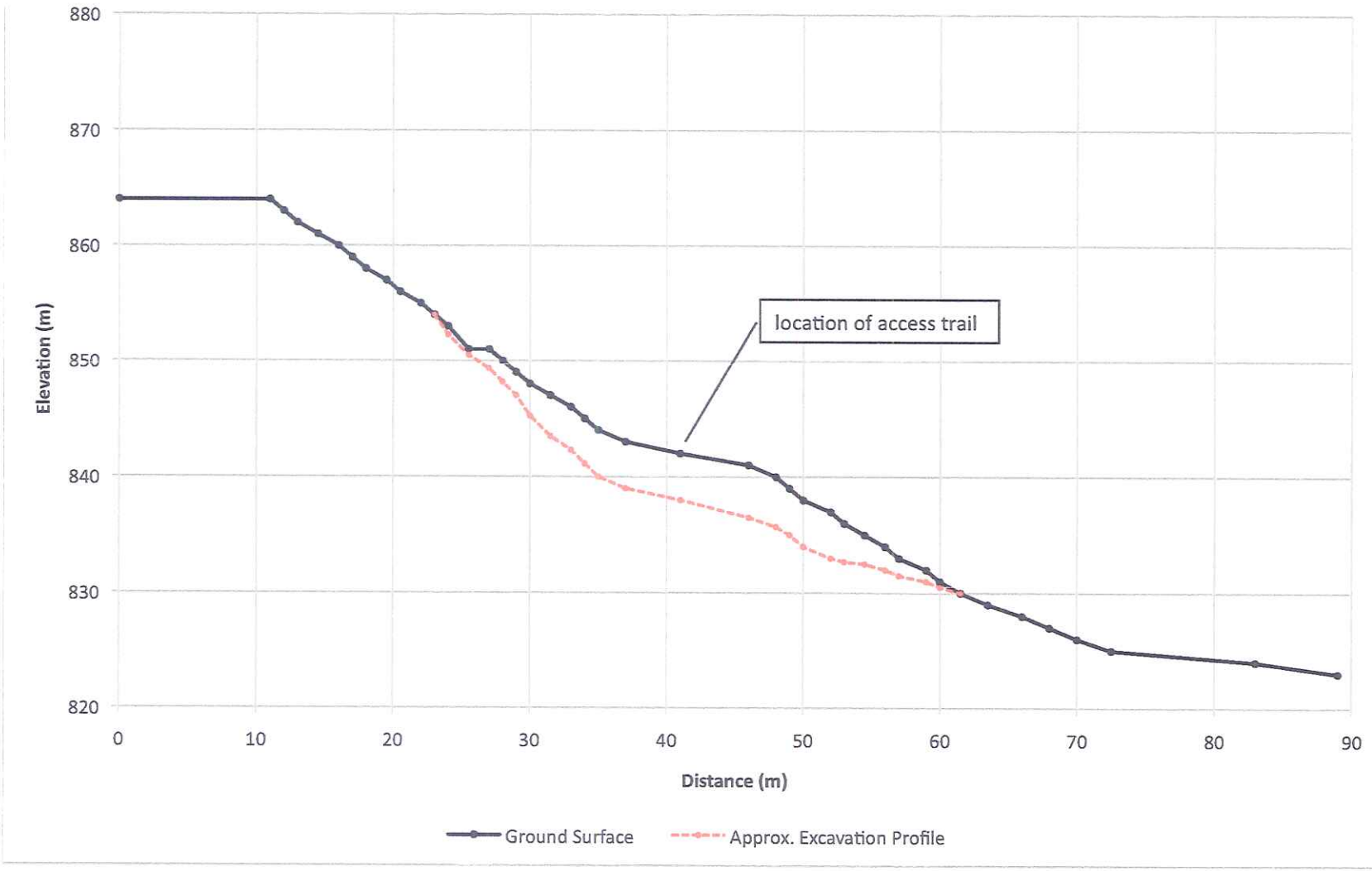
Clarke Geoscience Ltd. 2013. Geotechnical Monitoring Report, Wilmer Marsh Unit, Columbia National Wildlife Refuge, Wilmer, BC (SLR Project No. 219.05112.01.0001). Report prepared for SLR (Canada) Consulting Ltd. Kelowna, BC.



EM survey and test pit locations provided as base map from SLR Consulting (Canada) Ltd.

Project: Geotechnical Monitoring Report (Addendum), Wilmer Marsh, Wilmer BC	
Date: February 18, 2014	Figure No.: 1
Title: Site Plan	
Clarke Geoscience Ltd.	

Figure 2: Schematic of Proposed Excavation along Wilmer Slopes



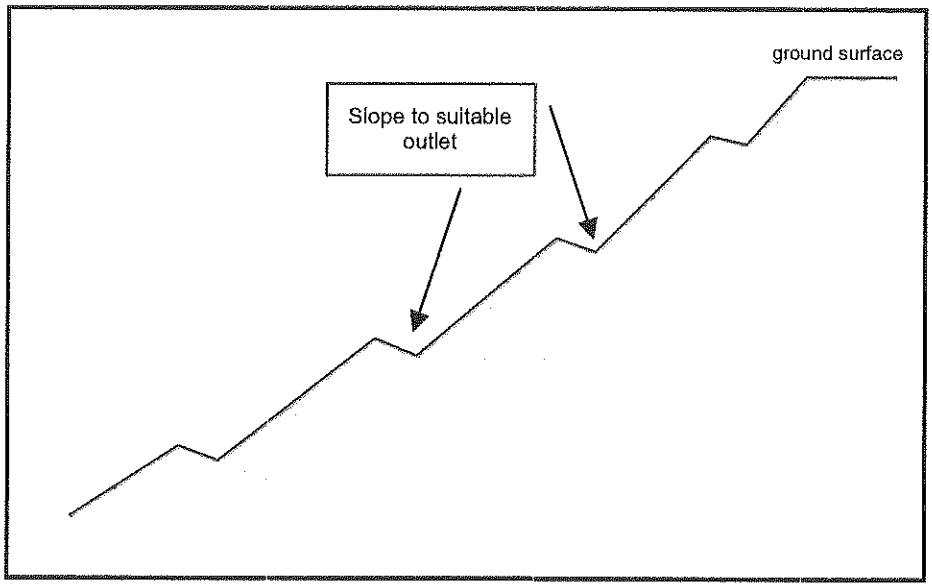


Figure 3: Schematic of slope terracing for surface erosion control

APPENDIX H

SLR Field Methodology and QA/QC Procedures

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area
SLR Project No.: 219.05112.00008

FIELD METHODOLOGY

SLR conducted a subsurface investigation at the unofficial refuse area located in the Wilmer Marsh Unit of the Columbia National Wildlife Area (the Site) in 2013-2014. The field procedures for all works are presented in the following sections.

LOCATION OF UTILITIES

Prior to commencing the investigation program, SLR placed a BC1 call to confirm the absence of underground services in the area of the Site. SLR also contacted CWS to confirm the absence of utilities at the Site

2013-2014 SITE ACTIVITES

SLR completed a test pitting program and surficial soil sampling program at the Site in October 2013. An assessment of seasonal runoff was subsequently conducted in March 2014. The field procedures are documented below.

Test Pitting Investigation

SLR was present at the Site on October 29 and 30, 2013 to oversee the advancement of fourteen test pits (TP1 through TP14) along the access trail on the southern portion of the Site. The test pits were advanced to a maximum depth of 4.5 mbg using a spider type excavator supplied and operated by SPIDEX All Terrain Excavating. The sample locations were documented by SLR field personnel in both note form and with photos and videos.

Samples of the soil matrix surrounding the buried debris were collected at the depths where deemed most appropriate. Soil was classified according to colour, texture, qualitative moisture content, and soil stratigraphy. Soil samples were obtained from the bucket of the excavator; soil at bucket edges was avoided to prevent cross-contamination.

All samples were field-screened for the presence of combustible hydrocarbon vapours using a fixed volume headspace technique with a RKI Eagle Photoionization Detector (PID), equipped with a methane-elimination feature and calibrated prior to field use. A plastic bag was half filled with soil and sealed for approximately ten minutes prior to puncturing the bag and analyzing for the headspace vapour levels. The test is dependent on temperature, soil type and equipment calibration, and is independent of field personnel. The explosimeter utilized displayed the concentration of combustible hydrocarbons in ppmv.

Soil samples were stored per laboratory requirements (i.e. ice-filled cooler with completed Chain-of-Custody documents) and submitted to ALS Environmental (ALS) in Burnaby for analysis of potential contaminants of concern within prescribed holding times.

Surficial Soil Sampling Program

On October 30, 2013, SLR advanced eight hand-auger samples (RA1 through RA8) along the southern edge of the uplands bench. The surface samples were advanced to a maximum depth of 0.5 mbg. The sample locations were documented by SLR field personnel in both note form and with photos.

Soil was classified according to colour, texture, qualitative moisture content, and soil stratigraphy. Discrete soil samples were obtained directly from the core of the hand auger. The hand auger was washed with Alconox detergent and rinsed with distilled water prior to each use. All samples were field-screened for the presence of combustible hydrocarbon vapours using the methodology described previously.

Soil samples were stored per laboratory requirements and submitted for analysis of potential contaminants of concern within prescribed holding times. SLR collected and analyzed one blind field duplicate.

Seasonal Water Assessment

SLR returned to the Site in March 2014 to assess seasonal runoff. As snowmelt had occurred immediately prior to SLR's arrival, no runoff samples were collected.

SLR QA/QC PROCEDURES

The following outlines the procedures and results of the quality assurance/quality control program implemented at the Site.

Soil Sampling

All soil samples obtained were split and half of the sample was retained in an airtight plastic bag for subsequent field screening, while the other half was retained in two clean, laboratory-prepared glass jars with Teflon-lined lids. Samples of soil retained for analysis on the basis of field screening were jarred in such a way as to ensure that a negligible headspace was present in the sample container. All samples were documented on a Chain-of-Custody document and placed in a cooler with ice.

To prevent cross-contamination all samples were collected using single-use disposable nitrile gloves. Sampling equipment, including the hand-auger, was cleaned between samples.

Blind field duplicates were collected at a minimum frequency of one for every ten samples to ensure laboratory quality control as well as reproducibility of field sampling techniques. The sample to be duplicated was split and placed into two sets of identical laboratory-prepared jars.

Laboratory Qualifications

Soil samples for the purpose of site characterization were submitted for analysis to ALS of Burnaby, BC. ALS is accredited with the Canadian Association of Laboratory Accreditation and is registered under the BC MoE Environmental Data Quality Assurance Regulation. For more detailed information of the analytical procedures followed, reference should be made to the analytical laboratory reports in Appendix J.

Analyses of Duplicate Samples

To verify the reproducibility of the laboratory analyses and to demonstrate that the field sampling techniques utilized by SLR personnel are capable of yielding reproducible results, four blind field duplicates collected, as described above, were submitted to ALS for analysis of selected parameters. When possible, the relative percent difference (RPD) of the sample and its duplicate was calculated. RPD is defined as the difference of the absolute value of the

duplicate results divided by the average of the duplicate results, expressed as a percentage. Analytical error increases near the method detection limit (MDL); therefore the RPD calculation should not be performed unless the concentrations of both samples are greater than five times the MDL. The acceptable RPD values for various parameters in soil are presented in the following table.

Duplicate Acceptance Criteria

Parameter	Soil RPD (%)
Organics (including BETX and PHC)	+/- 80
PAH	+/- 100
Metals	+/- 60

Four duplicate soil samples were collected and submitted to ALS during the October 2013 test pitting program. The RPD results are presented in Tables 1 through 4. RPDs could not be calculated for BETX, PHCs or PAH as all results were less than the MDL. RPDs for one of the four duplicate-sample pairs submitted for metals analysis could not be calculated because the results were all less than the MDL. RPDs were calculated for the remaining three duplicate-sample pairs for various metals parameters and ranged from 0% to 53.1%; all calculated RPDs were within the acceptance criteria.

As an internal quality control lab procedure, samples submitted to ALS are subjected to laboratory QA/QC procedures (method blanks, surrogate recoveries, lab duplicates, reference materials, and lab control samples), which were documented on the laboratory certificates provided. A summary of the lab QA/QC and SLR QA/QC is included on the SLR QA/QC summary attached to the laboratory report included in Appendix J. The results of the laboratory and field QA/QC procedures were examined and deemed acceptable by SLR and as such, the entire set of data was deemed reliable by SLR.

APPENDIX I

Test Pit Logs

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP1
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
0					**Fine-grained soil** brown, dry					
		TP1-1								
		TP1-2								
1					debris observed between 1.0 m and 3.0 m					1.0
									backfilled with excavated soil	
		TP1-3								
2										2.0
		TP1-4								
3					End of borehole at 3.0 m No well installed. Test pit dug to determine garbage extent on site.					3.0

DRILLING METHOD: Excavator

DRILL DATE: October 29, 2013

LOGGED BY: KA/KN

DRILLER NAME: Spidex All Terrain Excavating, Dominic

Notes: ■ GRAB SAMPLE

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP2
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
0					cover material over debris and natural soil from surface to 2.5 m					0
		TP2-1								
		TP2-2								
1										1.0
		TP2-3								
2									backfilled with excavated soil	2.0
					Fine-grained soil debris from surface to 4.5 m, brown, dry					
		TP2-4								
3										3.0
		TP2-5								
4										4.0
					End of borehole at 4.5 m No well installed. Test pit dug to determine garbage extent on site.					

DRILLING METHOD: Excavator

DRILL DATE: October 29, 2013

LOGGED BY: KA/KN

DRILLER NAME: Spidex All Terrain Excavating, Dominic

Notes: ■ GRAB SAMPLE

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP3
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
		TP3-1			**Fine-grained soil** fill material and debris observed from surface to 0.75 m, brown, dry				backfilled with excavated soil	
1		TP3-2			End of borehole at 1.0 m No well installed. Test pit dug to determine garbage extent on site.					1.0

DRILLING METHOD: Excavator

DRILL DATE: October 29, 2013

LOGGED BY: KA/KN

DRILLER NAME: Spidex All Terrain Excavating, Dominic

Notes: ■ GRAB SAMPLE

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP4
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
		TP4-1			**Fine-grained soil** brown, dry	0			backfilled with excavated soil	
					End of borehole at 0.5 m No well installed. Test pit dug to determine garbage extent on site.					

DRILLING METHOD: Excavator

DRILL DATE: October 29, 2013

LOGGED BY: KA/KN

DRILLER NAME: Spidex All Terrain Excavating, Dominic

Notes: GRAB SAMPLE

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP5
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
		TP5-1			**Fine-grained soil** brown, dry	10			backfilled with excavated soil	
					End of borehole at 0.5 m No well installed. Test pit dug to determine garbage extent on site.					

DRILLING METHOD: Excavator

DRILL DATE: October 29, 2013

LOGGED BY: KA/KN

DRILLER NAME: Spidex All Terrain Excavating, Dominic

Notes: ■ GRAB SAMPLE

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP6
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
		TP6-1			**Fine-grained soil** some gravel, brown, very dry	0			backfilled with excavated soil	
					End of borehole at 0.5 m No well installed. Test pit dug to determine garbage extent on site.					

DRILLING METHOD: Excavator

DRILL DATE: October 29, 2013

LOGGED BY: KA/KN
DRILLER NAME: Spidex All Terrain Excavating, Dominic

Notes: GRAB SAMPLE

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP7
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
0					**Fine-grained soil** debris observed within top 0.5 m and visible at 4.0 m, brown, dry	10				0
1		TP7-1				0				1.0
		TP7-2								
2		TP7-3				0			backfilled with excavated soil	2.0
3		TP7-4				15				3.0
4		TP7-5			End of borehole at 4.0 m No well installed. Test pit dug to determine garbage extent on site.	10				4.0

DRILLING METHOD: Excavator

DRILL DATE: October 29, 2013

LOGGED BY: KA/KN

DRILLER NAME: Spidex All Terrain Excavating, Dominic

Notes: ■ GRAB SAMPLE

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP8
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
0					**Fine-grained soil** debris observed from surface to 4.0 m, brown, dry	0				0
		TP8-1				5				
1		TP8-2								1.0
									backfilled with excavated soil	
2		TP8-3				0				2.0
		TP8-4				0				
3										3.0
		TP8-5				0				
4					End of borehole at 4.0 m					4.0

No well installed. Test pit dug to determine garbage extent on site.

DRILLING METHOD: Excavator

DRILL DATE: October 29, 2013

LOGGED BY: KA/KN

DRILLER NAME: Spidex All Terrain Excavating, Dominic

Notes: ■ GRAB SAMPLE

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP9
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
					No analysis for TP9				backfilled with excavated soil	
					End of borehole at 0.5 m No well installed. Test pit dug to determine garbage extent on site.					

DRILLING METHOD: Excavator

DRILL DATE: October 30, 2013

LOGGED BY: KA/KN
DRILLER NAME: Spidex All Terrain Excavating, Dominic

Notes:

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP10
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
0					**Fine-grained soil** brown, dry	0				
		TP10-1								
1									backfilled with excavated soil	1.0
2										2.0
3					End of borehole at 3.0 m No well installed. Test pit dug to determine garbage extent on site.					3.0

DRILLING METHOD: Excavator

DRILL DATE: October 30, 2013

LOGGED BY: KA/KN
DRILLER NAME: Spidex All Terrain Excavating, Dominic

Notes: GRAB SAMPLE

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP11
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
		TP11-1			**Fine-grained soil** debris observed from surface to 2.0 m, brown, dry					
1		TP11-2							backfilled with excavated soil	1.0
2		TP11-3								2.0
					End of borehole at 2.3 m No well installed. Test pit dug to determine garbage extent on site.					

DRILLING METHOD: Excavator

DRILL DATE: October 30, 2013

LOGGED BY: KA/KN
DRILLER NAME: Spidex All Terrain Excavating, Dominic

Notes: ■ GRAB SAMPLE

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP12
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
0					**Fine-grained soil** debris visible at surface, brown, dry					
		TP12-1							backfilled with excavated soil	
		TP12-2								
1										1.0
2										2.0
3					End of borehole at 3.0 m No well installed. Test pit dug to determine garbage extent on site.					3.0

DRILLING METHOD: Excavator

DRILL DATE: October 30, 2013

LOGGED BY: KA/KN
DRILLER NAME: Spidex All Terrain Excavating, Dominic

Notes: ■ GRAB SAMPLE

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP13
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
		TP13-1			**Fine-grained soil** debris observed from surface to 0.5 m, brown, dry	0			backfilled with excavated soil	
1					End of borehole at 1.0 m No well installed. Test pit dug to determine garbage extent on site.					1.0

DRILLING METHOD: Excavator

DRILL DATE: October 30, 2013

LOGGED BY: KA/KN
DRILLER NAME: Spidex All Terrain Excavating, Dominic

Notes: GRAB SAMPLE

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP14
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
		TP14-1			**Fine-grained soil** upper area of the soil pile, brown, dry	0			backfilled with excavated soil	
					End of borehole at 0.5 m No well installed. Test pit dug to determine garbage extent on site.					

DRILLING METHOD: Excavator

DRILL DATE: October 30, 2013

LOGGED BY: KA/KN
DRILLER NAME: Spidex All Terrain Excavating, Dominic

Notes: GRAB SAMPLE

APPENDIX J

Detailed Analytical Chemistry Report and QAQC Summary Sheet

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008

SLR CONSULTING (CANADA) LTD.
ATTN: Lindsay Paterson
200 - 1475 Ellis Street
Kelowna BC V1Y 2A3

Date Received: 01-NOV-13
Report Date: 04-DEC-13 16:21 (MT)
Version: FINAL REV. 2

Client Phone: 250-762-7202

Certificate of Analysis

Lab Work Order #: L1386542

Project P.O. #:	KEL1322
Job Reference:	219.05112.00008
C of C Numbers:	5, 6, 7, 8, 10-334338, 10-334339, 10-334341, 10-334342
Legal Site Desc:	

Comments: 4-DEC-2013 Additional metals analysis added to some samples.

Erin Bolster
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID: L1386542-1 Description: Soil Sampled Date: 29-OCT-13 Sampled Time: Client ID: TP1-1	L1386542-2 Soil 29-OCT-13 TP1-2	L1386542-3 Soil 29-OCT-13 TP1-3	L1386542-4 Soil 29-OCT-13 TP1-4	L1386542-5 Soil 29-OCT-13 TP2-1
SOIL						
Physical Tests	% Moisture (%)	4.23				2.86
	Moisture (%)	1.90	2.60		1.29	2.66
	pH (1:2 soil:water) (pH)	8.84	8.33	8.46	8.90	8.57
Particle Size	MUST PSA % > 75um (%)	8.07				
Organic / Inorganic Carbon	Total Organic Carbon (%)	0.55				
Metals	Antimony (Sb) (mg/kg)	0.47	0.97		0.29	0.44
	Arsenic (As) (mg/kg)	6.05	6.23		5.78	6.17
	Barium (Ba) (mg/kg)	122	128		94.7	111
	Beryllium (Be) (mg/kg)	0.27	0.28		0.21	0.31
	Cadmium (Cd) (mg/kg)	0.140	0.371	0.073	0.054	0.163
	Chromium (Cr) (mg/kg)	16.8	18.2		14.1	18.4
	Cobalt (Co) (mg/kg)	8.25	9.06		7.96	8.97
	Copper (Cu) (mg/kg)	15.4	18.4		13.9	16.1
	Lead (Pb) (mg/kg)	17.9	24.9	9.34	8.10	17.3
	Mercury (Hg) (mg/kg)	0.0196	0.0199		0.0090	0.0163
	Molybdenum (Mo) (mg/kg)	<0.50	0.54		<0.50	<0.50
	Nickel (Ni) (mg/kg)	20.1	22.0	18.6	18.4	25.0
	Selenium (Se) (mg/kg)	<0.20	<0.20		<0.20	<0.20
	Silver (Ag) (mg/kg)	<0.10	<0.10		<0.10	<0.10
	Thallium (Tl) (mg/kg)	<0.050	<0.050		<0.050	<0.050
	Tin (Sn) (mg/kg)	2.9	4.5	<2.0	<2.0	<2.0
	Uranium (U) (mg/kg)	0.803	0.696		0.727	0.636
	Vanadium (V) (mg/kg)	10.9	11.6		9.35	12.3
	Zinc (Zn) (mg/kg)	65.2	111	42.7	37.7	70.5
Speciated Metals	Hexavalent Chromium (mg/kg)	<0.10				<0.10
Volatile Organic Compounds	Benzene (mg/kg)	<0.0050	<0.0050		<0.0050	<0.0050
	Ethylbenzene (mg/kg)	<0.015	<0.015		<0.015	<0.015
	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)	<0.075	<0.075		<0.075	<0.075
	Surrogate: 4-Bromofluorobenzene (SS) (%)	110.1	100.3		106.2	103.6
	Surrogate: 1,4-Difluorobenzene (SS) (%)	107.6	98.7		102.6	99.8
Hydrocarbons	F1 (C6-C10) (mg/kg)	<10	<10		<10	<10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1386542-6 Soil 29-OCT-13 TP2-2	L1386542-7 Soil 29-OCT-13 TP2-3	L1386542-8 Soil 29-OCT-13 TP2-4	L1386542-9 Soil 29-OCT-13 TP2-5	L1386542-10 Soil 29-OCT-13 TP3-1
Sample ID / Description / Sampled Date / Sampled Time / Client ID						
SOIL						
Physical Tests	% Moisture (%)	3.00				2.10
	Moisture (%)	2.35	3.86	5.83	4.11	1.84
	pH (1:2 soil:water) (pH)	8.56	8.32	8.13	8.25	8.86
Particle Size	MUST PSA % > 75um (%)	7.28				
Organic / Inorganic Carbon	Total Organic Carbon (%)	0.48				
Metals	Antimony (Sb) (mg/kg)	0.43	1.21	0.31	1.00	0.30
	Arsenic (As) (mg/kg)	5.88	6.58	5.85	6.96	5.56
	Barium (Ba) (mg/kg)	107	152	107	143	86.6
	Beryllium (Be) (mg/kg)	0.25	0.30	0.25	0.24	0.26
	Cadmium (Cd) (mg/kg)	0.175	1.01	0.114	0.920	0.071
	Chromium (Cr) (mg/kg)	16.3	21.5	14.7	19.2	17.3
	Cobalt (Co) (mg/kg)	8.43	9.07	8.12	8.61	8.70
	Copper (Cu) (mg/kg)	16.5	24.4	14.3	38.3	14.2
	Lead (Pb) (mg/kg)	18.3	40.2	9.39	47.1	10.3
	Mercury (Hg) (mg/kg)	0.0166	0.0190	0.0119	0.0208	0.0211
	Molybdenum (Mo) (mg/kg)	<0.50	0.74	<0.50	1.04	<0.50
	Nickel (Ni) (mg/kg)	19.9	21.7	18.2	21.9	21.4
	Selenium (Se) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Silver (Ag) (mg/kg)	<0.10	0.11	<0.10	<0.10	<0.10
	Thallium (Tl) (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Tin (Sn) (mg/kg)	<2.0	7.7	<2.0	69.4	<2.0
	Uranium (U) (mg/kg)	0.569	0.527	0.360	0.512	0.686
	Vanadium (V) (mg/kg)	10.3	11.3	10.9	11.0	11.1
	Zinc (Zn) (mg/kg)	69.5	168	43.6	179	46.6
Speciated Metals	Hexavalent Chromium (mg/kg)					<0.10
Volatile Organic Compounds	Benzene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Ethylbenzene (mg/kg)	<0.015	<0.015	<0.015	<0.015	<0.015
	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
	Toluene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	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)	<0.075	<0.075	<0.075	<0.075	<0.075
	Surrogate: 4-Bromofluorobenzene (SS) (%)	102.2	104.7	102.2	105.7	111.4
	Surrogate: 1,4-Difluorobenzene (SS) (%)	99.4	103.4	100.7	103.0	104.4
Hydrocarbons	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1386542-11 Soil 29-OCT-13 TP3-2	L1386542-12 Soil 29-OCT-13 TP4-1	L1386542-13 Soil 29-OCT-13 TP5-1	L1386542-14 Soil 29-OCT-13 TP6-1	L1386542-15 Soil 29-OCT-13 TP7-1
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
SOIL						
Physical Tests	% Moisture (%)	1.97				6.42
	Moisture (%)	1.68	3.47	3.98	2.44	3.46
	pH (1:2 soil:water) (pH)	8.64	9.01	9.16	8.67	8.88
Particle Size	MUST PSA % > 75um (%)	1.50	7.74	0.12		
Organic / Inorganic Carbon	Total Organic Carbon (%)	0.40	0.68	0.32		
Metals	Antimony (Sb) (mg/kg)	0.30	0.40	0.37	0.74	0.39
	Arsenic (As) (mg/kg)	5.89	5.94	7.14	5.75	6.02
	Barium (Ba) (mg/kg)	86.5	107	145	110	101
	Beryllium (Be) (mg/kg)	0.26	0.26	0.25	0.24	0.28
	Cadmium (Cd) (mg/kg)	0.067	0.107	0.064	0.101	0.127
	Chromium (Cr) (mg/kg)	17.5	16.6	14.4	12.1	16.8
	Cobalt (Co) (mg/kg)	9.47	8.27	8.00	7.28	8.69
	Copper (Cu) (mg/kg)	14.3	14.8	15.4	14.3	15.2
	Lead (Pb) (mg/kg)	9.38	13.0	9.37	10.6	14.9
	Mercury (Hg) (mg/kg)	0.0133	0.0138	0.0198	0.0085	0.0162
	Molybdenum (Mo) (mg/kg)	0.52	<0.50	<0.50	<0.50	<0.50
	Nickel (Ni) (mg/kg)	21.5	19.8	18.7	16.6	20.9
	Selenium (Se) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Thallium (Tl) (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Uranium (U) (mg/kg)	0.696	0.649	0.739	0.641	0.610
	Vanadium (V) (mg/kg)	10.8	11.0	9.70	9.04	11.2
	Zinc (Zn) (mg/kg)	45.8	50.4	37.2	42.7	96.2
Speciated Metals	Hexavalent Chromium (mg/kg)					<0.10
Volatile Organic Compounds	Benzene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Ethylbenzene (mg/kg)	<0.015	<0.015	<0.015	<0.015	<0.015
	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
	Toluene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	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)	<0.075	<0.075	<0.075	<0.075	<0.075
	Surrogate: 4-Bromofluorobenzene (SS) (%)	102.0	100.1	100.5	101.0	99.2
	Surrogate: 1,4-Difluorobenzene (SS) (%)	97.2	95.9	95.6	98.4	95.1
Hydrocarbons	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1386542-16 Soil 29-OCT-13 TP7-2	L1386542-17 Soil 29-OCT-13 TP7-3	L1386542-18 Soil 29-OCT-13 TP7-4	L1386542-19 Soil 29-OCT-13 TP7-5	L1386542-20 Soil 29-OCT-13 TP8-1
SOIL						
Physical Tests	% Moisture (%)					2.73
	Moisture (%)	3.39	3.03	3.34	3.14	2.10
	pH (1:2 soil:water) (pH)	8.21	8.09	7.75	8.45	8.26
Particle Size	MUST PSA % > 75um (%)		12.5			9.87
Organic / Inorganic Carbon	Total Organic Carbon (%)		1.54			0.69
Metals	Antimony (Sb) (mg/kg)	1.40	2.94	1.47	1.06	0.54
	Arsenic (As) (mg/kg)	6.49	6.97	7.10	6.13	6.16
	Barium (Ba) (mg/kg)	138	173	159	112	108
	Beryllium (Be) (mg/kg)	0.27	0.30	0.24	0.24	0.25
	Cadmium (Cd) (mg/kg)	0.783	0.973	15.6	0.614	0.283
	Chromium (Cr) (mg/kg)	18.5	18.9	18.8	17.2	17.0
	Cobalt (Co) (mg/kg)	9.06	8.69	8.67	8.53	8.42
	Copper (Cu) (mg/kg)	27.5	28.1	36.8	21.1	16.4
	Lead (Pb) (mg/kg)	45.5	81.4	127	42.0	14.9
	Mercury (Hg) (mg/kg)	0.0220	0.0302	0.0245	0.0435	0.0190
	Molybdenum (Mo) (mg/kg)	0.90	0.80	1.32	0.65	<0.50
	Nickel (Ni) (mg/kg)	70.4	21.2	22.3	21.9	20.1
	Selenium (Se) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Silver (Ag) (mg/kg)	<0.10	0.16	0.11	<0.10	<0.10
	Thallium (Tl) (mg/kg)	0.053	<0.050	<0.050	<0.050	<0.050
	Tin (Sn) (mg/kg)	25.5	10.7	13.8	6.5	<2.0
	Uranium (U) (mg/kg)	0.641	0.598	0.452	0.559	0.604
	Vanadium (V) (mg/kg)	10.8	11.7	9.57	9.96	10.4
	Zinc (Zn) (mg/kg)	306	288	493	213	61.0
Speciated Metals	Hexavalent Chromium (mg/kg)					<0.10
Volatile Organic Compounds	Benzene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Ethylbenzene (mg/kg)	<0.015	<0.015	<0.015	<0.015	<0.015
	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
	Toluene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	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)	<0.075	<0.075	<0.075	<0.075	<0.075
	Surrogate: 4-Bromofluorobenzene (SS) (%)	104.7	100.1	102.4	100.9	98.9
	Surrogate: 1,4-Difluorobenzene (SS) (%)	100.1	96.2	98.5	95.8	95.0
Hydrocarbons	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1386542-21 Soil 29-OCT-13 TP8-2	L1386542-22 Soil 29-OCT-13 TP8-3	L1386542-23 Soil 29-OCT-13 TP8-4	L1386542-24 Soil 29-OCT-13 TP8-5	L1386542-25 Soil 30-OCT-13 TP10-1
SOIL						
Physical Tests	% Moisture (%)					4.13
	Moisture (%)	3.19	3.20	3.60	3.20	2.81
	pH (1:2 soil:water) (pH)	8.73	8.38	8.39	8.41	8.49
Particle Size	MUST PSA % > 75um (%)					4.41
Organic / Inorganic Carbon	Total Organic Carbon (%)					1.48
Metals	Antimony (Sb) (mg/kg)	0.48	0.90	0.50	0.56	0.36
	Arsenic (As) (mg/kg)	6.00	6.07	5.97	5.93	6.30
	Barium (Ba) (mg/kg)	105	138	121	112	85.7
	Beryllium (Be) (mg/kg)	0.27	0.26	0.25	0.24	0.29
	Cadmium (Cd) (mg/kg)	0.212	0.599	0.333	0.404	0.085
	Chromium (Cr) (mg/kg)	16.0	17.0	14.7	14.3	15.9
	Cobalt (Co) (mg/kg)	8.43	8.25	7.79	7.81	8.58
	Copper (Cu) (mg/kg)	16.7	24.3	16.9	17.2	14.9
	Lead (Pb) (mg/kg)	17.5	41.8	24.7	23.9	12.9
	Mercury (Hg) (mg/kg)	0.0149	0.0175	0.0238	0.0261	0.0129
	Molybdenum (Mo) (mg/kg)	<0.50	0.69	<0.50	<0.50	<0.50
	Nickel (Ni) (mg/kg)	19.7	20.2	18.9	18.3	20.9
	Selenium (Se) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Thallium (Tl) (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Tin (Sn) (mg/kg)	<2.0	9.7	2.1	3.8	<2.0
	Uranium (U) (mg/kg)	0.595	0.535	0.491	0.510	0.472
	Vanadium (V) (mg/kg)	10.5	10.4	9.60	9.74	10.7
	Zinc (Zn) (mg/kg)	70.9	177	86.9	158	46.4
Speciated Metals	Hexavalent Chromium (mg/kg)					
Volatile Organic Compounds	Benzene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Ethylbenzene (mg/kg)	<0.015	<0.015	<0.015	<0.015	<0.015
	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
	Toluene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	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)	<0.075	<0.075	<0.075	<0.075	<0.075
	Surrogate: 4-Bromofluorobenzene (SS) (%)	99.5	94.0	99.3	96.5	96.4
	Surrogate: 1,4-Difluorobenzene (SS) (%)	94.0	91.6	95.1	93.0	95.4
Hydrocarbons	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1386542-26 Soil 30-OCT-13 TP11-1	L1386542-27 Soil 30-OCT-13 TP11-2	L1386542-28 Soil 30-OCT-13 TP11-3	L1386542-29 Soil 30-OCT-13 TP12-1	L1386542-31 Soil 30-OCT-13 TP13-1
SOIL						
Physical Tests	% Moisture (%)	5.10			6.34	2.48
	Moisture (%)	6.66	5.99	2.07	7.00	2.38
	pH (1:2 soil:water) (pH)	9.01	8.50	9.36	8.46	8.76
Particle Size	MUST PSA % > 75um (%)					
Organic / Inorganic Carbon	Total Organic Carbon (%)					
Metals	Antimony (Sb) (mg/kg)	0.29	0.31	0.31	0.33	0.49
	Arsenic (As) (mg/kg)	5.70	5.76	6.15	5.79	5.88
	Barium (Ba) (mg/kg)	70.7	89.9	86.6	87.5	114
	Beryllium (Be) (mg/kg)	0.27	0.27	0.27	0.24	0.25
	Cadmium (Cd) (mg/kg)	0.075	0.064	0.070	0.071	0.184
	Chromium (Cr) (mg/kg)	16.3	17.3	17.5	14.7	15.8
	Cobalt (Co) (mg/kg)	8.09	8.52	8.47	7.44	8.16
	Copper (Cu) (mg/kg)	13.5	14.3	13.7	13.6	16.3
	Lead (Pb) (mg/kg)	9.03	9.92	9.84	11.2	19.6
	Mercury (Hg) (mg/kg)	0.0086	0.0098	0.0085	0.0156	0.0298
	Molybdenum (Mo) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Nickel (Ni) (mg/kg)	20.8	21.1	21.4	18.2	19.5
	Selenium (Se) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Thallium (Tl) (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	2.9
	Uranium (U) (mg/kg)	0.417	0.427	0.670	0.478	0.626
	Vanadium (V) (mg/kg)	10.4	11.2	11.2	10.3	10.7
	Zinc (Zn) (mg/kg)	42.7	46.5	44.9	43.6	72.5
Speciated Metals	Hexavalent Chromium (mg/kg)	<0.10			<0.10	<0.10
Volatile Organic Compounds	Benzene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Ethylbenzene (mg/kg)	<0.015	<0.015	<0.015	<0.015	<0.015
	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
	Toluene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	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)	<0.075	<0.075	<0.075	<0.075	<0.075
	Surrogate: 4-Bromofluorobenzene (SS) (%)	95.4	93.6	94.0	94.4	90.7
	Surrogate: 1,4-Difluorobenzene (SS) (%)	93.4	92.9	92.7	94.5	90.8
Hydrocarbons	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID: L1386542-32	L1386542-33	L1386542-34	L1386542-35	L1386542-36
	Description:	Soil	Soil	Soil	Soil	Soil
	Sampled Date:	30-OCT-13	29-OCT-13	30-OCT-13	30-OCT-13	30-OCT-13
	Client ID:	TP14-1	DUP A	DUP B	DUP C	DUP D
SOIL						
Physical Tests	% Moisture (%)	5.10			4.54	6.16
	Moisture (%)	5.00	7.70	5.61	4.44	4.54
	pH (1:2 soil:water) (pH)	8.94	8.25	8.50		8.96
Particle Size	MUST PSA % > 75um (%)	0.29				0.10
Organic / Inorganic Carbon	Total Organic Carbon (%)	0.28				0.12
Metals	Antimony (Sb) (mg/kg)	0.31	1.00	0.31		0.30
	Arsenic (As) (mg/kg)	6.13	6.04	5.69		5.91
	Barium (Ba) (mg/kg)	69.1	132	86.7		68.1
	Beryllium (Be) (mg/kg)	0.29	0.28	0.29		0.28
	Cadmium (Cd) (mg/kg)	0.077	1.11	0.095		0.066
	Chromium (Cr) (mg/kg)	20.6	18.5	17.3		19.8
	Cobalt (Co) (mg/kg)	9.91	8.76	8.67		9.54
	Copper (Cu) (mg/kg)	14.9	26.6	14.6		14.9
	Lead (Pb) (mg/kg)	12.8	76.0	12.8		11.1
	Mercury (Hg) (mg/kg)	0.0250	0.0243	0.0213		0.0159
	Molybdenum (Mo) (mg/kg)	<0.50	0.72	<0.50		<0.50
	Nickel (Ni) (mg/kg)	25.0	72.0	21.0		24.0
	Selenium (Se) (mg/kg)	<0.20	<0.20	<0.20		<0.20
	Silver (Ag) (mg/kg)	<0.10	0.14	<0.10		<0.10
	Thallium (Tl) (mg/kg)	<0.050	<0.050	<0.050		<0.050
	Tin (Sn) (mg/kg)	<2.0	14.8	<2.0		<2.0
	Uranium (U) (mg/kg)	0.707	0.450	0.434		0.690
	Vanadium (V) (mg/kg)	12.4	10.0	11.0		11.7
	Zinc (Zn) (mg/kg)	58.5	251	54.6		52.2
Speciated Metals	Hexavalent Chromium (mg/kg)				<0.10	
Volatile Organic Compounds	Benzene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Ethylbenzene (mg/kg)	<0.015	<0.015	<0.015	<0.015	<0.015
	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
	Toluene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	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)	<0.075	<0.075	<0.075	<0.075	<0.075
	Surrogate: 4-Bromofluorobenzene (SS) (%)	97.3	102.7	95.7	100.4	99.0
	Surrogate: 1,4-Difluorobenzene (SS) (%)	97.6	99.3	93.7	100.3	99.6
Hydrocarbons	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID	L1386542-37	L1386542-38	L1386542-39	L1386542-40	L1386542-41
		Description	Soil	Soil	Soil	Soil	Soil
		Sampled Date	30-OCT-13	30-OCT-13	30-OCT-13	30-OCT-13	30-OCT-13
		Client ID	RA1	RA2	RA3	RA4	RA5
SOIL							
Physical Tests	% Moisture (%)		4.73			4.50	5.91
	Moisture (%)		4.23	4.60	3.54	4.33	5.30
	pH (1:2 soil:water) (pH)				9.34	9.43	8.08
Particle Size	MUST PSA % > 75um (%)			26.2		55.0	
Organic / Inorganic Carbon	Total Organic Carbon (%)			1.26		0.33	
Metals	Antimony (Sb) (mg/kg)						1.13
	Arsenic (As) (mg/kg)						6.18
	Barium (Ba) (mg/kg)						200
	Beryllium (Be) (mg/kg)						0.28
	Cadmium (Cd) (mg/kg)					<0.050	1.94
	Chromium (Cr) (mg/kg)						27.6
	Cobalt (Co) (mg/kg)						7.54
	Copper (Cu) (mg/kg)						26.1
	Lead (Pb) (mg/kg)					7.46	72.8
	Mercury (Hg) (mg/kg)					0.0149	7.26
	Molybdenum (Mo) (mg/kg)						0.74
	Nickel (Ni) (mg/kg)						19.2
	Selenium (Se) (mg/kg)						<0.20
	Silver (Ag) (mg/kg)						4.02
	Thallium (Tl) (mg/kg)						<0.050
	Tin (Sn) (mg/kg)				<2.0	<2.0	3.9
	Uranium (U) (mg/kg)						0.391
	Vanadium (V) (mg/kg)						10.6
	Zinc (Zn) (mg/kg)					31.6	285
Speciated Metals	Hexavalent Chromium (mg/kg)		<0.10				0.23
Volatile Organic Compounds	Benzene (mg/kg)		<0.0050		<0.0050		<0.0050
	Ethylbenzene (mg/kg)		<0.015		<0.015		<0.015
	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)		<0.075		<0.075		<0.075
	Surrogate: 4-Bromofluorobenzene (SS) (%)		97.8		95.7		99.8
	Surrogate: 1,4-Difluorobenzene (SS) (%)		98.2		95.3		98.5
Hydrocarbons	F1 (C6-C10) (mg/kg)		<10		<10		<10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1386542-42	L1386542-43	L1386542-44		
	Description	Soil	Soil	Soil		
	Sampled Date	30-OCT-13	30-OCT-13	30-OCT-13		
	Sampled Time					
	Client ID	RA6	RA7	RA8		
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	2.71	13.9			
	Moisture (%)	2.51	12.7	5.90		
	pH (1:2 soil:water) (pH)	8.16	9.14			
Particle Size	MUST PSA % > 75um (%)		0.15			
Organic / Inorganic Carbon	Total Organic Carbon (%)		0.32			
Metals	Antimony (Sb) (mg/kg)	4.90				
	Arsenic (As) (mg/kg)	7.56				
	Barium (Ba) (mg/kg)	136				
	Beryllium (Be) (mg/kg)	0.21				
	Cadmium (Cd) (mg/kg)	0.796				
	Chromium (Cr) (mg/kg)	16.7				
	Cobalt (Co) (mg/kg)	8.31				
	Copper (Cu) (mg/kg)	46.0				
	Lead (Pb) (mg/kg)	30.4				
	Mercury (Hg) (mg/kg)	0.218				
	Molybdenum (Mo) (mg/kg)	1.25				
	Nickel (Ni) (mg/kg)	18.8				
	Selenium (Se) (mg/kg)	0.26				
	Silver (Ag) (mg/kg)	0.15				
	Thallium (Tl) (mg/kg)	<0.050				
	Tin (Sn) (mg/kg)	50.8	<2.0			
	Uranium (U) (mg/kg)	0.558				
	Vanadium (V) (mg/kg)	8.39				
	Zinc (Zn) (mg/kg)	1020	52.4			
Speciated Metals	Hexavalent Chromium (mg/kg)	0.10				
Volatile Organic Compounds	Benzene (mg/kg)	<0.0050	<0.0050			
	Ethylbenzene (mg/kg)	<0.015	<0.015			
	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)	<0.075	<0.075			
	Surrogate: 4-Bromofluorobenzene (SS) (%)	94.5	92.2			
	Surrogate: 1,4-Difluorobenzene (SS) (%)	94.7	91.3			
Hydrocarbons	F1 (C6-C10) (mg/kg)	<10	<10			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1386542-1 Soil 29-OCT-13 TP1-1	L1386542-2 Soil 29-OCT-13 TP1-2	L1386542-3 Soil 29-OCT-13 TP1-3	L1386542-4 Soil 29-OCT-13 TP1-4	L1386542-5 Soil 29-OCT-13 TP2-1
Sample ID / Description / Sampled Date / Sampled Time / Client ID						
SOIL						
Hydrocarbons	F1-BTEX (mg/kg)	<10	<10		<10	<10
	F2 (C10-C16) (mg/kg)	<30	<30		<30	<30
	F2-Naphth (mg/kg)	<30	<30		<30	<30
	F3 (C16-C34) (mg/kg)	<50	<50		<50	<50
	F3-PAH (mg/kg)	<50	<50		<50	<50
	F4 (C34-C50) (mg/kg)	<50	<50		<50	<50
	F4G-SG (mg/kg)					
	Chrom. to baseline at nC50	YES	YES		YES	YES
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	118.4	126.7		121.5	125.4
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.0050		<0.0050	<0.0050
	Acenaphthylene (mg/kg)	<0.0050	<0.0050		<0.0050	<0.0050
	Anthracene (mg/kg)	<0.0040	<0.0040		<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.010	<0.010		<0.010	<0.010
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010		<0.010	<0.010
	Benzo(b)fluoranthene (mg/kg)	<0.010	0.013		<0.010	<0.010
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	<0.015		<0.015	<0.015
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.010		<0.010	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010		<0.010	<0.010
	Chrysene (mg/kg)	<0.010	<0.010		<0.010	<0.010
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050		<0.0050	<0.0050
	Fluoranthene (mg/kg)	<0.010	<0.010		<0.010	<0.010
	Fluorene (mg/kg)	<0.010	<0.010		<0.010	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010		<0.010	<0.010
	2-Methylnaphthalene (mg/kg)	<0.010	<0.010		<0.010	<0.010
	Naphthalene (mg/kg)	<0.010	<0.010		<0.010	<0.010
	Phenanthrene (mg/kg)	<0.010	<0.010		<0.010	<0.010
	Pyrene (mg/kg)	<0.010	0.011		<0.010	<0.010
	Surrogate: Acenaphthene d10 (%)	84.5	92.2		83.1	89.1
	Surrogate: Chrysene d12 (%)	92.7	104.1		97.8	98.3
	Surrogate: Naphthalene d8 (%)	82.4	89.3		83.6	86.7
	Surrogate: Phenanthrene d10 (%)	88.0	98.6		83.1	94.1
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020		<0.020	<0.020
	IACR (CCME) (mg/kg)	<0.15	0.16		<0.15	<0.15

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1386542-6	L1386542-7	L1386542-8	L1386542-9	L1386542-10
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	29-OCT-13	29-OCT-13	29-OCT-13	29-OCT-13	29-OCT-13
	Sampled Time					
	Client ID	TP2-2	TP2-3	TP2-4	TP2-5	TP3-1
Grouping	**Analyte**					
SOIL						
Hydrocarbons	F1-BTEX (mg/kg)	<10	<10	<10	<10	<10
	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
	F2-Naphth (mg/kg)	<30	<30	<30	<30	<30
	F3 (C16-C34) (mg/kg)	<50	<50	<50	<50	<50
	F3-PAH (mg/kg)	<50	<50	<50	<50	<50
	F4 (C34-C50) (mg/kg)	<50	<50	<50	<50	<50
	F4G-SG (mg/kg)					
	Chrom. to baseline at nC50	YES	YES	YES	YES	YES
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	100.2	121.8	120.4	123.2	126.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	<0.015	<0.015	<0.015	<0.015
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Fluorene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	2-Methylnaphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Naphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Phenanthrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Surrogate: Acenaphthene d10 (%)	87.8	87.1	88.3	94.7	86.8
	Surrogate: Chrysene d12 (%)	92.2	87.7	93.7	96.5	88.7
	Surrogate: Naphthalene d8 (%)	86.0	83.4	84.3	89.8	84.2
	Surrogate: Phenanthrene d10 (%)	91.4	92.0	94.9	98.7	87.6
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	IACR (CCME) (mg/kg)	<0.15	<0.15	<0.15	<0.15	<0.15

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1386542-11	L1386542-12	L1386542-13	L1386542-14	L1386542-15
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	29-OCT-13	29-OCT-13	29-OCT-13	29-OCT-13	29-OCT-13
	Sampled Time					
	Client ID	TP3-2	TP4-1	TP5-1	TP6-1	TP7-1
Grouping	**Analyte**					
SOIL						
Hydrocarbons	F1-BTEX (mg/kg)	<10	<10	<10	<10	<10
	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
	F2-Naphth (mg/kg)	<30	<30	<30	<30	<30
	F3 (C16-C34) (mg/kg)	<50	<50	<50	<50	<50
	F3-PAH (mg/kg)	<50	<50	<50	<50	<50
	F4 (C34-C50) (mg/kg)	<50	<50	<50	<50	<50
	F4G-SG (mg/kg)					
	Chrom. to baseline at nC50	YES	YES	YES	YES	YES
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	121.3	119.7	120.5	101.4	114.5
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	<0.015	<0.015	<0.015	<0.015
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Fluorene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	2-Methylnaphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Naphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Phenanthrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Surrogate: Acenaphthene d10 (%)	90.0	84.3	85.0	92.5	83.9
	Surrogate: Chrysene d12 (%)	93.4	82.0	87.8	93.8	97.5
	Surrogate: Naphthalene d8 (%)	88.1	81.4	83.1	90.2	78.8
	Surrogate: Phenanthrene d10 (%)	87.3	83.6	82.5	93.7	88.1
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	IACR (CCME) (mg/kg)	<0.15	<0.15	<0.15	<0.15	<0.15

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1386542-16 Soil 29-OCT-13 TP7-2	L1386542-17 Soil 29-OCT-13 TP7-3	L1386542-18 Soil 29-OCT-13 TP7-4	L1386542-19 Soil 29-OCT-13 TP7-5	L1386542-20 Soil 29-OCT-13 TP8-1
SOIL						
Hydrocarbons	F1-BTEX (mg/kg)	<10	<10	<10	<10	<10
	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
	F2-Naphth (mg/kg)	<30	<30	<30	<30	<30
	F3 (C16-C34) (mg/kg)	<50	<50	170	64	<50
	F3-PAH (mg/kg)	<50	<50	170	64	<50
	F4 (C34-C50) (mg/kg)	<50	<50	84	<50	<50
	F4G-SG (mg/kg)			<500		
	Chrom. to baseline at nC50	YES	YES	NO	YES	YES
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	121.7	115.4	113.5	124.3	117.9
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.020 DLA	<0.0050	<0.0050	<0.0050	<0.0050
	Acenaphthylene (mg/kg)	<0.020 DLA	<0.0050	<0.0050	<0.0050	<0.0050
	Anthracene (mg/kg)	<0.020 DLA	<0.0040	<0.0040	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.020 DLA	<0.010	<0.010	<0.010	<0.010
	Benzo(a)pyrene (mg/kg)	0.028	<0.010	<0.010	<0.010	0.011
	Benzo(b)fluoranthene (mg/kg)	0.037	<0.010	0.015	<0.010	0.023
	Benzo(b+j+k)fluoranthene (mg/kg)	0.037	<0.015	0.015	<0.015	0.023
	Benzo(g,h,i)perylene (mg/kg)	0.031	<0.010	<0.010	<0.010	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.020 DLA	<0.010	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	0.025	<0.010	<0.010	<0.010	0.012
	Dibenz(a,h)anthracene (mg/kg)	<0.020 DLA	<0.0050	<0.0050	<0.0050	<0.0050
	Fluoranthene (mg/kg)	<0.020 DLA	<0.010	0.010	<0.010	<0.010
	Fluorene (mg/kg)	<0.020 DLA	<0.010	<0.010	<0.010	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	0.021	<0.010	<0.010	<0.010	0.011
	2-Methylnaphthalene (mg/kg)	<0.020 DLA	<0.010	<0.010	<0.010	<0.010
	Naphthalene (mg/kg)	<0.020 DLA	<0.010	<0.010	<0.010	<0.010
	Phenanthrene (mg/kg)	<0.020 DLA	<0.010	<0.010	<0.010	<0.010
	Pyrene (mg/kg)	0.023	<0.010	0.013	<0.010	<0.010
	Surrogate: Acenaphthene d10 (%)	95.3	79.5	92.1	89.8	82.7
	Surrogate: Chrysene d12 (%)	89.0	88.7	89.0	112.0	102.7
	Surrogate: Naphthalene d8 (%)	83.3	75.7	81.3	91.5	80.1
	Surrogate: Phenanthrene d10 (%)	93.1	87.9	96.9	95.8	88.8
	B(a)P Total Potency Equivalent (mg/kg)	0.046	<0.020	<0.020	<0.020	<0.020
	IACR (CCME) (mg/kg)	0.47	<0.15	0.17	<0.15	0.24

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1386542-21	L1386542-22	L1386542-23	L1386542-24	L1386542-25
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	29-OCT-13	29-OCT-13	29-OCT-13	29-OCT-13	30-OCT-13
	Sampled Time					
	Client ID	TP8-2	TP8-3	TP8-4	TP8-5	TP10-1
Grouping	**Analyte**					
SOIL						
Hydrocarbons	F1-BTEX (mg/kg)	<10	<10	<10	<10	<10
	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
	F2-Naphth (mg/kg)	<30	<30	<30	<30	<30
	F3 (C16-C34) (mg/kg)	<50	<50	<50	<50	<50
	F3-PAH (mg/kg)	<50	<50	<50	<50	<50
	F4 (C34-C50) (mg/kg)	<50	<50	<50	<50	<50
	F4G-SG (mg/kg)					
	Chrom. to baseline at nC50	YES	YES	YES	YES	YES
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	121.8	117.0	116.6	119.2	99.4
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	<0.015	<0.015	<0.015	<0.015
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Fluorene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	2-Methylnaphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Naphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Phenanthrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Surrogate: Acenaphthene d10 (%)	87.9	75.2	74.8	73.6	81.1
	Surrogate: Chrysene d12 (%)	107.6	80.3	81.7	83.9	91.3
	Surrogate: Naphthalene d8 (%)	85.2	71.8	62.1	71.6	76.9
	Surrogate: Phenanthrene d10 (%)	95.1	81.5	79.7	78.7	84.5
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	IACR (CCME) (mg/kg)	<0.15	<0.15	<0.15	<0.15	<0.15

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1386542-26	L1386542-27	L1386542-28	L1386542-29	L1386542-31
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	30-OCT-13	30-OCT-13	30-OCT-13	30-OCT-13	30-OCT-13
	Sampled Time					
	Client ID	TP11-1	TP11-2	TP11-3	TP12-1	TP13-1
Grouping	**Analyte**					
SOIL						
Hydrocarbons	F1-BTEX (mg/kg)	<10	<10	<10	<10	<10
	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
	F2-Naphth (mg/kg)	<30	<30	<30	<30	<30
	F3 (C16-C34) (mg/kg)	<50	<50	<50	<50	<50
	F3-PAH (mg/kg)	<50	<50	<50	<50	<50
	F4 (C34-C50) (mg/kg)	<50	<50	<50	<50	<50
	F4G-SG (mg/kg)					
	Chrom. to baseline at nC50	YES	YES	YES	YES	YES
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	113.2	99.7	102.6	100.4	95.8
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	<0.015	<0.015	<0.015	<0.015
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Fluorene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	2-Methylnaphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Naphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Phenanthrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Surrogate: Acenaphthene d10 (%)	71.8	73.6	75.7	79.0	74.1
	Surrogate: Chrysene d12 (%)	85.1	85.6	85.7	90.7	80.4
	Surrogate: Naphthalene d8 (%)	68.3	66.9	73.8	77.3	71.0
	Surrogate: Phenanthrene d10 (%)	77.8	80.8	77.4	81.4	77.2
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	IACR (CCME) (mg/kg)	<0.15	<0.15	<0.15	<0.15	<0.15

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1386542-32	L1386542-33	L1386542-34	L1386542-35	L1386542-36
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	30-OCT-13	29-OCT-13	30-OCT-13	30-OCT-13	30-OCT-13
	Sampled Time					
	Client ID	TP14-1	DUP A	DUP B	DUP C	DUP D
Grouping	**Analyte**					
SOIL						
Hydrocarbons	F1-BTEX (mg/kg)	<10	<10	<10	<10	<10
	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
	F2-Naphth (mg/kg)	<30	<30	<30	<30	<30
	F3 (C16-C34) (mg/kg)	<50	<50	<50	<50	<50
	F3-PAH (mg/kg)	<50	<50	<50	<50	<50
	F4 (C34-C50) (mg/kg)	<50	<50	<50	<50	<50
	F4G-SG (mg/kg)					
	Chrom. to baseline at nC50	YES	YES	YES	YES	YES
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	112.3	115.9	81.3	102.3	101.4
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	<0.015	<0.015	<0.015	<0.015
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Fluorene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	2-Methylnaphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Naphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Phenanthrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Surrogate: Acenaphthene d10 (%)	77.7	85.7	72.5	75.0	73.9
	Surrogate: Chrysene d12 (%)	86.0	97.6	84.3	81.8	82.2
	Surrogate: Naphthalene d8 (%)	68.5	82.2	70.1	72.0	70.4
	Surrogate: Phenanthrene d10 (%)	77.0	93.5	79.4	76.7	74.5
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	IACR (CCME) (mg/kg)	<0.15	<0.15	<0.15	<0.15	<0.15

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1386542-37	L1386542-38	L1386542-39	L1386542-40	L1386542-41
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	30-OCT-13	30-OCT-13	30-OCT-13	30-OCT-13	30-OCT-13
	Sampled Time					
	Client ID	RA1	RA2	RA3	RA4	RA5
Grouping	**Analyte**					
SOIL						
Hydrocarbons	F1-BTEX (mg/kg)	<10		<10		<10
	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
	F2-Naphth (mg/kg)	<30	<30	<30	<30	<30
	F3 (C16-C34) (mg/kg)	<50	<50	<50	<50	68
	F3-PAH (mg/kg)	<50	<50	<50	<50	68
	F4 (C34-C50) (mg/kg)	<50	<50	<50	<50	<50
	F4G-SG (mg/kg)					
	Chrom. to baseline at nC50	YES	YES	YES	YES	YES
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	111.0		104.2		115.9
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	0.018
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	<0.015	<0.015	<0.015	0.018
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	<0.010	<0.010	<0.010	<0.010	0.014
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	0.019
	Fluorene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	2-Methylnaphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Naphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Phenanthrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	0.025
	Pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	0.020
	Surrogate: Acenaphthene d10 (%)	74.9	81.1	78.1	81.2	82.7
	Surrogate: Chrysene d12 (%)	84.6	118.3	89.4	92.0	85.0
	Surrogate: Naphthalene d8 (%)	57.1	79.5	56.2	85.2	63.2
	Surrogate: Phenanthrene d10 (%)	80.8	98.3	82.0	82.6	86.6
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	IACR (CCME) (mg/kg)	<0.15	<0.15	<0.15	<0.15	0.19

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1386542-42	L1386542-43	L1386542-44		
	Description	Soil	Soil	Soil		
	Sampled Date	30-OCT-13	30-OCT-13	30-OCT-13		
	Sampled Time					
	Client ID	RA6	RA7	RA8		
Grouping	**Analyte**					
SOIL						
Hydrocarbons	F1-BTEX (mg/kg)	<10	<10			
	F2 (C10-C16) (mg/kg)	<30	<30	<30		
	F2-Naphth (mg/kg)	<30	<30	<30		
	F3 (C16-C34) (mg/kg)	67	<50	<50		
	F3-PAH (mg/kg)	67	<50	<50		
	F4 (C34-C50) (mg/kg)	188	<50	<50		
	F4G-SG (mg/kg)	1250				
	Chrom. to baseline at nC50	NO	YES	YES		
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	102.6	114.2			
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.0050	<0.0050		
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	<0.0050		
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0040		
	Benz(a)anthracene (mg/kg)	<0.010	<0.010	<0.010		
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.010		
	Benzo(b)fluoranthene (mg/kg)	<0.010	<0.010	<0.010		
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	<0.015	<0.015		
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.010	<0.010		
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010		
	Chrysene (mg/kg)	<0.010	<0.010	<0.010		
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050	<0.0050		
	Fluoranthene (mg/kg)	<0.010	<0.010	<0.010		
	Fluorene (mg/kg)	<0.010	<0.010	<0.010		
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010		
	2-Methylnaphthalene (mg/kg)	<0.010	<0.010	<0.010		
	Naphthalene (mg/kg)	<0.010	<0.010	<0.010		
	Phenanthrene (mg/kg)	<0.010	<0.010	<0.010		
	Pyrene (mg/kg)	<0.010	<0.010	<0.010		
	Surrogate: Acenaphthene d10 (%)	80.1	86.1	92.9		
	Surrogate: Chrysene d12 (%)	83.4	94.1	104.6		
	Surrogate: Naphthalene d8 (%)	75.3	82.3	91.4		
	Surrogate: Phenanthrene d10 (%)	84.9	84.7	87.9		
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020	<0.020		
	IACR (CCME) (mg/kg)	<0.15	<0.15	<0.15		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Molybdenum (Mo)	DUP-H	L1386542-18, -19, -20, -21, -22, -23, -24, -33
Duplicate	Uranium (U)	DUP-H	L1386542-18, -19, -20, -21, -22, -23, -24, -33
Duplicate	Copper (Cu)	DUP-H	L1386542-18, -19, -20, -21, -22, -23, -24, -33
Duplicate	Lead (Pb)	DUP-H	L1386542-18, -19, -20, -21, -22, -23, -24, -33
Duplicate	Zinc (Zn)	DUP-H	L1386542-18, -19, -20, -21, -22, -23, -24, -33
Duplicate	Nickel (Ni)	DUP-H	L1386542-25, -26, -27, -28, -29, -31, -32, -34, -36, -41, -42

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TOT-ORG-LECO-SK	Soil	Organic Carbon by combustion method	SSSA (1996) p. 973

Total Organic Carbon (C-TOT-ORG-LECO-SK, C-TOT-ORG-SK)

Total C and inorganic C are determined on separate samples. The total C is determined by combustion and thermal conductivity detection, while inorganic C is determined by weight lass after addition of hydrochloric acid. Organic C is calculated by the difference between these two determinations.

Reference for Total C:
Nelson, D.W. and Sommers, L.E. 1996. Total Carbon, organic carbon and organic matter. P. 961-1010 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

Reference for Inorganic C:
Loeppert, R.H. and Suarez, D.L. 1996. Gravimetric Method for Loss of Carbon Dioxide. P. 455-456 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

CR-CR6-3060-ED	Soil	Chromium, Hexavalent (Cr +6)	APHA 3500-CR C, EPA 3060A ALKALINE
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-HSFID-VA	Soil	CCME F1 by headspace GCMS	EPA SW846, CCME CWS PHC TIER 1

The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. The F1 fraction concentration is measured using flame ionization detection.

F2F3-PAH-CALC-VA	Soil	F2&F3-PAH	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 F2 (C10-C16) and F3 (C16-C34), 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 analysis by on-column GC/FID. The F2-Napth and F3-PAH results are then calculated as follows:

1. F2-Napth: F2 (C10-C16) minus naphthalene.
2. F3-PAH: F3 (C16-C34) minus selected PAHs (phenanthrene, benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene and pyrene).

F2F4-TUMB-H/A-FID-VA	Soil	Petroleum Hydrocarbon by Tumbler GCFID	CCME PETROLEUM HYDROCARBONS

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

Reference Information

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-200.2-CVAF-VA Soil Mercury in Soil by CVAFS EPA 200.2/245.7

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry(EPA Method 245.7).

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-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from 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.

MOISTURE-VA Soil Moisture content ASTM D2974-00 Method A

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 PETROLEUM HYDROCARBONS-GRAVIMETRIC

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-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3545 & 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. Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) 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 (No. 10 / 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.

PREP-MOISTURE-ED Soil % Moisture Oven dry 105C-Gravimetric

PSA-MUST-SK Soil % Particles > 75um (Coarse/Fine) ASTM D422-63-SIEVE

An air-dried sample is reduced to < 2 mm size and mixed with a dispersing agent (Calgon solution). The sample is washed through a 200 mesh (75 µm) sieve. The retained mass of sample is used to determine % sand fraction.

Reference: ASTM D422-63

VH-SURR-FID-VA Soil VH Surrogates for Soils BCMELP CSR ANALYTICAL METHOD 2

Reference Information

VOC7-L-HSMS-VA	Soil	VOCs in soil by Headspace GCMS	EPA8260B, 5021, 5035, BC MOE

The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

VOC7/VOC-SURR-MS-VA	Soil	VOC7 and/or VOC Surrogates for Soils	EPA METHODS 8260B & 524.2
XYLENES-CALC-VA	Soil	Sum of Xylene Isomer Concentrations	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.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

10-334338	10-334339	10-334341	10-334342	5
6	7	8		

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
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.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: SLR CONSULTING (CANADA) LTD.
200 - 1475 Ellis Street
Kelowna BC V1Y 2A3
Contact: Lindsay Paterson

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-LECO-SK	**Soil**							
Batch R2736201								
WG1782879-13 DUP		**L1386542-40**						
Total Organic Carbon		0.33	0.35		%	7.3	30	06-NOV-13
WG1782879-11 IRM		**08-109_SOIL**						
Total Organic Carbon			1.04		%		0.77-1.43	06-NOV-13
WG1782879-14 IRM		**08-109_SOIL**						
Total Organic Carbon			0.99		%		0.77-1.43	06-NOV-13
WG1782879-17 IRM		**08-109_SOIL**						
Total Organic Carbon			0.94		%		0.77-1.43	06-NOV-13
WG1782879-2 IRM		**08-109_SOIL**						
Total Organic Carbon			1.03		%		0.77-1.43	06-NOV-13
WG1782879-5 IRM		**08-109_SOIL**						
Total Organic Carbon			1.00		%		0.77-1.43	06-NOV-13
WG1782879-8 IRM		**08-109_SOIL**						
Total Organic Carbon			1.04		%		0.77-1.43	06-NOV-13
WG1782879-12 MB								
Total Organic Carbon			<0.10		%		0.1	06-NOV-13
WG1782879-15 MB								
Total Organic Carbon			<0.10		%		0.1	06-NOV-13
WG1782879-18 MB								
Total Organic Carbon			<0.10		%		0.1	06-NOV-13
WG1782879-3 MB								
Total Organic Carbon			<0.10		%		0.1	06-NOV-13
WG1782879-6 MB								
Total Organic Carbon			<0.10		%		0.1	06-NOV-13
WG1782879-9 MB								
Total Organic Carbon			<0.10		%		0.1	06-NOV-13
CR-CR6-3060-ED	**Soil**							
Batch R2740576								
WG1786632-4 DUP		**L1386542-42**						
Hexavalent Chromium		0.10	0.11		mg/kg	4.8	20	12-NOV-13
WG1786632-2 LCS								
Hexavalent Chromium			97.0		%		80-120	12-NOV-13
WG1786632-1 MB								
Hexavalent Chromium			<0.10		mg/kg		0.1	12-NOV-13
F1-HSFID-VA	**Soil**							

Quality Control Report

Workorder: L1386542 Report Date: 04-DEC-13

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HSFID-VA	**Soil**							
Batch R2733028								
WG1781958-2 LCS								
F1 (C6-C10)			103.6		%		70-130	06-NOV-13
WG1782145-2 LCS								
F1 (C6-C10)			100.9		%		70-130	07-NOV-13
WG1782146-2 LCS								
F1 (C6-C10)			105.0		%		70-130	07-NOV-13
WG1782147-2 LCS								
F1 (C6-C10)			111.4		%		70-130	08-NOV-13
WG1781958-1 MB								
F1 (C6-C10)			<10		mg/kg		10	06-NOV-13
WG1782145-1 MB								
F1 (C6-C10)			<10		mg/kg		10	07-NOV-13
WG1782146-1 MB								
F1 (C6-C10)			<10		mg/kg		10	07-NOV-13
WG1782147-1 MB								
F1 (C6-C10)			<10		mg/kg		10	08-NOV-13
Batch R2733785								
WG1781958-3 DUP		**L1386542-20**						
F1 (C6-C10)		<10	<10	RPD-NA	mg/kg	N/A	40	06-NOV-13
WG1781954-1 MB								
F1 (C6-C10)			<10		mg/kg		10	07-NOV-13
Batch R2734275								
WG1782146-3 DUP		**L1386542-31**						
F1 (C6-C10)		<10	<10	RPD-NA	mg/kg	N/A	40	07-NOV-13
Batch R2735429								
WG1781954-2 LCS								
F1 (C6-C10)			111.9		%		70-130	07-NOV-13
F2F4-TUMB-H/A-FID-VA	**Soil**							
Batch R2737480								
WG1781968-8 DUP		**L1386542-10**						
F2 (C10-C16)		<30	<30	RPD-NA	mg/kg	N/A	40	08-NOV-13
F3 (C16-C34)		<50	<50	RPD-NA	mg/kg	N/A	40	08-NOV-13
F4 (C34-C50)		<50	<50	RPD-NA	mg/kg	N/A	40	08-NOV-13
WG1782140-4 DUP		**L1386542-41**						
F2 (C10-C16)		<30	<30	RPD-NA	mg/kg	N/A	40	08-NOV-13
F3 (C16-C34)		68	75		mg/kg	10	40	08-NOV-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2F4-TUMB-H/A-FID-VA	**Soil**							
Batch R2737480								
WG1782140-4 DUP		**L1386542-41**						
F4 (C34-C50)		<50	<50	RPD-NA	mg/kg	N/A	40	08-NOV-13
WG1781968-7 IRM		**ALS PHC2 RM**						
F2 (C10-C16)			98.5		%		70-130	08-NOV-13
F3 (C16-C34)			106.3		%		70-130	08-NOV-13
F4 (C34-C50)			90.0		%		70-130	08-NOV-13
WG1782140-3 IRM		**ALS PHC2 RM**						
F2 (C10-C16)			94.7		%		70-130	08-NOV-13
F3 (C16-C34)			98.9		%		70-130	08-NOV-13
F4 (C34-C50)			74.0		%		70-130	08-NOV-13
WG1784466-3 IRM		**ALS PHC2 RM**						
F2 (C10-C16)			91.4		%		70-130	10-NOV-13
F3 (C16-C34)			101.5		%		70-130	10-NOV-13
F4 (C34-C50)			84.7		%		70-130	10-NOV-13
WG1781968-6 LCS								
F2 (C10-C16)			87.3		%		80-120	08-NOV-13
F3 (C16-C34)			87.4		%		80-120	08-NOV-13
F4 (C34-C50)			80.3		%		80-120	08-NOV-13
WG1782140-2 LCS								
F2 (C10-C16)			87.3		%		80-120	08-NOV-13
F3 (C16-C34)			83.1		%		80-120	08-NOV-13
F4 (C34-C50)			80.9		%		80-120	08-NOV-13
WG1784466-2 LCS								
F2 (C10-C16)			105.8		%		80-120	10-NOV-13
F3 (C16-C34)			102.9		%		80-120	10-NOV-13
F4 (C34-C50)			97.2		%		80-120	10-NOV-13
WG1781968-5 MB								
F2 (C10-C16)			<30		mg/kg		30	08-NOV-13
F3 (C16-C34)			<50		mg/kg		50	08-NOV-13
F4 (C34-C50)			<50		mg/kg		50	08-NOV-13
WG1782140-1 MB								
F2 (C10-C16)			<30		mg/kg		30	08-NOV-13
F3 (C16-C34)			<50		mg/kg		50	08-NOV-13
F4 (C34-C50)			<50		mg/kg		50	08-NOV-13
WG1784466-1 MB								
F2 (C10-C16)			<30		mg/kg		30	10-NOV-13
F3 (C16-C34)			<50		mg/kg		50	10-NOV-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2F4-TUMB-H/A-FID-VA	**Soil**							
Batch R2737480								
WG1784466-1 MB								
F4 (C34-C50)			<50		mg/kg		50	10-NOV-13
HG-200.2-CVAF-VA	**Soil**							
Batch R2735412								
WG1781851-3 CRM		**VA-CANMET-TILL1**						
Mercury (Hg)			88.1		%		70-130	05-NOV-13
WG1781851-4 CRM		**VA-NRC-STSD1**						
Mercury (Hg)			97.1		%		70-130	05-NOV-13
WG1782143-3 CRM		**VA-CANMET-TILL1**						
Mercury (Hg)			88.5		%		70-130	05-NOV-13
WG1782143-4 CRM		**VA-NRC-STSD1**						
Mercury (Hg)			90.4		%		70-130	05-NOV-13
WG1781851-2 DUP		**L1386542-1**						
Mercury (Hg)		0.0196	0.0137		mg/kg	35	40	05-NOV-13
WG1781851-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	05-NOV-13
WG1782143-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	05-NOV-13
Batch R2735471								
WG1782023-3 CRM		**VA-CANMET-TILL1**						
Mercury (Hg)			88.6		%		70-130	06-NOV-13
WG1782023-4 CRM		**VA-NRC-STSD1**						
Mercury (Hg)			87.1		%		70-130	06-NOV-13
WG1782023-2 DUP		**L1386542-33**						
Mercury (Hg)		0.0243	0.0234		mg/kg	3.5	40	06-NOV-13
WG1782023-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	06-NOV-13
Batch R2753129								
WG1797707-4 CRM		**VA-CANMET-TILL1**						
Mercury (Hg)			103.3		%		70-130	01-DEC-13
WG1797707-5 CRM		**VA-NRC-STSD1**						
Mercury (Hg)			106.3		%		70-130	01-DEC-13
WG1797707-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	01-DEC-13
WG1797707-2 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	01-DEC-13
MET-200.2-CCMS-VA	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2734370								
WG1781851-3 CRM		**VA-CANMET-TILL1**						
Antimony (Sb)			105.1		%		70-130	05-NOV-13
Arsenic (As)			105.2		%		70-130	05-NOV-13
Barium (Ba)			107.7		%		70-130	05-NOV-13
Beryllium (Be)			0.52		mg/kg		0.34-0.74	05-NOV-13
Cadmium (Cd)			89.4		%		70-130	05-NOV-13
Chromium (Cr)			108.5		%		70-130	05-NOV-13
Cobalt (Co)			102.8		%		70-130	05-NOV-13
Copper (Cu)			98.9		%		70-130	05-NOV-13
Lead (Pb)			92.4		%		70-130	05-NOV-13
Molybdenum (Mo)			0.71		mg/kg		0.24-1.24	05-NOV-13
Nickel (Ni)			104.1		%		70-130	05-NOV-13
Selenium (Se)			0.33		mg/kg		0.12-0.52	05-NOV-13
Silver (Ag)			0.23		mg/kg		0.12-0.32	05-NOV-13
Thallium (Tl)			0.125		mg/kg		0.075-0.175	05-NOV-13
Tin (Sn)			1.0		mg/kg		0-3	05-NOV-13
Uranium (U)			105.9		%		70-130	05-NOV-13
Vanadium (V)			109.5		%		70-130	05-NOV-13
Zinc (Zn)			99.8		%		70-130	05-NOV-13
WG1781851-4 CRM		**VA-NRC-STSD1**						
Antimony (Sb)			106.0		%		70-130	05-NOV-13
Arsenic (As)			99.3		%		70-130	05-NOV-13
Barium (Ba)			106.6		%		70-130	05-NOV-13
Beryllium (Be)			106.4		%		70-130	05-NOV-13
Cadmium (Cd)			100.2		%		70-130	05-NOV-13
Chromium (Cr)			104.1		%		70-130	05-NOV-13
Cobalt (Co)			100.5		%		70-130	05-NOV-13
Copper (Cu)			100.6		%		70-130	05-NOV-13
Lead (Pb)			101.8		%		70-130	05-NOV-13
Molybdenum (Mo)			108.2		%		70-130	05-NOV-13
Nickel (Ni)			101.9		%		70-130	05-NOV-13
Selenium (Se)			105.5		%		70-130	05-NOV-13
Silver (Ag)			103.4		%		70-130	05-NOV-13
Thallium (Tl)			106.8		%		70-130	05-NOV-13
Tin (Sn)			95.7		%		70-130	05-NOV-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2734370								
WG1781851-4 CRM		**VA-NRC-STSD1**						
Vanadium (V)			106.1		%		70-130	05-NOV-13
Zinc (Zn)			98.9		%		70-130	05-NOV-13
WG1781851-2 DUP		**L1386542-1**						
Antimony (Sb)		0.47	0.41		mg/kg	13	30	05-NOV-13
Arsenic (As)		6.05	5.99		mg/kg	1.0	30	05-NOV-13
Barium (Ba)		122	110		mg/kg	9.8	40	05-NOV-13
Beryllium (Be)		0.27	0.28		mg/kg	3.0	30	05-NOV-13
Cadmium (Cd)		0.140	0.153		mg/kg	9.4	30	05-NOV-13
Chromium (Cr)		16.8	16.1		mg/kg	4.1	30	05-NOV-13
Cobalt (Co)		8.25	8.15		mg/kg	1.3	30	05-NOV-13
Copper (Cu)		15.4	15.2		mg/kg	1.0	30	05-NOV-13
Lead (Pb)		17.9	14.7		mg/kg	19	40	05-NOV-13
Molybdenum (Mo)		<0.50	<0.50	RPD-NA	mg/kg	N/A	40	05-NOV-13
Nickel (Ni)		20.1	19.6		mg/kg	2.3	30	05-NOV-13
Selenium (Se)		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	05-NOV-13
Silver (Ag)		<0.10	<0.10	RPD-NA	mg/kg	N/A	40	05-NOV-13
Thallium (Tl)		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	05-NOV-13
Tin (Sn)		2.9	2.3		mg/kg	22	40	05-NOV-13
Uranium (U)		0.803	0.644		mg/kg	22	30	05-NOV-13
Vanadium (V)		10.9	10.9		mg/kg	0.3	30	05-NOV-13
Zinc (Zn)		65.2	59.6		mg/kg	9.0	30	05-NOV-13
WG1781851-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	05-NOV-13
Arsenic (As)			<0.050		mg/kg		0.05	05-NOV-13
Barium (Ba)			<0.50		mg/kg		0.5	05-NOV-13
Beryllium (Be)			<0.20		mg/kg		0.2	05-NOV-13
Cadmium (Cd)			<0.050		mg/kg		0.05	05-NOV-13
Chromium (Cr)			<0.50		mg/kg		0.5	05-NOV-13
Cobalt (Co)			<0.10		mg/kg		0.1	05-NOV-13
Copper (Cu)			<0.50		mg/kg		0.5	05-NOV-13
Lead (Pb)			<0.50		mg/kg		0.5	05-NOV-13
Molybdenum (Mo)			<0.50		mg/kg		0.5	05-NOV-13
Nickel (Ni)			<0.50		mg/kg		0.5	05-NOV-13
Selenium (Se)			<0.20		mg/kg		0.2	05-NOV-13
Silver (Ag)			<0.10		mg/kg		0.1	05-NOV-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2734370								
WG1781851-1 MB								
Thallium (Tl)			<0.050		mg/kg		0.05	05-NOV-13
Tin (Sn)			<2.0		mg/kg		2	05-NOV-13
Uranium (U)			<0.050		mg/kg		0.05	05-NOV-13
Vanadium (V)			<0.20		mg/kg		0.2	05-NOV-13
Zinc (Zn)			<1.0		mg/kg		1	05-NOV-13
Batch R2735393								
WG1782023-3 CRM		**VA-CANMET-TILL1**						
Antimony (Sb)			98.1		%		70-130	06-NOV-13
Arsenic (As)			108.4		%		70-130	06-NOV-13
Barium (Ba)			100.2		%		70-130	06-NOV-13
Beryllium (Be)			0.53		mg/kg		0.34-0.74	06-NOV-13
Cadmium (Cd)			94.5		%		70-130	06-NOV-13
Chromium (Cr)			105.7		%		70-130	06-NOV-13
Cobalt (Co)			103.7		%		70-130	06-NOV-13
Copper (Cu)			99.8		%		70-130	06-NOV-13
Lead (Pb)			97.2		%		70-130	06-NOV-13
Molybdenum (Mo)			0.70		mg/kg		0.24-1.24	06-NOV-13
Nickel (Ni)			104.1		%		70-130	06-NOV-13
Selenium (Se)			0.31		mg/kg		0.12-0.52	06-NOV-13
Silver (Ag)			0.23		mg/kg		0.12-0.32	06-NOV-13
Thallium (Tl)			0.121		mg/kg		0.075-0.175	06-NOV-13
Tin (Sn)			1.1		mg/kg		0-3	06-NOV-13
Uranium (U)			105.1		%		70-130	06-NOV-13
Vanadium (V)			107.7		%		70-130	06-NOV-13
Zinc (Zn)			102.7		%		70-130	06-NOV-13
WG1782023-4 CRM		**VA-NRC-STSD1**						
Antimony (Sb)			107.0		%		70-130	06-NOV-13
Arsenic (As)			103.2		%		70-130	06-NOV-13
Barium (Ba)			103.1		%		70-130	06-NOV-13
Beryllium (Be)			113.1		%		70-130	06-NOV-13
Cadmium (Cd)			102.8		%		70-130	06-NOV-13
Chromium (Cr)			102.3		%		70-130	06-NOV-13
Cobalt (Co)			103.9		%		70-130	06-NOV-13
Copper (Cu)			102.3		%		70-130	06-NOV-13
Lead (Pb)			100.5		%		70-130	06-NOV-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2735393								
WG1782023-4 CRM		**VA-NRC-STSD1**						
Molybdenum (Mo)			105.1		%		70-130	06-NOV-13
Nickel (Ni)			101.0		%		70-130	06-NOV-13
Selenium (Se)			106.3		%		70-130	06-NOV-13
Silver (Ag)			104.8		%		70-130	06-NOV-13
Thallium (Tl)			98.0		%		70-130	06-NOV-13
Tin (Sn)			97.2		%		70-130	06-NOV-13
Vanadium (V)			105.3		%		70-130	06-NOV-13
Zinc (Zn)			104.9		%		70-130	06-NOV-13
WG1782023-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	06-NOV-13
Arsenic (As)			<0.050		mg/kg		0.05	06-NOV-13
Barium (Ba)			<0.50		mg/kg		0.5	06-NOV-13
Beryllium (Be)			<0.20		mg/kg		0.2	06-NOV-13
Cadmium (Cd)			<0.050		mg/kg		0.05	06-NOV-13
Chromium (Cr)			<0.50		mg/kg		0.5	06-NOV-13
Cobalt (Co)			<0.10		mg/kg		0.1	06-NOV-13
Copper (Cu)			<0.50		mg/kg		0.5	06-NOV-13
Lead (Pb)			<0.50		mg/kg		0.5	06-NOV-13
Molybdenum (Mo)			<0.50		mg/kg		0.5	06-NOV-13
Nickel (Ni)			<0.50		mg/kg		0.5	06-NOV-13
Selenium (Se)			<0.20		mg/kg		0.2	06-NOV-13
Silver (Ag)			<0.10		mg/kg		0.1	06-NOV-13
Thallium (Tl)			<0.050		mg/kg		0.05	06-NOV-13
Tin (Sn)			<2.0		mg/kg		2	06-NOV-13
Uranium (U)			<0.050		mg/kg		0.05	06-NOV-13
Vanadium (V)			<0.20		mg/kg		0.2	06-NOV-13
Zinc (Zn)			<1.0		mg/kg		1	06-NOV-13
Batch R2735442								
WG1782143-3 CRM		**VA-CANMET-TILL1**						
Antimony (Sb)			112.0		%		70-130	05-NOV-13
Arsenic (As)			108.6		%		70-130	05-NOV-13
Barium (Ba)			102.0		%		70-130	05-NOV-13
Beryllium (Be)			0.53		mg/kg		0.34-0.74	05-NOV-13
Cadmium (Cd)			96.2		%		70-130	05-NOV-13
Chromium (Cr)			111.4		%		70-130	05-NOV-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2735442								
WG1782143-3 CRM		**VA-CANMET-TILL1**						
Cobalt (Co)			104.2		%		70-130	05-NOV-13
Copper (Cu)			99.4		%		70-130	05-NOV-13
Lead (Pb)			95.7		%		70-130	05-NOV-13
Molybdenum (Mo)			0.73		mg/kg		0.24-1.24	05-NOV-13
Nickel (Ni)			107.6		%		70-130	05-NOV-13
Selenium (Se)			0.34		mg/kg		0.12-0.52	05-NOV-13
Silver (Ag)			0.23		mg/kg		0.12-0.32	05-NOV-13
Thallium (Tl)			0.130		mg/kg		0.075-0.175	05-NOV-13
Tin (Sn)			1.1		mg/kg		0-3	05-NOV-13
Uranium (U)			115.4		%		70-130	05-NOV-13
Vanadium (V)			112.0		%		70-130	05-NOV-13
Zinc (Zn)			103.1		%		70-130	05-NOV-13
WG1782143-4 CRM		**VA-NRC-STSD1**						
Antimony (Sb)			102.9		%		70-130	05-NOV-13
Arsenic (As)			100.6		%		70-130	05-NOV-13
Barium (Ba)			105.0		%		70-130	05-NOV-13
Beryllium (Be)			100.3		%		70-130	05-NOV-13
Cadmium (Cd)			96.6		%		70-130	05-NOV-13
Chromium (Cr)			104.1		%		70-130	05-NOV-13
Cobalt (Co)			101.8		%		70-130	05-NOV-13
Copper (Cu)			101.2		%		70-130	05-NOV-13
Lead (Pb)			100.4		%		70-130	05-NOV-13
Molybdenum (Mo)			104.6		%		70-130	05-NOV-13
Nickel (Ni)			102.4		%		70-130	05-NOV-13
Selenium (Se)			103.3		%		70-130	05-NOV-13
Silver (Ag)			99.5		%		70-130	05-NOV-13
Thallium (Tl)			102.7		%		70-130	05-NOV-13
Tin (Sn)			102.3		%		70-130	05-NOV-13
Vanadium (V)			105.9		%		70-130	05-NOV-13
Zinc (Zn)			100.0		%		70-130	05-NOV-13
WG1782023-2 DUP		**L1386542-33**						
Antimony (Sb)		1.00	1.08		mg/kg	7.4	30	05-NOV-13
Arsenic (As)		6.04	6.49		mg/kg	7.1	30	05-NOV-13
Barium (Ba)		132	135		mg/kg	2.7	40	05-NOV-13
Beryllium (Be)		0.28	0.25		mg/kg	14	30	05-NOV-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2735442								
WG1782023-2 DUP		**L1386542-33**						
Cadmium (Cd)		1.11	0.941		mg/kg	17	30	05-NOV-13
Chromium (Cr)		18.5	16.2		mg/kg	13	30	05-NOV-13
Cobalt (Co)		8.76	8.50		mg/kg	2.9	30	05-NOV-13
Copper (Cu)		26.6	37.4	DUP-H	mg/kg	34	30	05-NOV-13
Lead (Pb)		76.0	39.8	DUP-H	mg/kg	63	40	05-NOV-13
Molybdenum (Mo)		0.72	0.60		mg/kg	19	40	05-NOV-13
Nickel (Ni)		72.0	63.4		mg/kg	13	30	05-NOV-13
Selenium (Se)		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	05-NOV-13
Silver (Ag)		0.14	<0.10	RPD-NA	mg/kg	N/A	40	05-NOV-13
Thallium (Tl)		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	05-NOV-13
Tin (Sn)		14.8	13.5		mg/kg	9.7	40	05-NOV-13
Uranium (U)		0.450	0.445		mg/kg	1.2	30	05-NOV-13
Vanadium (V)		10.0	9.54		mg/kg	4.9	30	05-NOV-13
Zinc (Zn)		251	403	DUP-H	mg/kg	47	30	05-NOV-13
WG1782143-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	05-NOV-13
Arsenic (As)			<0.050		mg/kg		0.05	05-NOV-13
Barium (Ba)			<0.50		mg/kg		0.5	05-NOV-13
Beryllium (Be)			<0.20		mg/kg		0.2	05-NOV-13
Cadmium (Cd)			<0.050		mg/kg		0.05	05-NOV-13
Chromium (Cr)			<0.50		mg/kg		0.5	05-NOV-13
Cobalt (Co)			<0.10		mg/kg		0.1	05-NOV-13
Copper (Cu)			<0.50		mg/kg		0.5	05-NOV-13
Lead (Pb)			<0.50		mg/kg		0.5	05-NOV-13
Molybdenum (Mo)			<0.50		mg/kg		0.5	05-NOV-13
Nickel (Ni)			<0.50		mg/kg		0.5	05-NOV-13
Selenium (Se)			<0.20		mg/kg		0.2	05-NOV-13
Silver (Ag)			<0.10		mg/kg		0.1	05-NOV-13
Thallium (Tl)			<0.050		mg/kg		0.05	05-NOV-13
Tin (Sn)			<2.0		mg/kg		2	05-NOV-13
Uranium (U)			<0.050		mg/kg		0.05	05-NOV-13
Vanadium (V)			<0.20		mg/kg		0.2	05-NOV-13
Zinc (Zn)			<1.0		mg/kg		1	05-NOV-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2753878								
WG1797707-4 CRM		**VA-CANMET-TILL1**						
Cadmium (Cd)			87.7		%		70-130	02-DEC-13
Lead (Pb)			87.8		%		70-130	02-DEC-13
Nickel (Ni)			101.1		%		70-130	02-DEC-13
Tin (Sn)			1.0		mg/kg		0-3	02-DEC-13
Zinc (Zn)			98.2		%		70-130	02-DEC-13
WG1797707-5 CRM		**VA-NRC-STSD1**						
Cadmium (Cd)			95.7		%		70-130	02-DEC-13
Lead (Pb)			99.1		%		70-130	02-DEC-13
Nickel (Ni)			104.1		%		70-130	02-DEC-13
Tin (Sn)			99.9		%		70-130	02-DEC-13
Zinc (Zn)			101.6		%		70-130	02-DEC-13
WG1797707-2 MB								
Cadmium (Cd)			<0.050		mg/kg		0.05	02-DEC-13
Lead (Pb)			<0.50		mg/kg		0.5	02-DEC-13
Nickel (Ni)			<0.50		mg/kg		0.5	02-DEC-13
Tin (Sn)			<2.0		mg/kg		2	02-DEC-13
Zinc (Zn)			<1.0		mg/kg		1	02-DEC-13
Batch R2754508								
WG1797707-1 MB								
Cadmium (Cd)			<0.050		mg/kg		0.05	03-DEC-13
Lead (Pb)			<0.50		mg/kg		0.5	03-DEC-13
Nickel (Ni)			<0.50		mg/kg		0.5	03-DEC-13
Tin (Sn)			<2.0		mg/kg		2	03-DEC-13
Zinc (Zn)			<1.0		mg/kg		1	03-DEC-13
MOISTURE-VA	**Soil**							
Batch R2733244								
WG1781952-3 DUP		**L1386542-1**						
Moisture		1.90	1.95		%	2.6	20	04-NOV-13
WG1781952-4 DUP		**L1386542-11**						
Moisture		1.68	1.81		%	7.1	20	04-NOV-13
WG1781952-2 LCS								
Moisture			99.9		%		70-130	04-NOV-13
WG1781952-1 MB								
Moisture			<0.25		%		0.25	04-NOV-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-VA	**Soil**							
Batch R2733266								
WG1782144-3 DUP		**L1386542-26**						
Moisture		6.66	5.69		%	16	20	04-NOV-13
WG1782144-2 LCS								
Moisture			100.1		%		70-130	04-NOV-13
WG1782144-1 MB								
Moisture			<0.25		%		0.25	04-NOV-13
Batch R2733268								
WG1782024-2 LCS								
Moisture			100.4		%		70-130	04-NOV-13
WG1782024-1 MB								
Moisture			<0.25		%		0.25	04-NOV-13
Batch R2736582								
WG1784379-2 LCS								
Moisture			99.2		%		70-130	07-NOV-13
WG1784379-1 MB								
Moisture			<0.25		%		0.25	07-NOV-13
OGG-F4G-TUMB-SG-VA	**Soil**							
Batch R2741514								
WG1787474-2 IRM		**ALS PHC2 RM**						
F4G-SG			107.8		%		70-130	07-NOV-13
WG1787474-4 IRM		**ALS PHC2 RM**						
F4G-SG			91.8		%		70-130	07-NOV-13
WG1787474-1 MB								
F4G-SG			<500		mg/kg		500	07-NOV-13
WG1787474-3 MB								
F4G-SG			<500		mg/kg		500	07-NOV-13
PAH-TMB-H/A-MS-VA	**Soil**							
Batch R2736555								
WG1782141-4 IRM		**ALS PAH1 RM**						
Acenaphthene			67.6		%		60-130	07-NOV-13
Acenaphthylene			118.8		%		60-130	07-NOV-13
Anthracene			94.1		%		60-130	07-NOV-13
Benz(a)anthracene			105.2		%		60-130	07-NOV-13
Benzo(a)pyrene			98.7		%		60-130	07-NOV-13
Benzo(b)fluoranthene			113.5		%		60-130	07-NOV-13
Benzo(g,h,i)perylene			98.3		%		60-130	07-NOV-13
Benzo(k)fluoranthene			103.8		%		60-130	07-NOV-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-VA	**Soil**							
Batch R2736555								
WG1782141-4 IRM		**ALS PAH1 RM**						
Chrysene			109.5		%		60-130	07-NOV-13
Dibenz(a,h)anthracene			116.2		%		60-130	07-NOV-13
Fluoranthene			111.2		%		60-130	07-NOV-13
Fluorene			71.7		%		60-130	07-NOV-13
Indeno(1,2,3-c,d)pyrene			100.0		%		60-130	07-NOV-13
2-Methylnaphthalene			91.3		%		60-130	07-NOV-13
Naphthalene			87.5		%		50-130	07-NOV-13
Phenanthrene			107.1		%		60-130	07-NOV-13
Pyrene			109.0		%		60-130	07-NOV-13
WG1782141-1 MB								
Acenaphthene			<0.0050		mg/kg		0.005	07-NOV-13
Acenaphthylene			<0.0050		mg/kg		0.005	07-NOV-13
Anthracene			<0.0040		mg/kg		0.004	07-NOV-13
Benz(a)anthracene			<0.010		mg/kg		0.01	07-NOV-13
Benzo(a)pyrene			<0.010		mg/kg		0.01	07-NOV-13
Benzo(b)fluoranthene			<0.010		mg/kg		0.01	07-NOV-13
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	07-NOV-13
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	07-NOV-13
Chrysene			<0.010		mg/kg		0.01	07-NOV-13
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	07-NOV-13
Fluoranthene			<0.010		mg/kg		0.01	07-NOV-13
Fluorene			<0.010		mg/kg		0.01	07-NOV-13
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	07-NOV-13
2-Methylnaphthalene			<0.010		mg/kg		0.01	07-NOV-13
Naphthalene			<0.010		mg/kg		0.01	07-NOV-13
Phenanthrene			<0.010		mg/kg		0.01	07-NOV-13
Pyrene			<0.010		mg/kg		0.01	07-NOV-13
Surrogate: Naphthalene d8			76.9		%		50-130	07-NOV-13
Surrogate: Acenaphthene d10			78.5		%		60-130	07-NOV-13
Surrogate: Phenanthrene d10			75.8		%		60-130	07-NOV-13
Surrogate: Chrysene d12			86.6		%		60-130	07-NOV-13
Batch R2737088								
WG1784467-4 IRM		**ALS PAH1 RM**						
Acenaphthene			79.2		%		60-130	08-NOV-13
Acenaphthylene			118.2		%		60-130	08-NOV-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-VA	**Soil**							
Batch R2737088								
WG1784467-4 IRM		**ALS PAH1 RM**						
Anthracene			99.7		%		60-130	08-NOV-13
Benz(a)anthracene			119.8		%		60-130	08-NOV-13
Benzo(a)pyrene			98.7		%		60-130	08-NOV-13
Benzo(b)fluoranthene			111.0		%		60-130	08-NOV-13
Benzo(g,h,i)perylene			100.1		%		60-130	08-NOV-13
Benzo(k)fluoranthene			107.7		%		60-130	08-NOV-13
Chrysene			121.3		%		60-130	08-NOV-13
Dibenz(a,h)anthracene			113.9		%		60-130	08-NOV-13
Fluoranthene			115.6		%		60-130	08-NOV-13
Fluorene			78.7		%		60-130	08-NOV-13
Indeno(1,2,3-c,d)pyrene			95.9		%		60-130	08-NOV-13
2-Methylnaphthalene			94.3		%		60-130	08-NOV-13
Naphthalene			91.3		%		50-130	08-NOV-13
Phenanthrene			113.8		%		60-130	08-NOV-13
Pyrene			115.6		%		60-130	08-NOV-13
WG1784467-1 MB								
Acenaphthene			<0.0050		mg/kg		0.005	08-NOV-13
Acenaphthylene			<0.0050		mg/kg		0.005	08-NOV-13
Anthracene			<0.0040		mg/kg		0.004	08-NOV-13
Benz(a)anthracene			<0.010		mg/kg		0.01	08-NOV-13
Benzo(a)pyrene			<0.010		mg/kg		0.01	08-NOV-13
Benzo(b)fluoranthene			<0.010		mg/kg		0.01	08-NOV-13
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	08-NOV-13
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	08-NOV-13
Chrysene			<0.010		mg/kg		0.01	08-NOV-13
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	08-NOV-13
Fluoranthene			<0.010		mg/kg		0.01	08-NOV-13
Fluorene			<0.010		mg/kg		0.01	08-NOV-13
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	08-NOV-13
2-Methylnaphthalene			<0.010		mg/kg		0.01	08-NOV-13
Naphthalene			<0.010		mg/kg		0.01	08-NOV-13
Phenanthrene			<0.010		mg/kg		0.01	08-NOV-13
Pyrene			<0.010		mg/kg		0.01	08-NOV-13
Surrogate: Naphthalene d8			93.7		%		50-130	08-NOV-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-VA	**Soil**							
Batch R2737088								
WG1784467-1 MB								
Surrogate: Acenaphthene d10			94.4		%		60-130	08-NOV-13
Surrogate: Phenanthrene d10			95.1		%		60-130	08-NOV-13
Surrogate: Chrysene d12			108.5		%		60-130	08-NOV-13
PH-1:2-VA	**Soil**							
Batch R2734147								
WG1781851-2 DUP		**L1386542-1**						
pH (1:2 soil:water)		8.84	8.95	J	pH	0.11	0.3	05-NOV-13
Batch R2734371								
WG1782023-2 DUP		**L1386542-33**						
pH (1:2 soil:water)		8.25	8.26	J	pH	0.01	0.3	05-NOV-13
PREP-MOISTURE-ED	**Soil**							
Batch R2734339								
WG1782592-3 DUP		**L1386542-20**						
% Moisture		2.73	2.66		%	2.8	20	05-NOV-13
WG1782592-2 LCS								
% Moisture			99.8		%		90-110	05-NOV-13
WG1782592-1 MB								
% Moisture			<0.10		%		0.1	05-NOV-13
PSA-MUST-SK	**Soil**							
Batch R2737012								
WG1782852-2 DUP		**L1386542-20**						
MUST PSA % > 75um		9.87	11.0	J	%	1.16	5	06-NOV-13
VOC7-L-HSMS-VA	**Soil**							
Batch R2731676								
WG1781958-2 LCS								
Benzene			98.6		%		70-130	07-NOV-13
Ethylbenzene			101.9		%		70-130	07-NOV-13
Methyl t-butyl ether (MTBE)			98.8		%		70-130	07-NOV-13
Styrene			100.2		%		70-130	07-NOV-13
Toluene			101.1		%		70-130	07-NOV-13
meta- & para-Xylene			104.4		%		70-130	07-NOV-13
ortho-Xylene			105.8		%		70-130	07-NOV-13
WG1782145-2 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC7-L-HSMS-VA	**Soil**							
Batch R2731676								
WG1782145-2 LCS								
Benzene			94.5		%		70-130	06-NOV-13
Ethylbenzene			102.3		%		70-130	06-NOV-13
Methyl t-butyl ether (MTBE)			94.6		%		70-130	06-NOV-13
Styrene			91.9		%		70-130	06-NOV-13
Toluene			100.9		%		70-130	06-NOV-13
meta- & para-Xylene			104.9		%		70-130	06-NOV-13
ortho-Xylene			102.5		%		70-130	06-NOV-13
WG1782146-2 LCS								
Benzene			98.3		%		70-130	06-NOV-13
Ethylbenzene			104.0		%		70-130	06-NOV-13
Methyl t-butyl ether (MTBE)			96.6		%		70-130	06-NOV-13
Styrene			97.4		%		70-130	06-NOV-13
Toluene			100.7		%		70-130	06-NOV-13
meta- & para-Xylene			106.0		%		70-130	06-NOV-13
ortho-Xylene			103.9		%		70-130	06-NOV-13
WG1782147-2 LCS								
Benzene			96.8		%		70-130	08-NOV-13
Ethylbenzene			103.4		%		70-130	08-NOV-13
Methyl t-butyl ether (MTBE)			96.9		%		70-130	08-NOV-13
Styrene			101.0		%		70-130	08-NOV-13
Toluene			100.3		%		70-130	08-NOV-13
meta- & para-Xylene			104.5		%		70-130	08-NOV-13
ortho-Xylene			106.5		%		70-130	08-NOV-13
WG1781958-1 MB								
Benzene			<0.0050		mg/kg		0.005	07-NOV-13
Ethylbenzene			<0.015		mg/kg		0.015	07-NOV-13
Methyl t-butyl ether (MTBE)			<0.20		mg/kg		0.2	07-NOV-13
Styrene			<0.050		mg/kg		0.05	07-NOV-13
Toluene			<0.050		mg/kg		0.05	07-NOV-13
meta- & para-Xylene			<0.050		mg/kg		0.05	07-NOV-13
ortho-Xylene			<0.050		mg/kg		0.05	07-NOV-13
WG1782145-1 MB								
Benzene			<0.0050		mg/kg		0.005	06-NOV-13
Ethylbenzene			<0.015		mg/kg		0.015	06-NOV-13
Methyl t-butyl ether (MTBE)			<0.20		mg/kg		0.2	06-NOV-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC7-L-HSMS-VA	**Soil**							
Batch R2731676								
WG1782145-1 MB								
Styrene			<0.050		mg/kg		0.05	06-NOV-13
Toluene			<0.050		mg/kg		0.05	06-NOV-13
meta- & para-Xylene			<0.050		mg/kg		0.05	06-NOV-13
ortho-Xylene			<0.050		mg/kg		0.05	06-NOV-13
WG1782146-1 MB								
Benzene			<0.0050		mg/kg		0.005	06-NOV-13
Ethylbenzene			<0.015		mg/kg		0.015	06-NOV-13
Methyl t-butyl ether (MTBE)			<0.20		mg/kg		0.2	06-NOV-13
Styrene			<0.050		mg/kg		0.05	06-NOV-13
Toluene			<0.050		mg/kg		0.05	06-NOV-13
meta- & para-Xylene			<0.050		mg/kg		0.05	06-NOV-13
ortho-Xylene			<0.050		mg/kg		0.05	06-NOV-13
WG1782147-1 MB								
Benzene			<0.0050		mg/kg		0.005	08-NOV-13
Ethylbenzene			<0.015		mg/kg		0.015	08-NOV-13
Methyl t-butyl ether (MTBE)			<0.20		mg/kg		0.2	08-NOV-13
Styrene			<0.050		mg/kg		0.05	08-NOV-13
Toluene			<0.050		mg/kg		0.05	08-NOV-13
meta- & para-Xylene			<0.050		mg/kg		0.05	08-NOV-13
ortho-Xylene			<0.050		mg/kg		0.05	08-NOV-13
Batch R2734175								
WG1781958-3 DUP		**L1386542-20**						
Benzene		<0.0050	<0.0050	RPD-NA	mg/kg	N/A	40	06-NOV-13
Ethylbenzene		<0.015	<0.015	RPD-NA	mg/kg	N/A	40	06-NOV-13
Methyl t-butyl ether (MTBE)		<0.20	<0.20	RPD-NA	mg/kg	N/A	40	06-NOV-13
Styrene		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	06-NOV-13
Toluene		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	06-NOV-13
meta- & para-Xylene		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	06-NOV-13
ortho-Xylene		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	06-NOV-13
WG1781954-2 LCS								
Benzene			98.4		%		70-130	08-NOV-13
Ethylbenzene			89.4		%		70-130	08-NOV-13
Methyl t-butyl ether (MTBE)			98.8		%		70-130	08-NOV-13
Styrene			95.7		%		70-130	08-NOV-13
Toluene			95.5		%		70-130	08-NOV-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC7-L-HSMS-VA	**Soil**							
Batch R2734175								
WG1781954-2 LCS								
meta- & para-Xylene			89.8		%		70-130	08-NOV-13
ortho-Xylene			95.8		%		70-130	08-NOV-13
WG1781954-1 MB								
Benzene			<0.0050		mg/kg		0.005	08-NOV-13
Ethylbenzene			<0.015		mg/kg		0.015	08-NOV-13
Methyl t-butyl ether (MTBE)			<0.20		mg/kg		0.2	08-NOV-13
Styrene			<0.050		mg/kg		0.05	08-NOV-13
Toluene			<0.050		mg/kg		0.05	08-NOV-13
meta- & para-Xylene			<0.050		mg/kg		0.05	08-NOV-13
ortho-Xylene			<0.050		mg/kg		0.05	08-NOV-13
Batch R2734545								
WG1782146-3 DUP		**L1386542-31**						
Benzene		<0.0050	<0.0050	RPD-NA	mg/kg	N/A	40	07-NOV-13
Ethylbenzene		<0.015	<0.015	RPD-NA	mg/kg	N/A	40	07-NOV-13
Methyl t-butyl ether (MTBE)		<0.20	<0.20	RPD-NA	mg/kg	N/A	40	07-NOV-13
Styrene		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	07-NOV-13
Toluene		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	07-NOV-13
meta- & para-Xylene		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	07-NOV-13
ortho-Xylene		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	07-NOV-13

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Metals							
Mercury in Soil by CVAFS							
	40	30-OCT-13	29-NOV-13 00:07	28	30	days	EHT

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1386542 were received on 01-NOV-13 09:20.

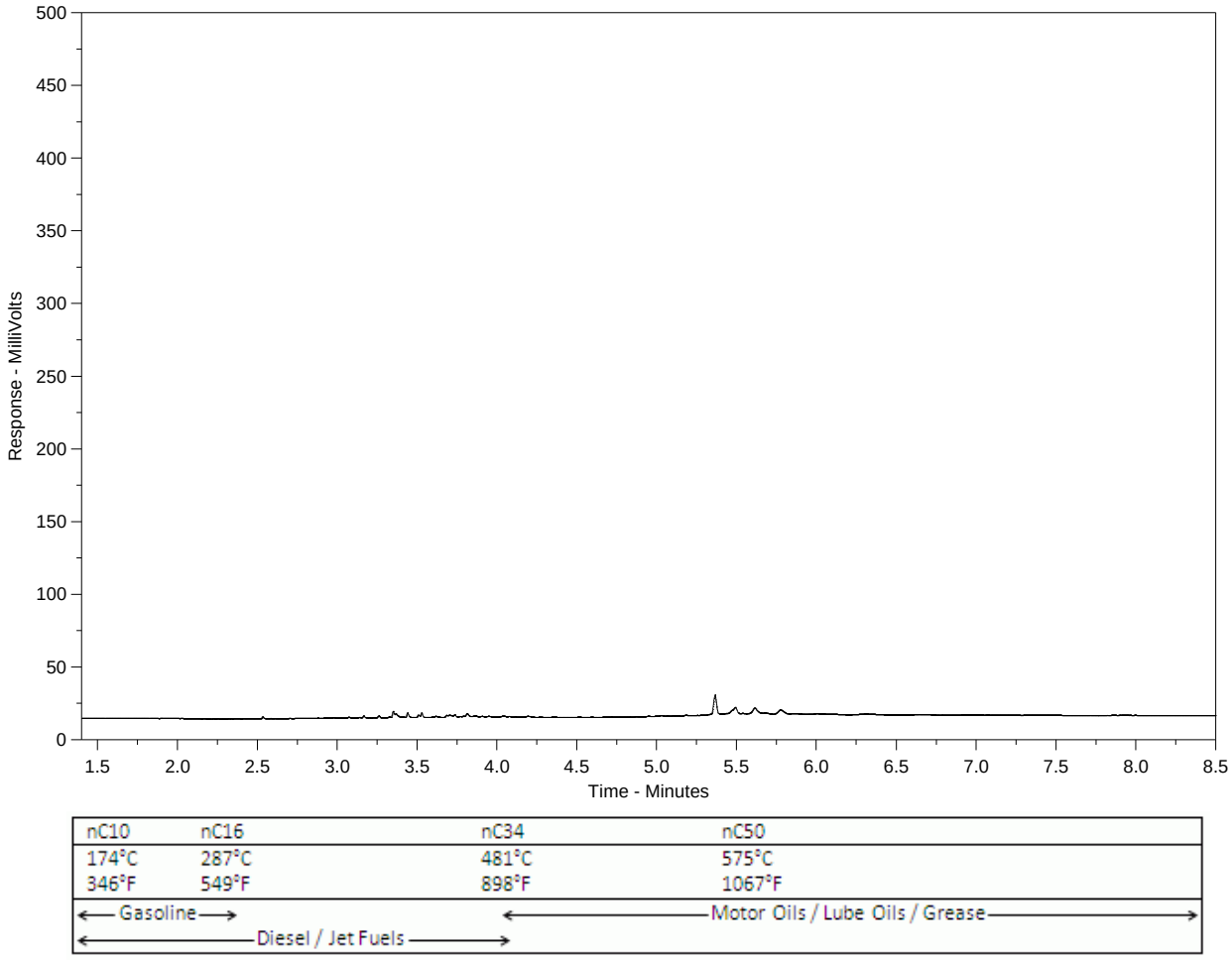
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-1
Client Sample ID: TP1-1



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

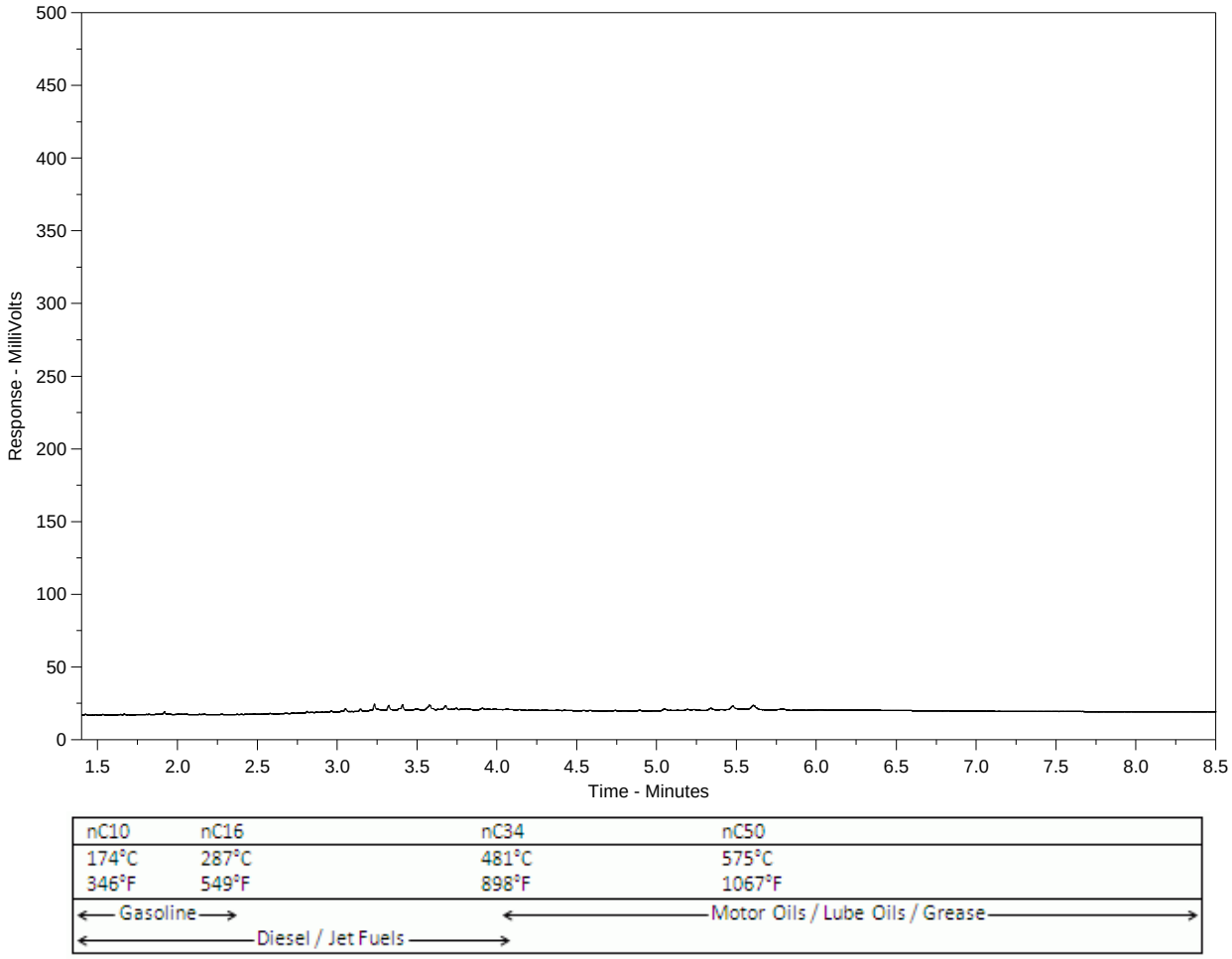
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-2
Client Sample ID: TP1-2



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

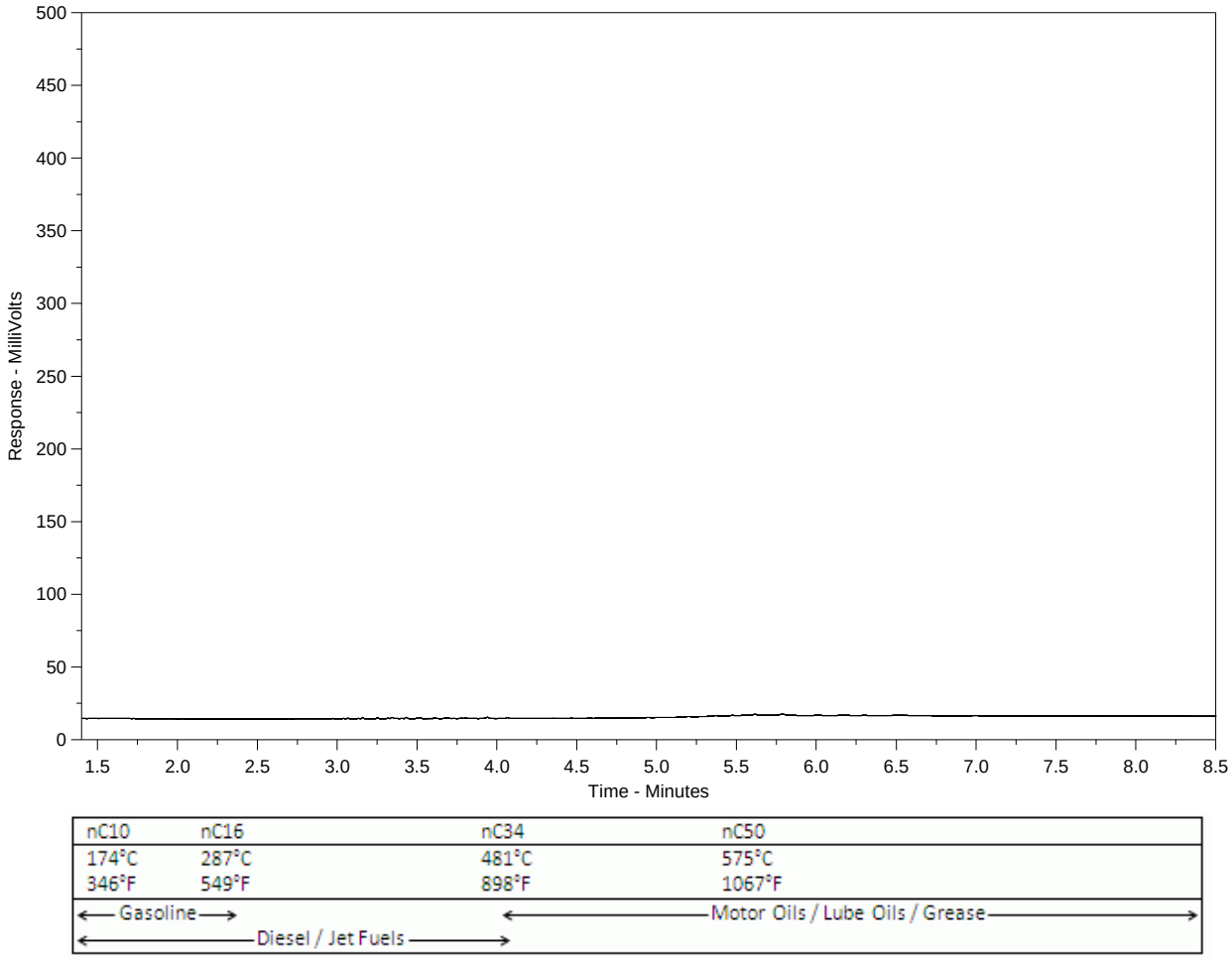
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-4
Client Sample ID: TP1-4



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

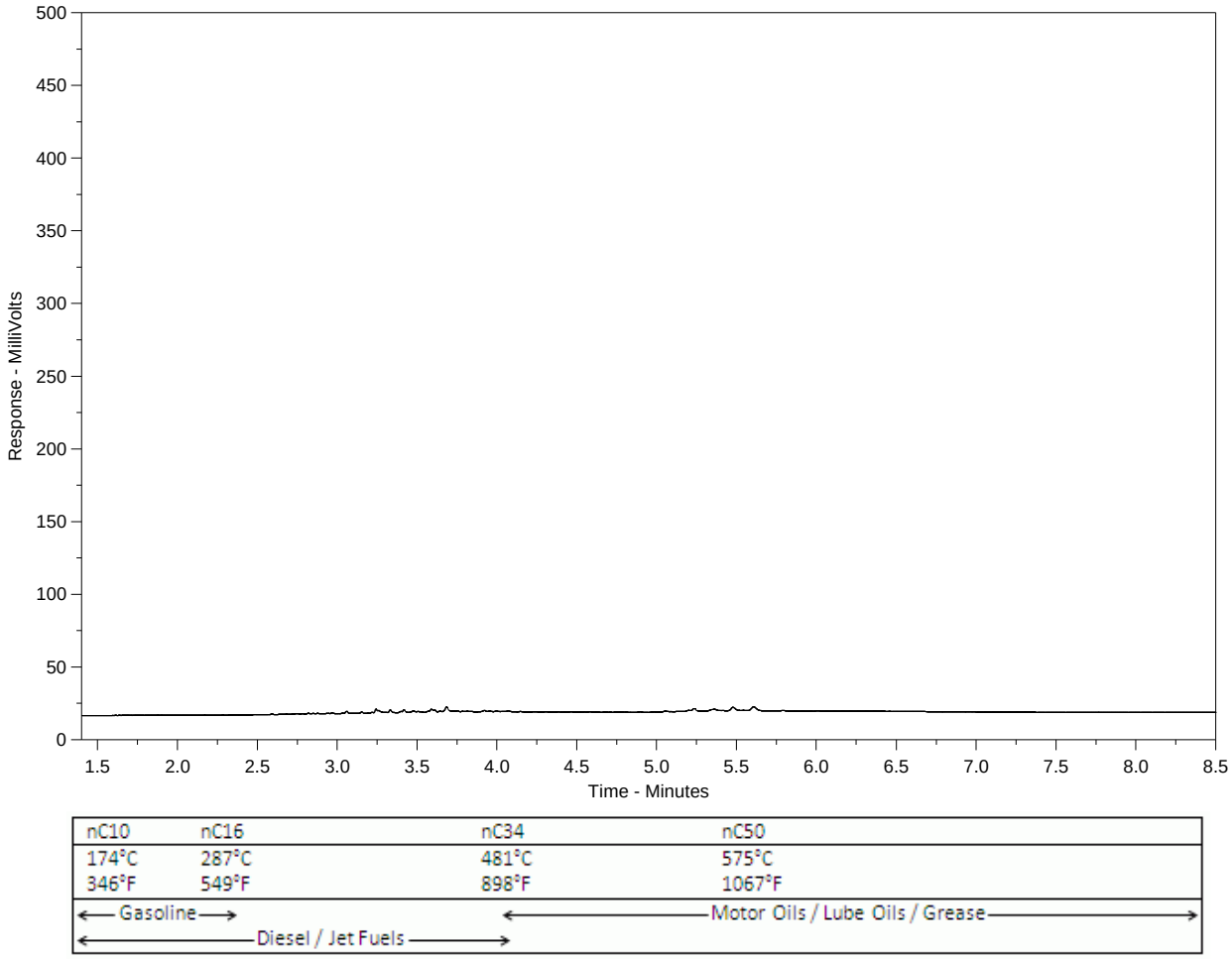
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-5
Client Sample ID: TP2-1



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

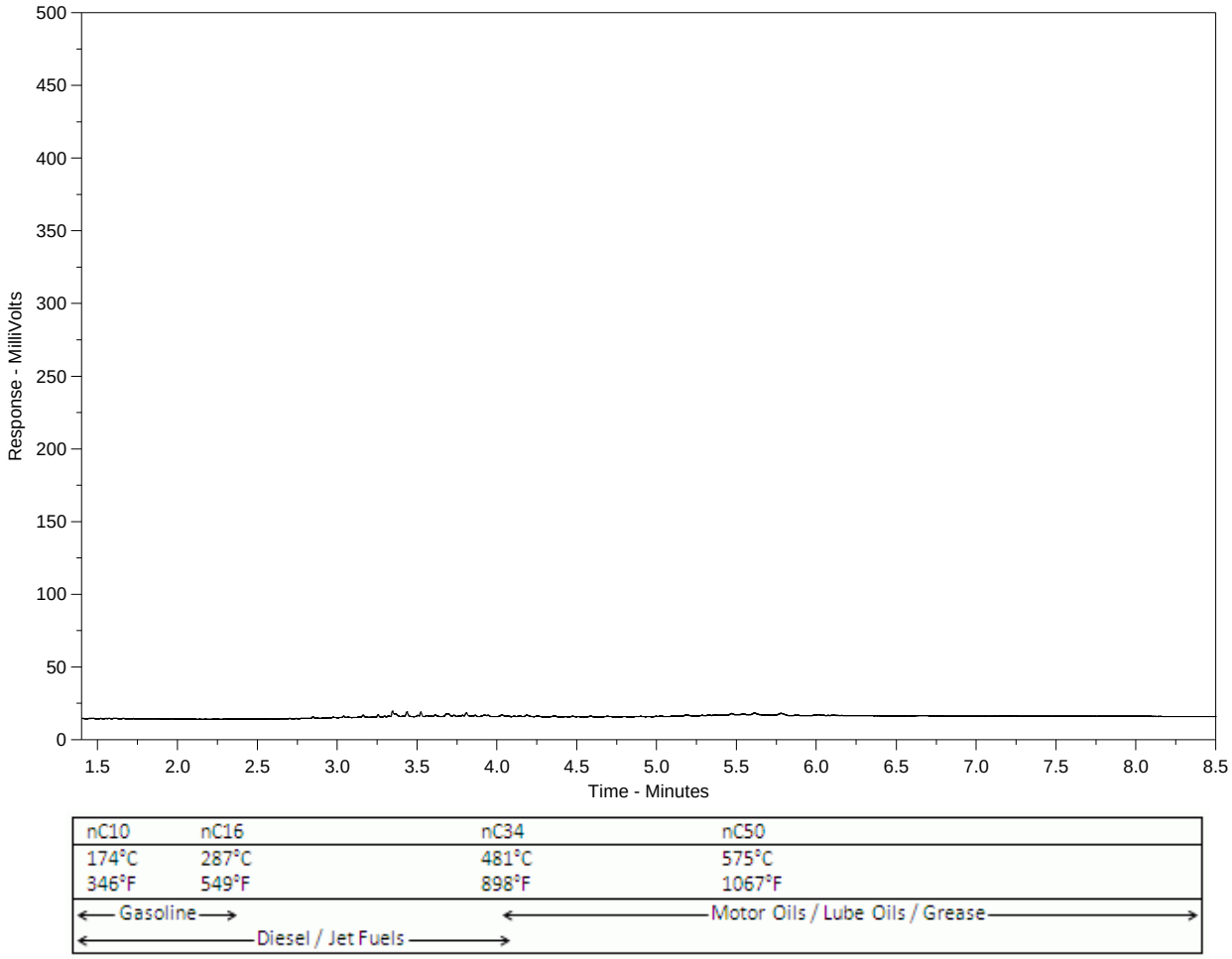
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-6
Client Sample ID: TP2-2



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

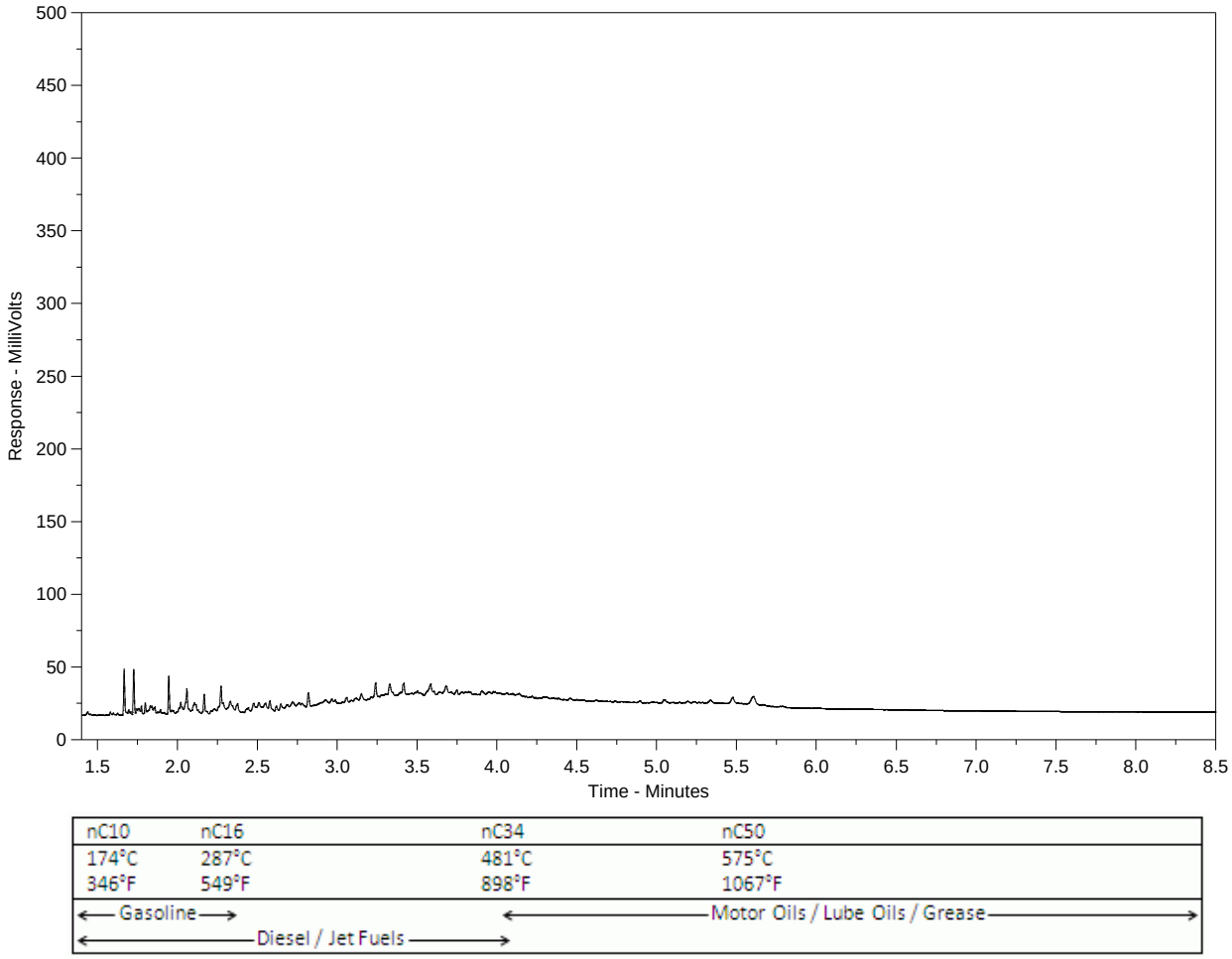
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-7
Client Sample ID: TP2-3



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

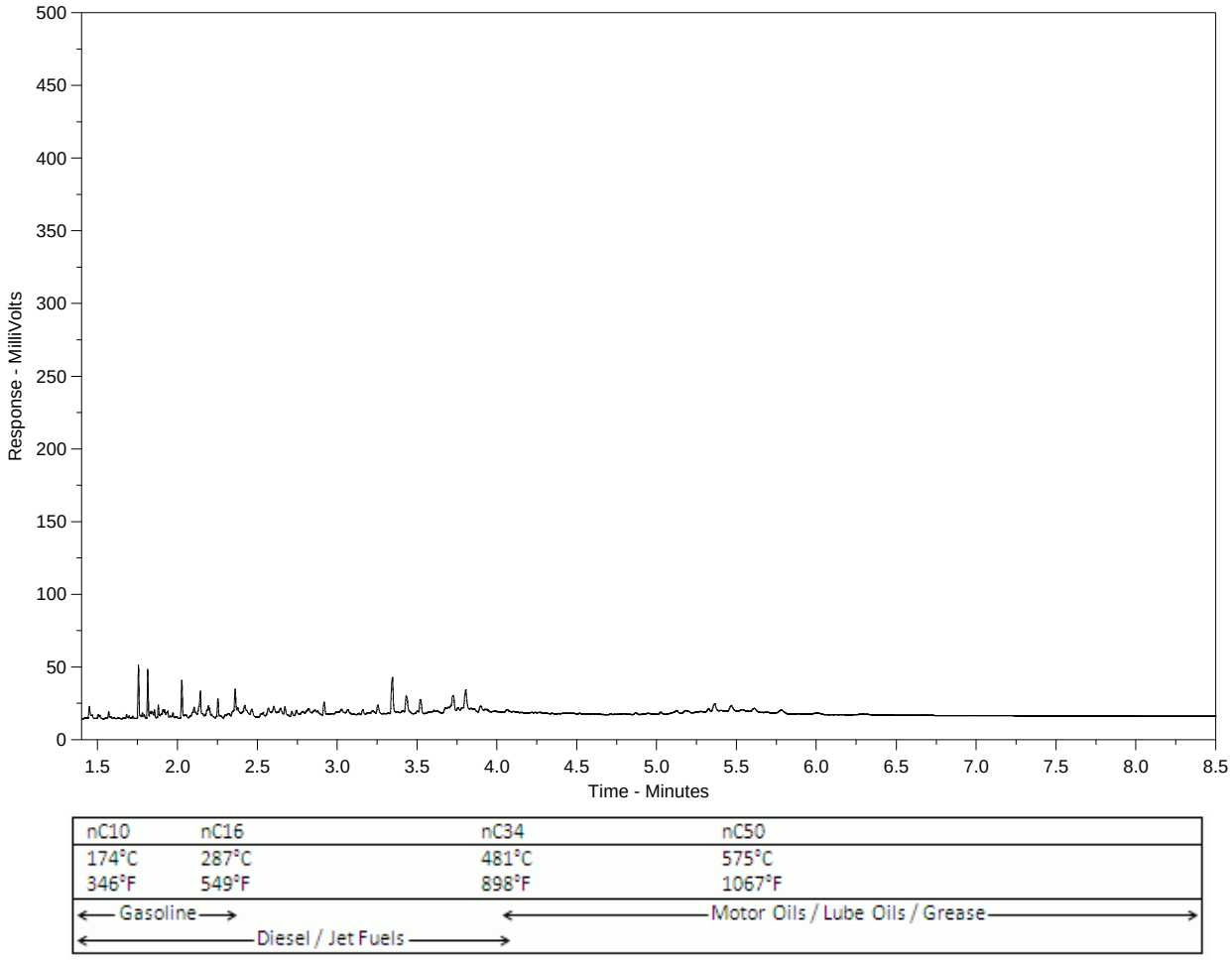
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-8
Client Sample ID: TP2-4



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

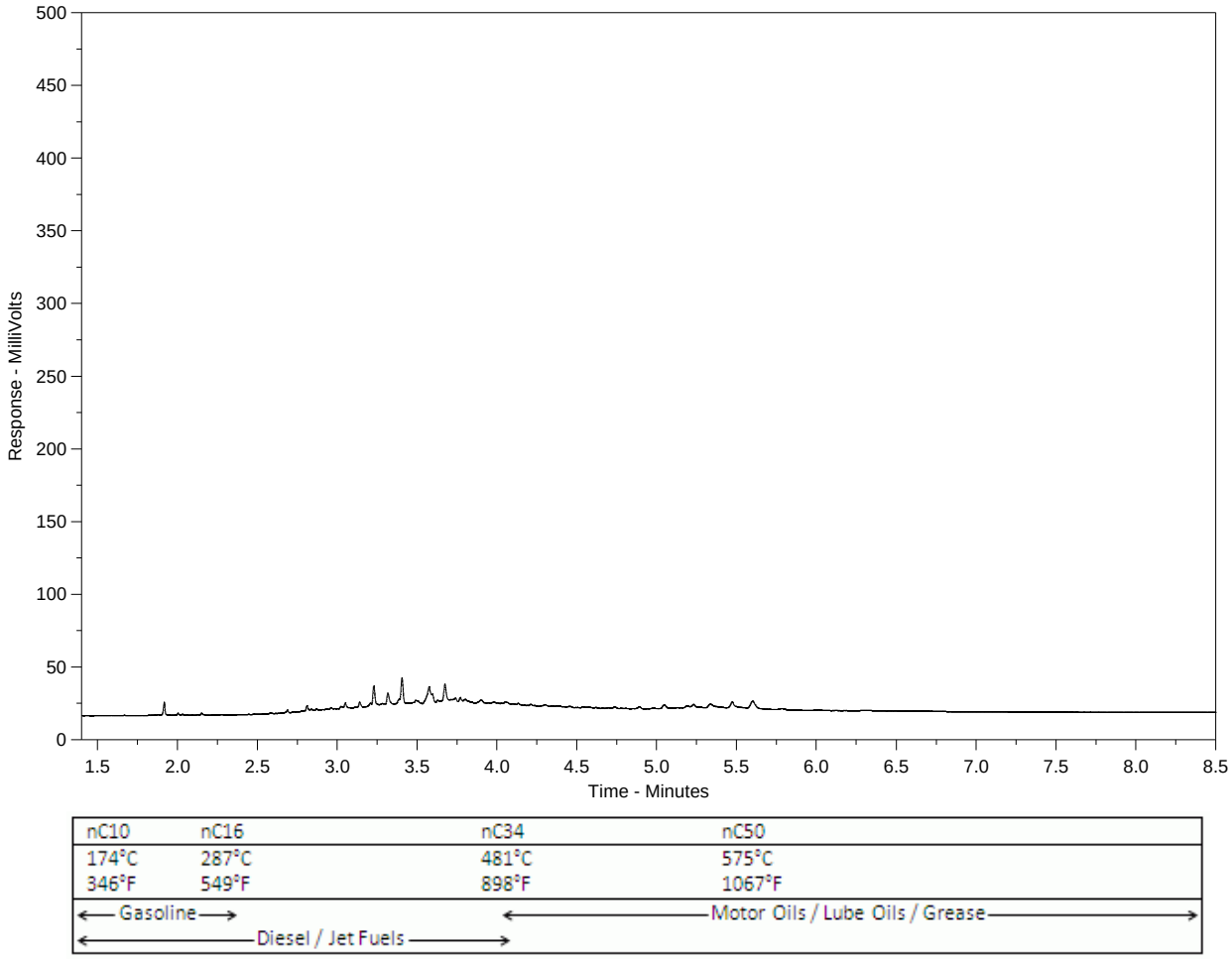
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-9
Client Sample ID: TP2-5



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

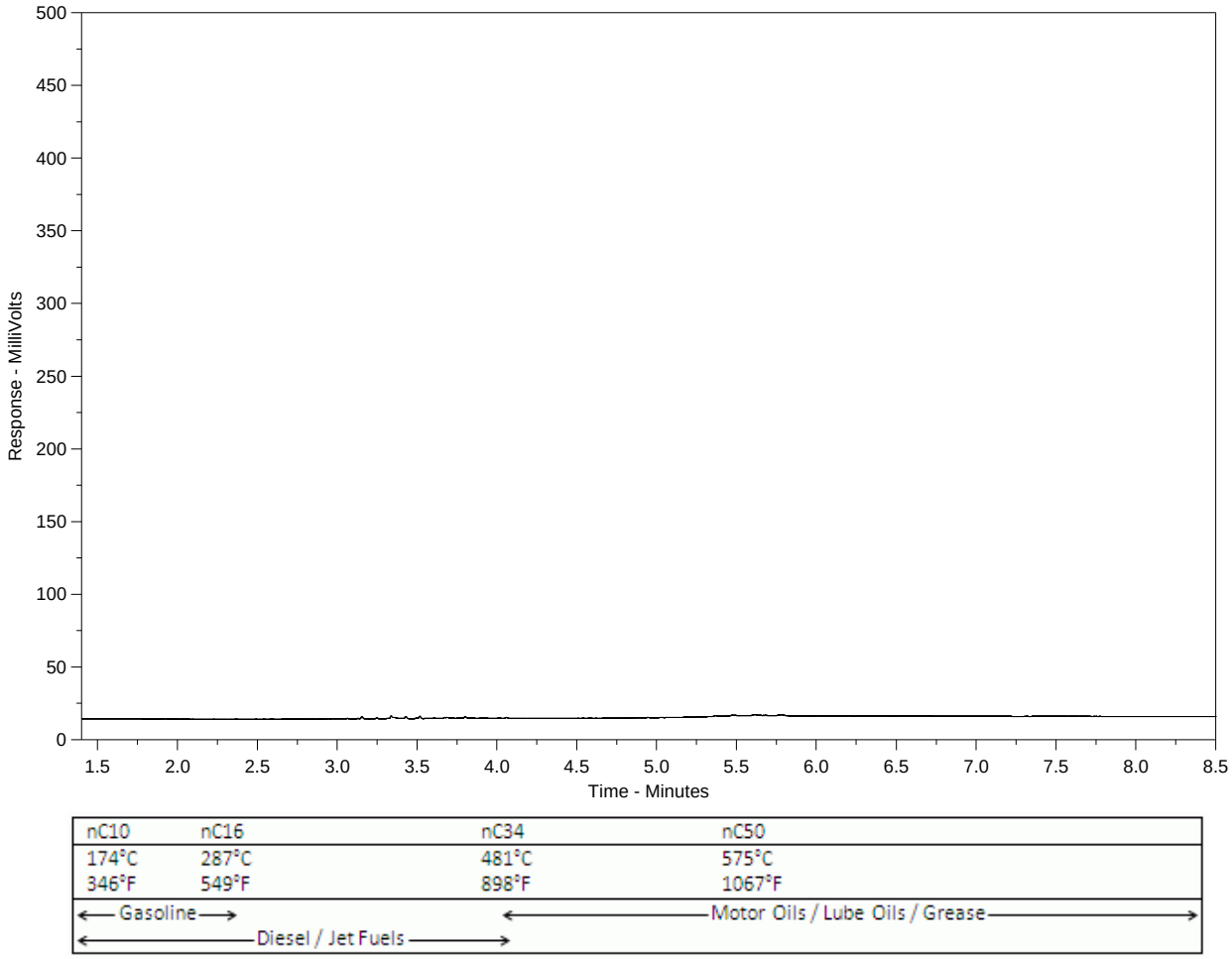
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-10
Client Sample ID: TP3-1



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

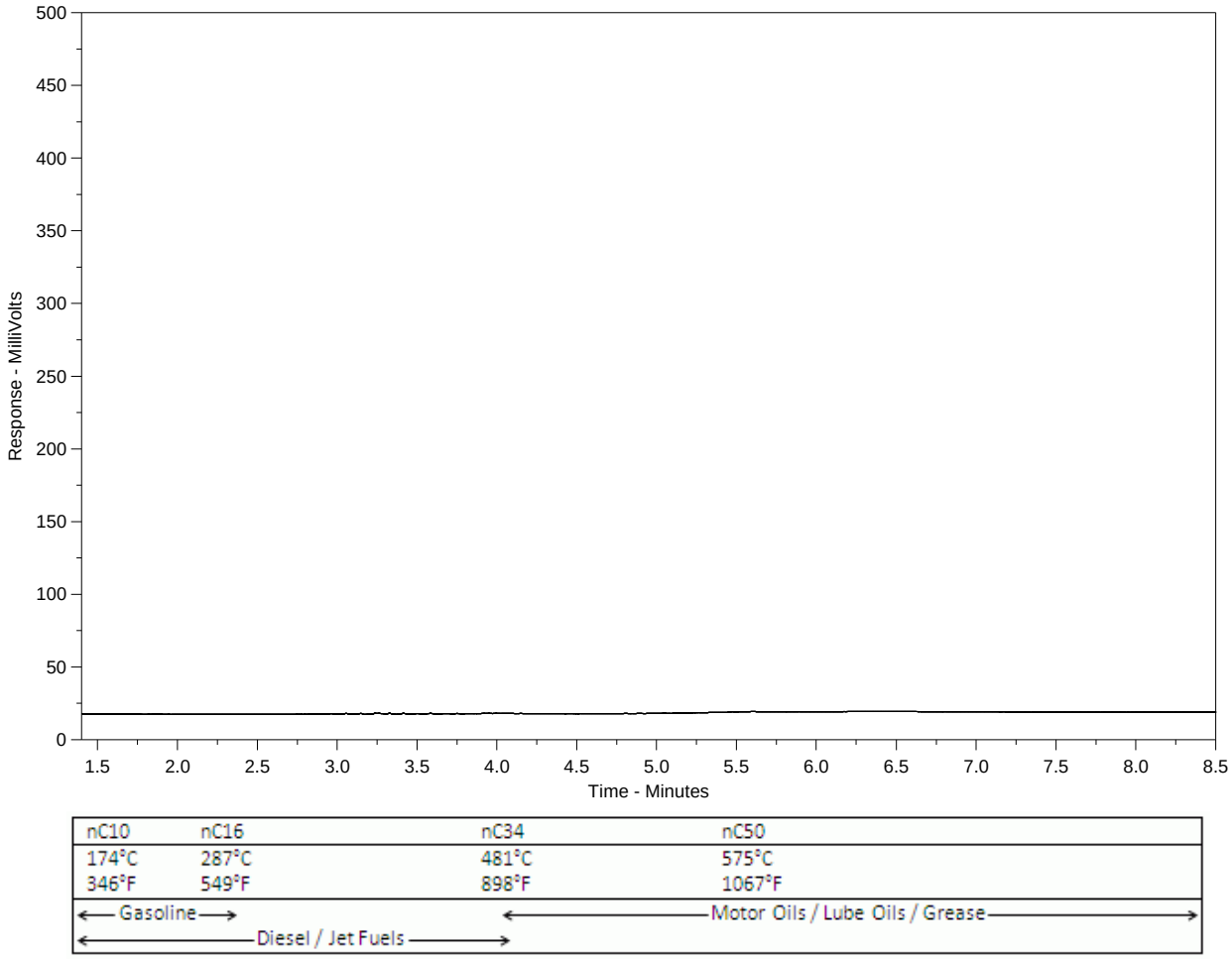
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: WG1781968-C-8#L1386542-C-10
Client Sample ID: TP3-1



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

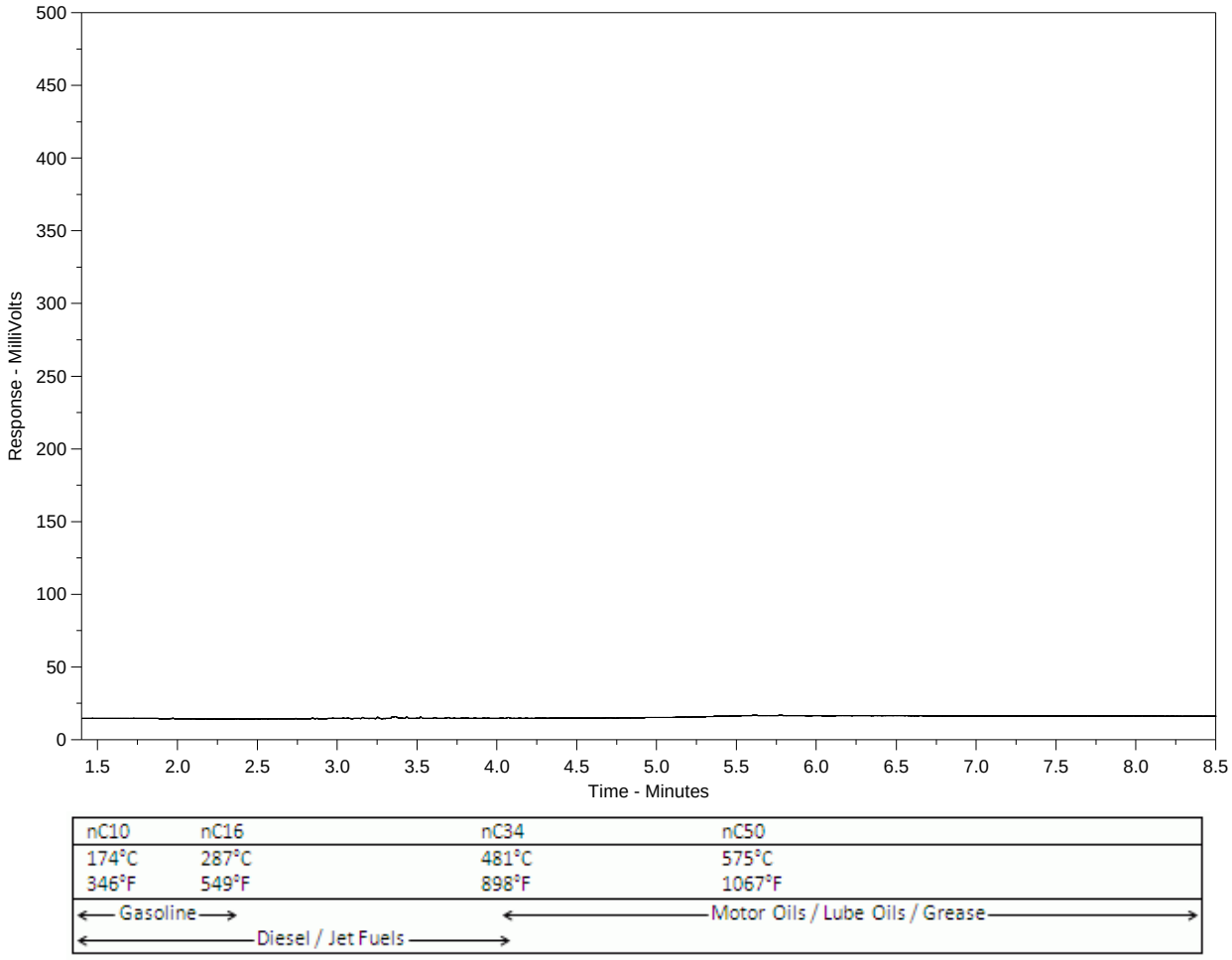
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-11
Client Sample ID: TP3-2



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

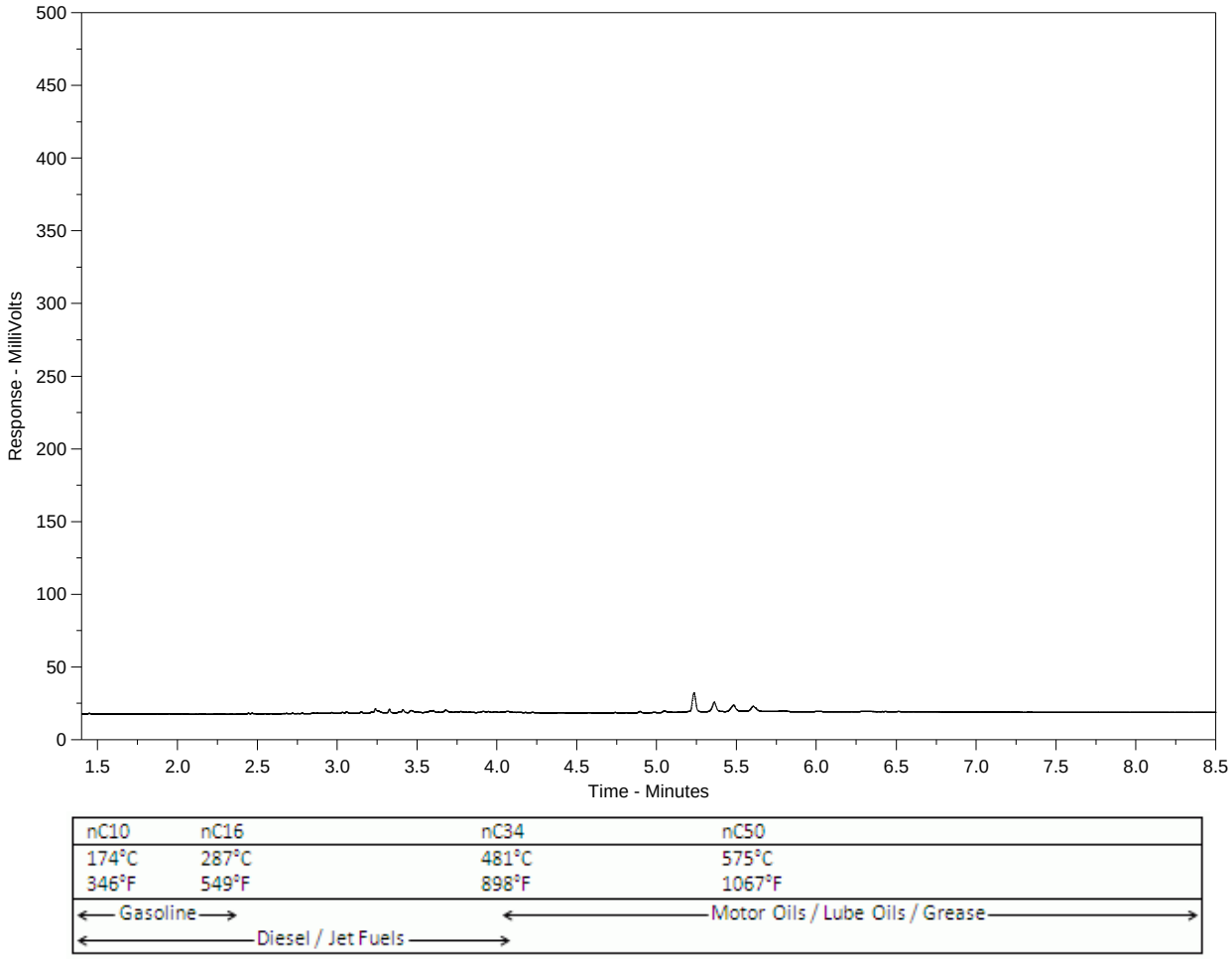
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-12
Client Sample ID: TP4-1



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

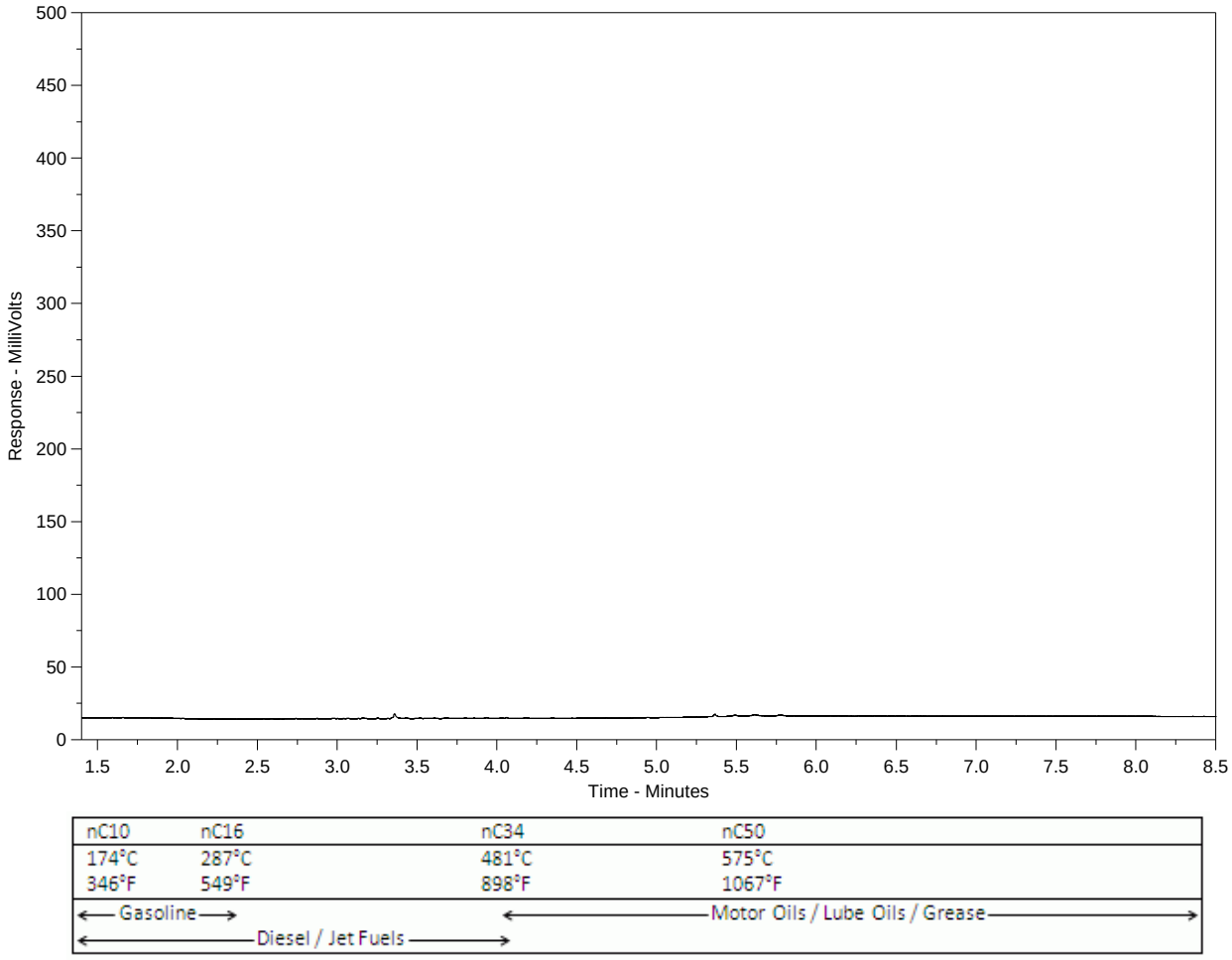
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-13
Client Sample ID: TP5-1



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

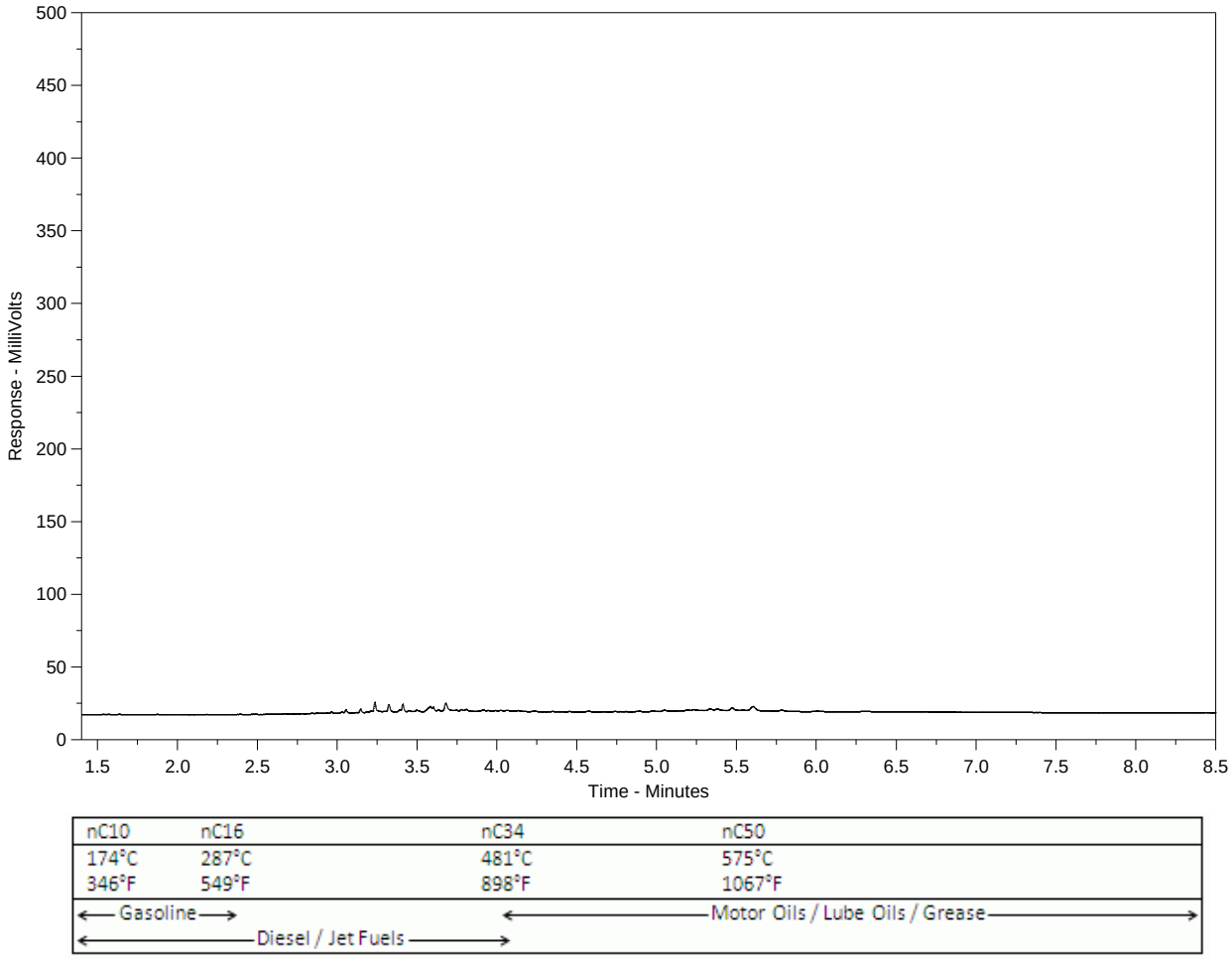
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-14
Client Sample ID: TP6-1



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

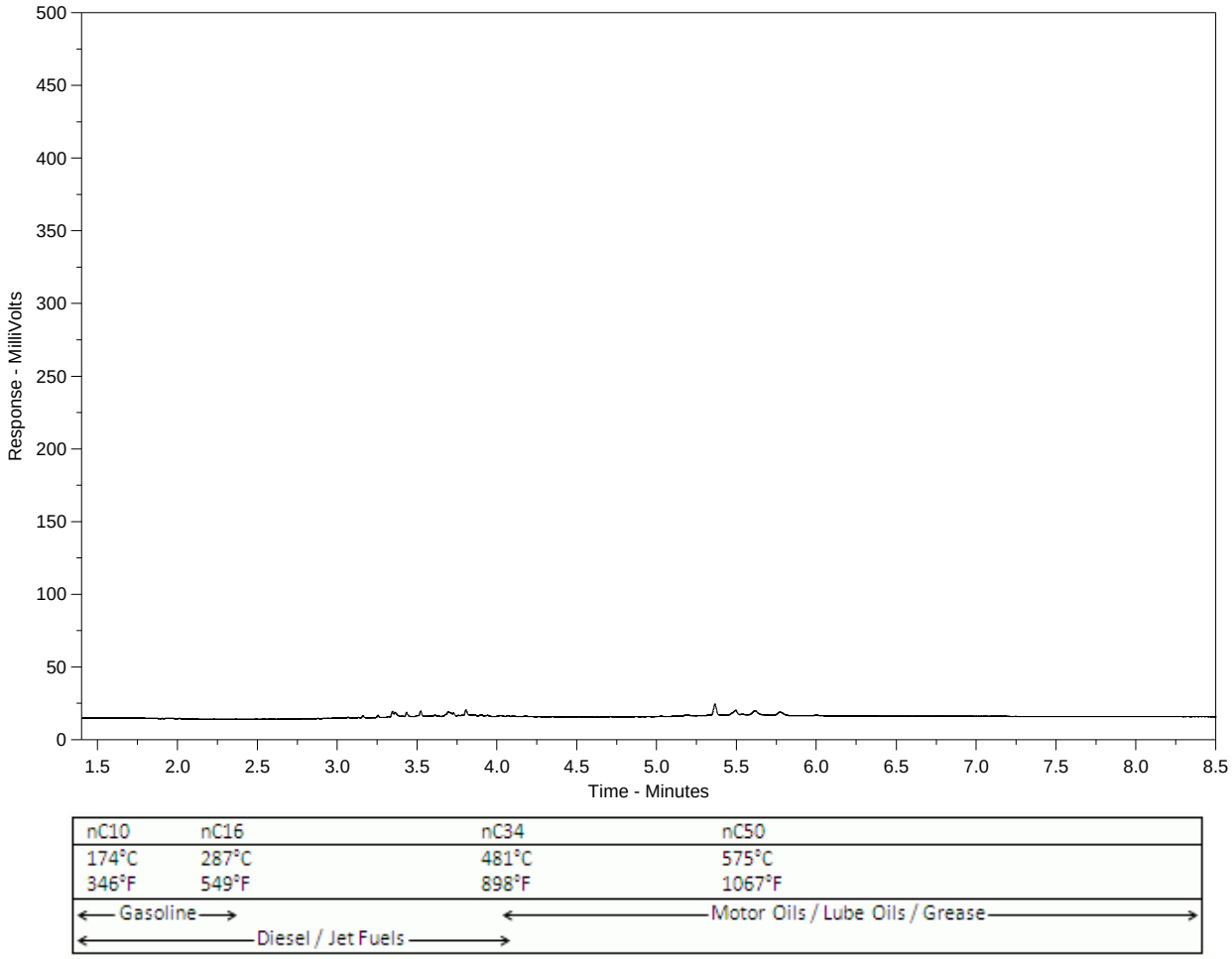
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-15
Client Sample ID: TP7-1



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

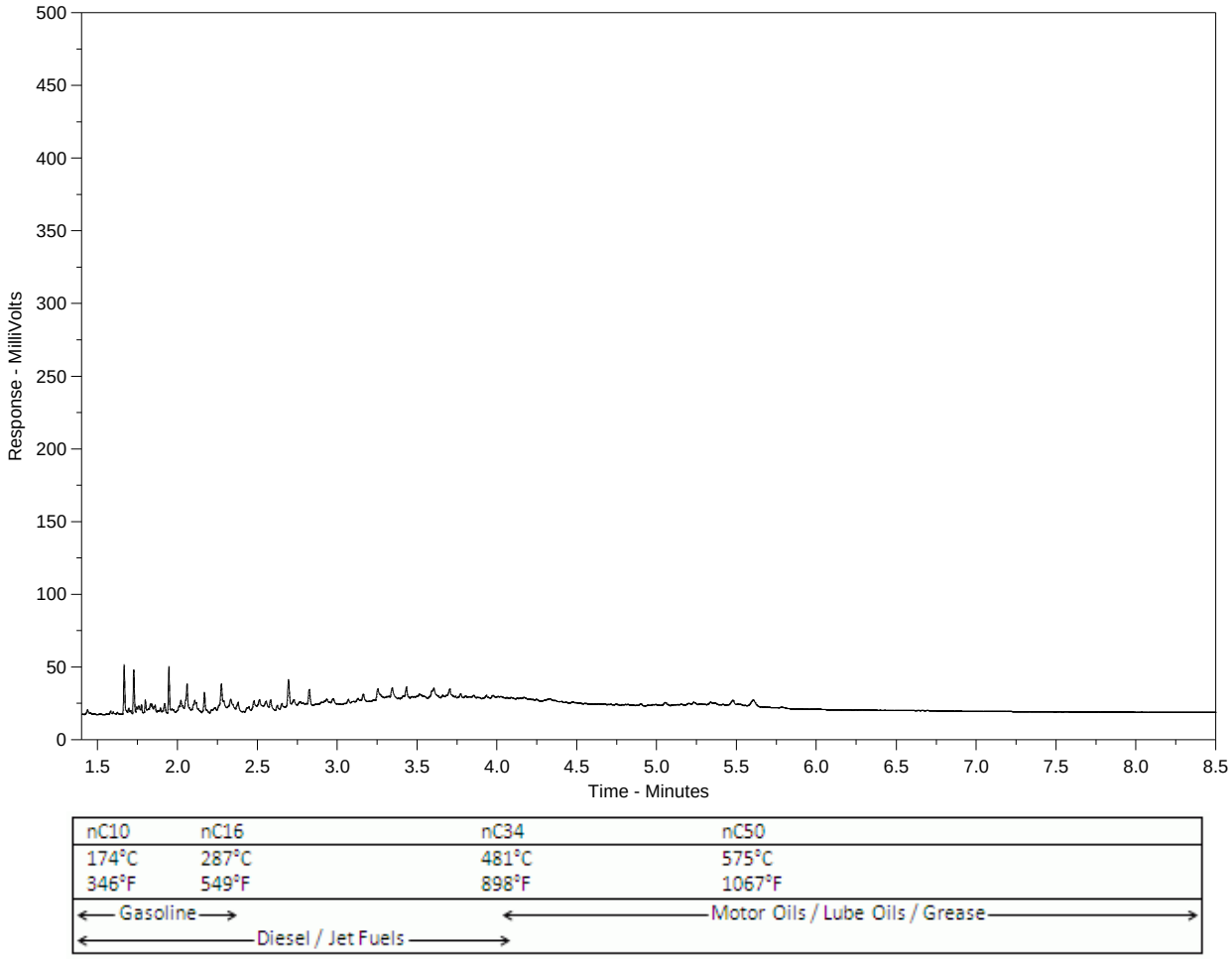
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-16
Client Sample ID: TP7-2



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

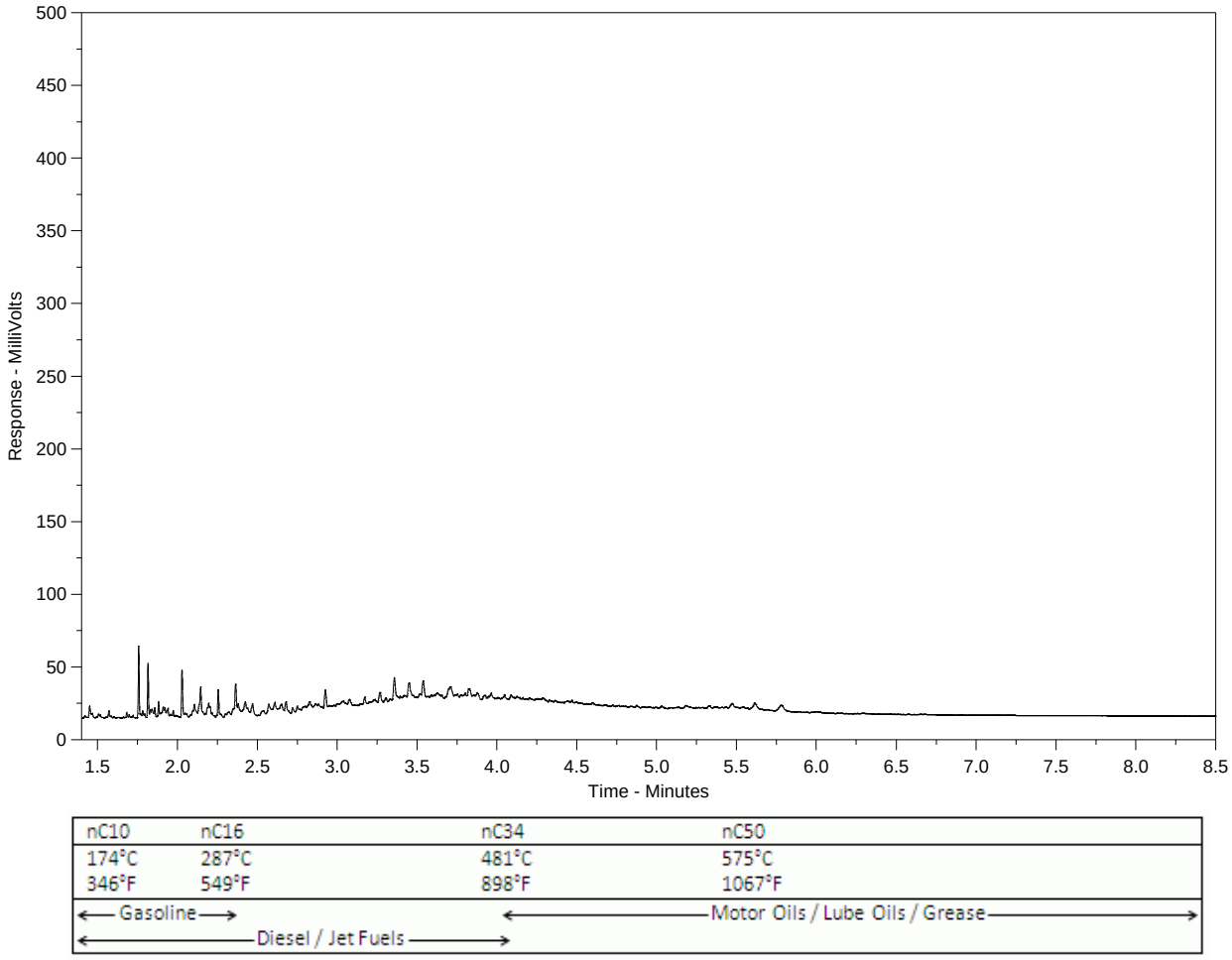
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-17
Client Sample ID: TP7-3



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

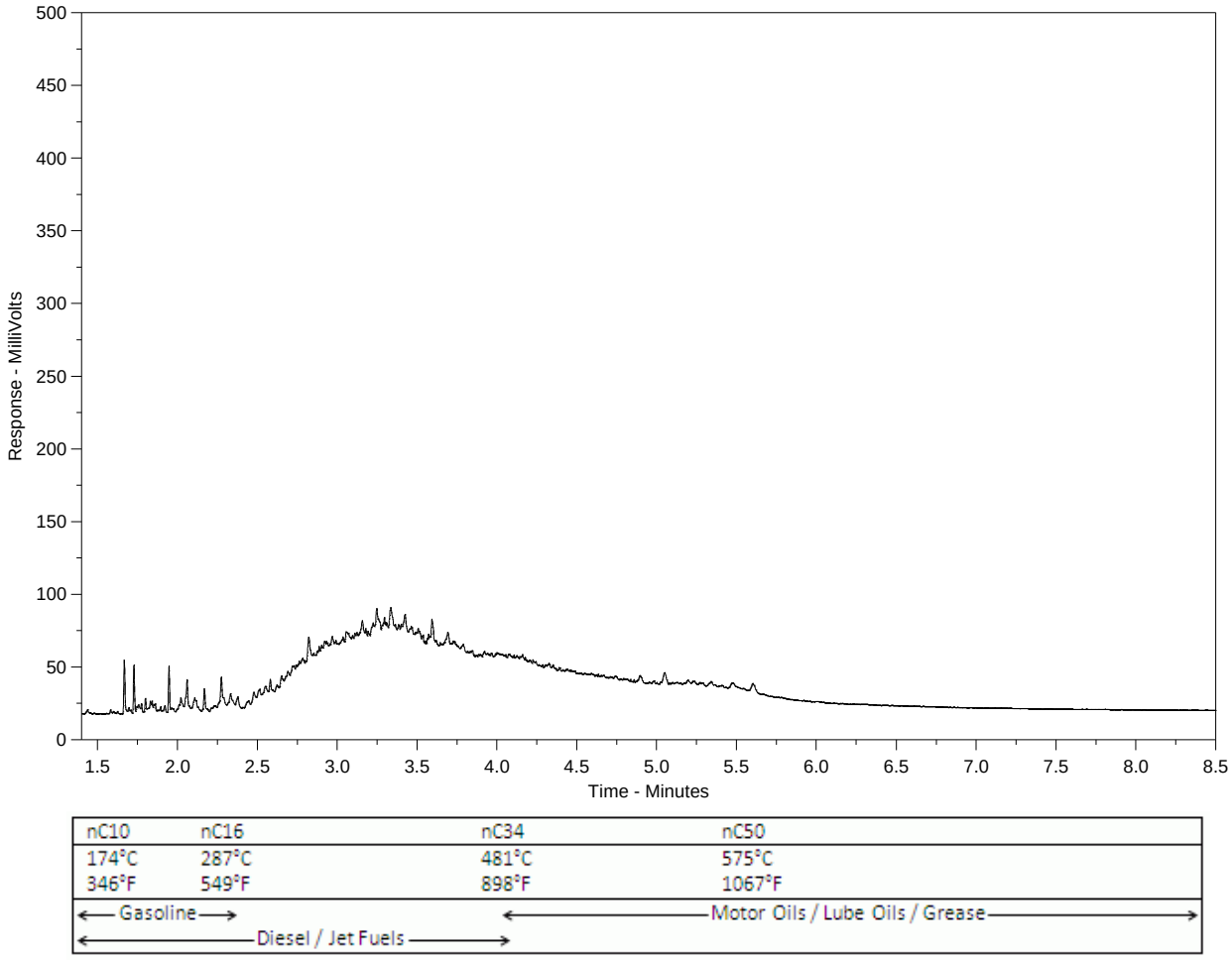
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-18
Client Sample ID: TP7-4



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

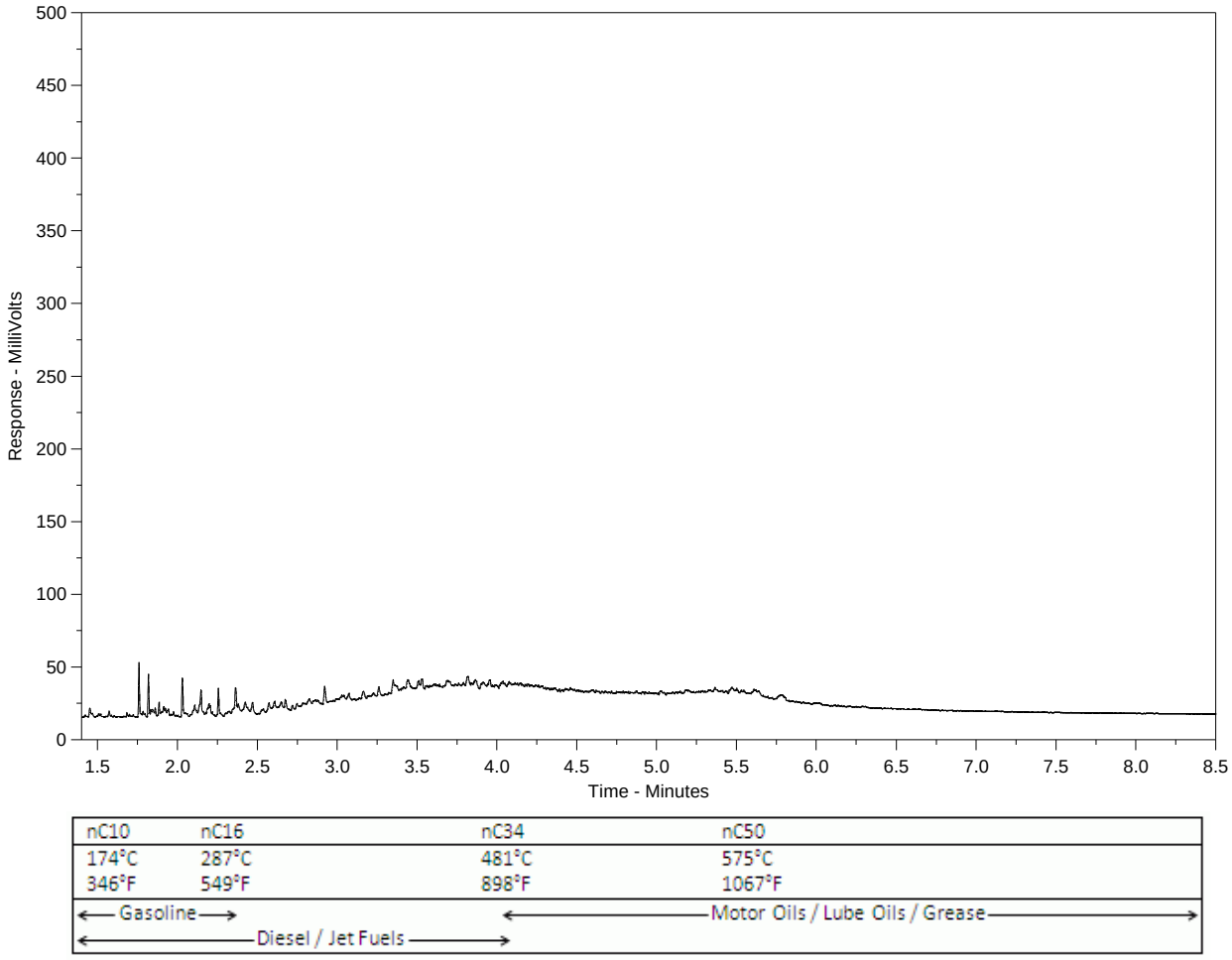
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-19
Client Sample ID: TP7-5



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

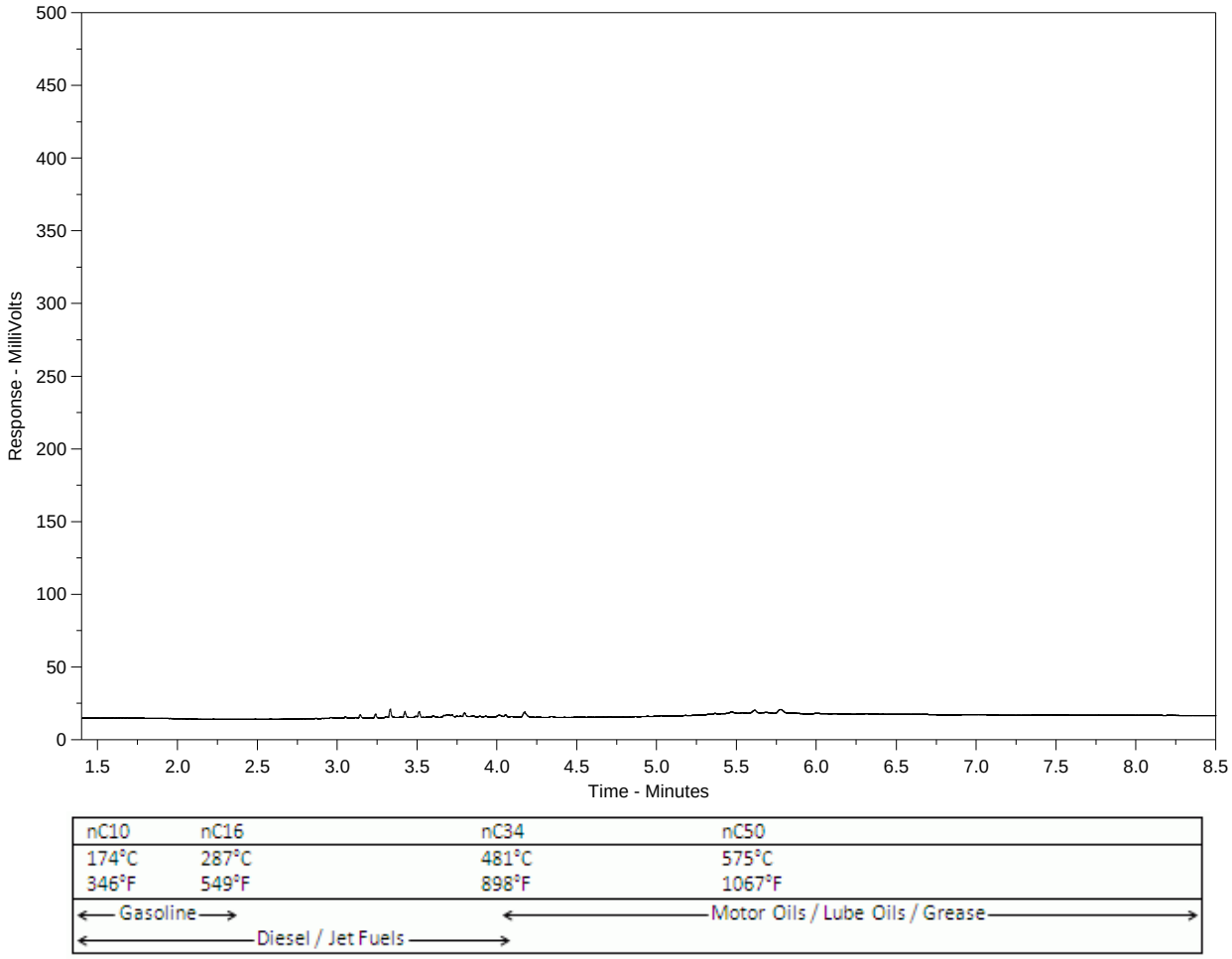
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-20
Client Sample ID: TP8-1



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

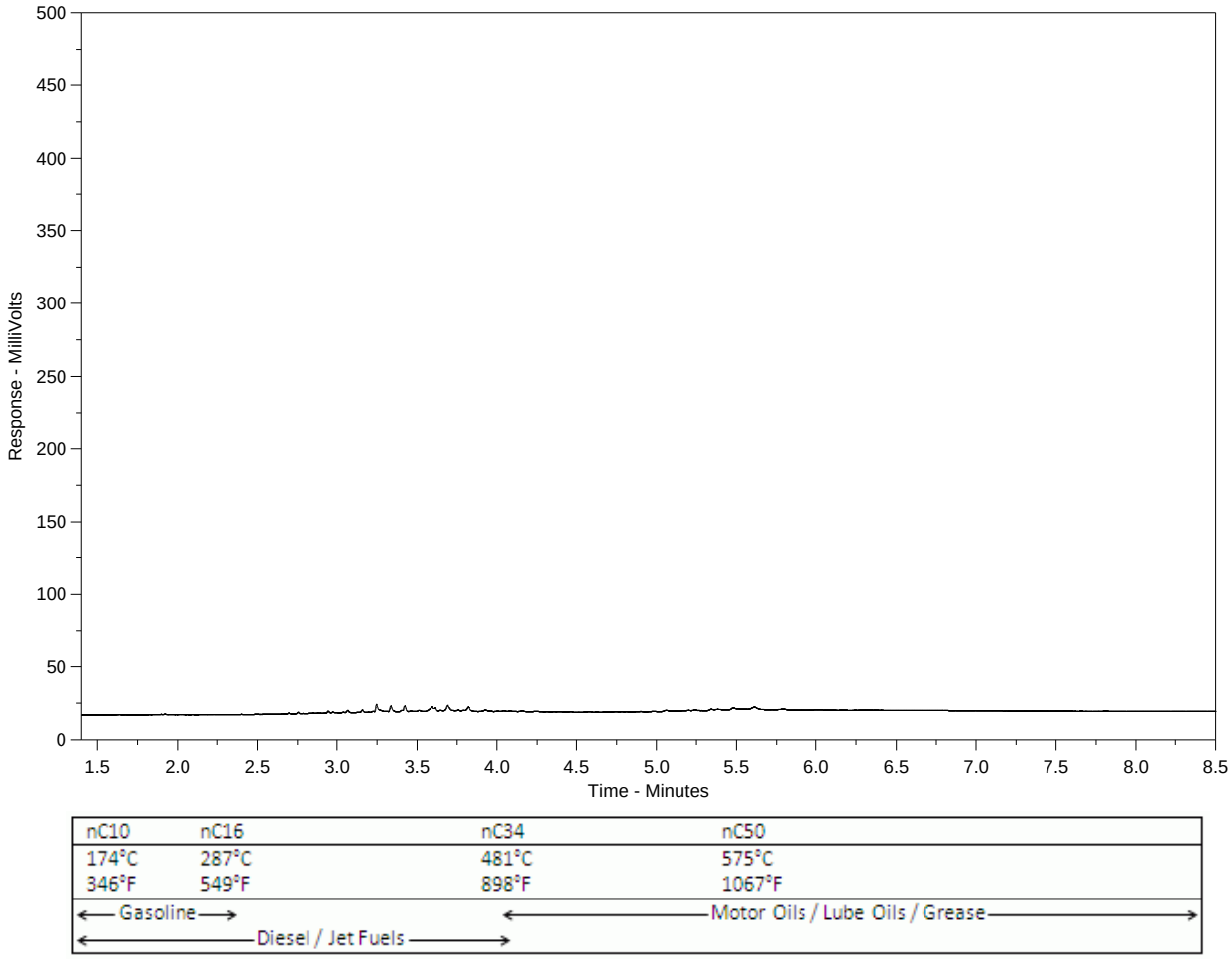
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-21
Client Sample ID: TP8-2



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

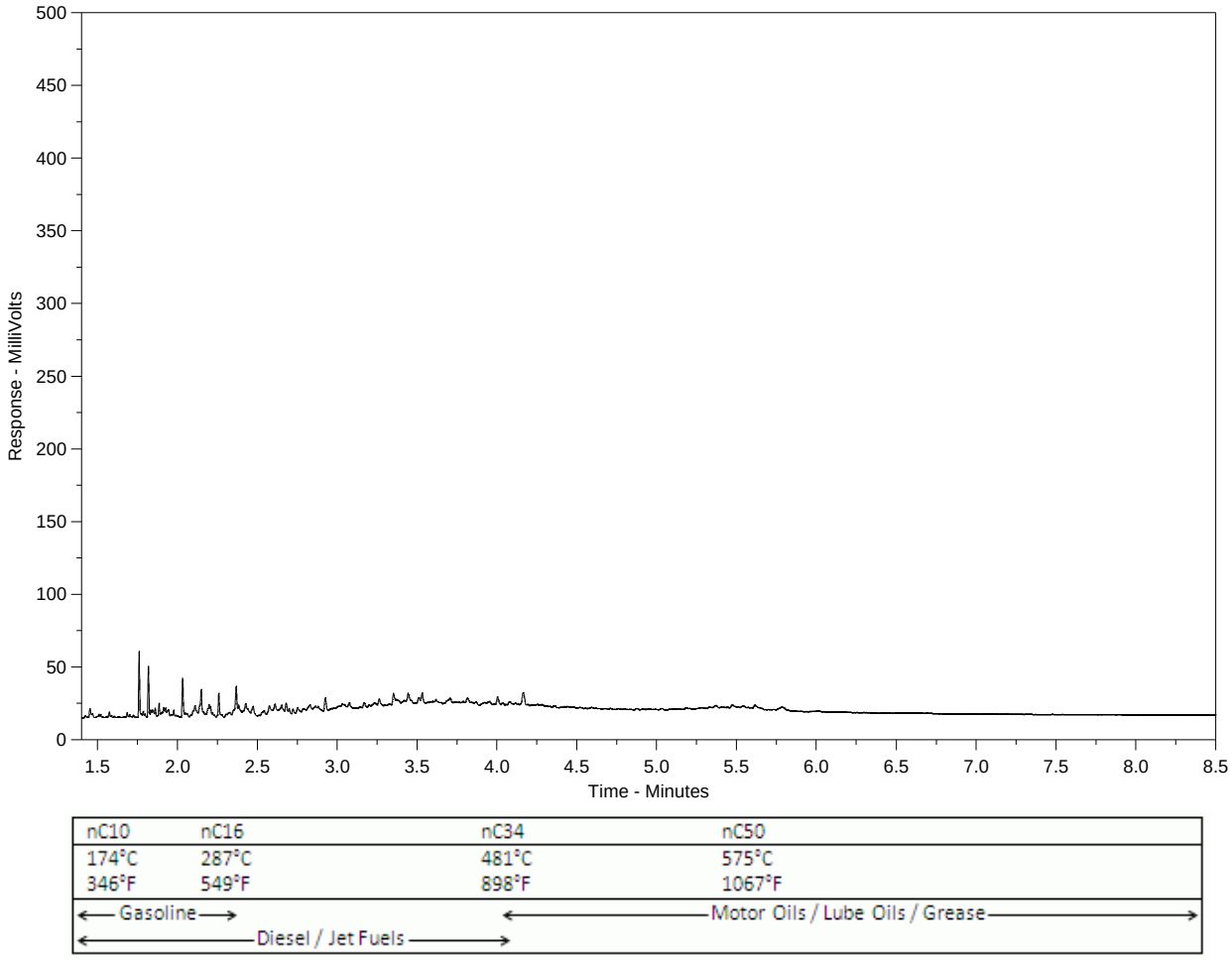
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-22
Client Sample ID: TP8-3



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

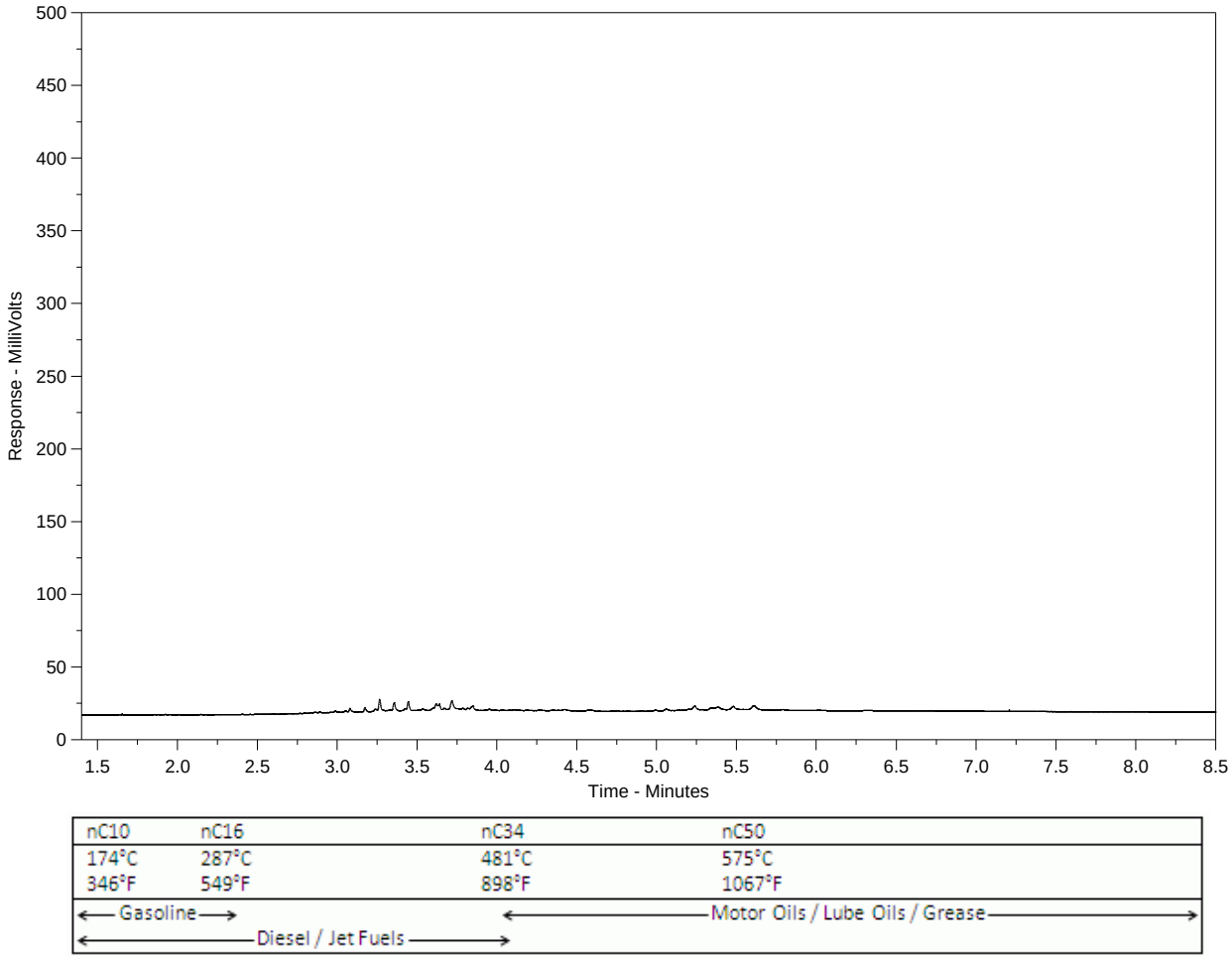
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-23
Client Sample ID: TP8-4



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

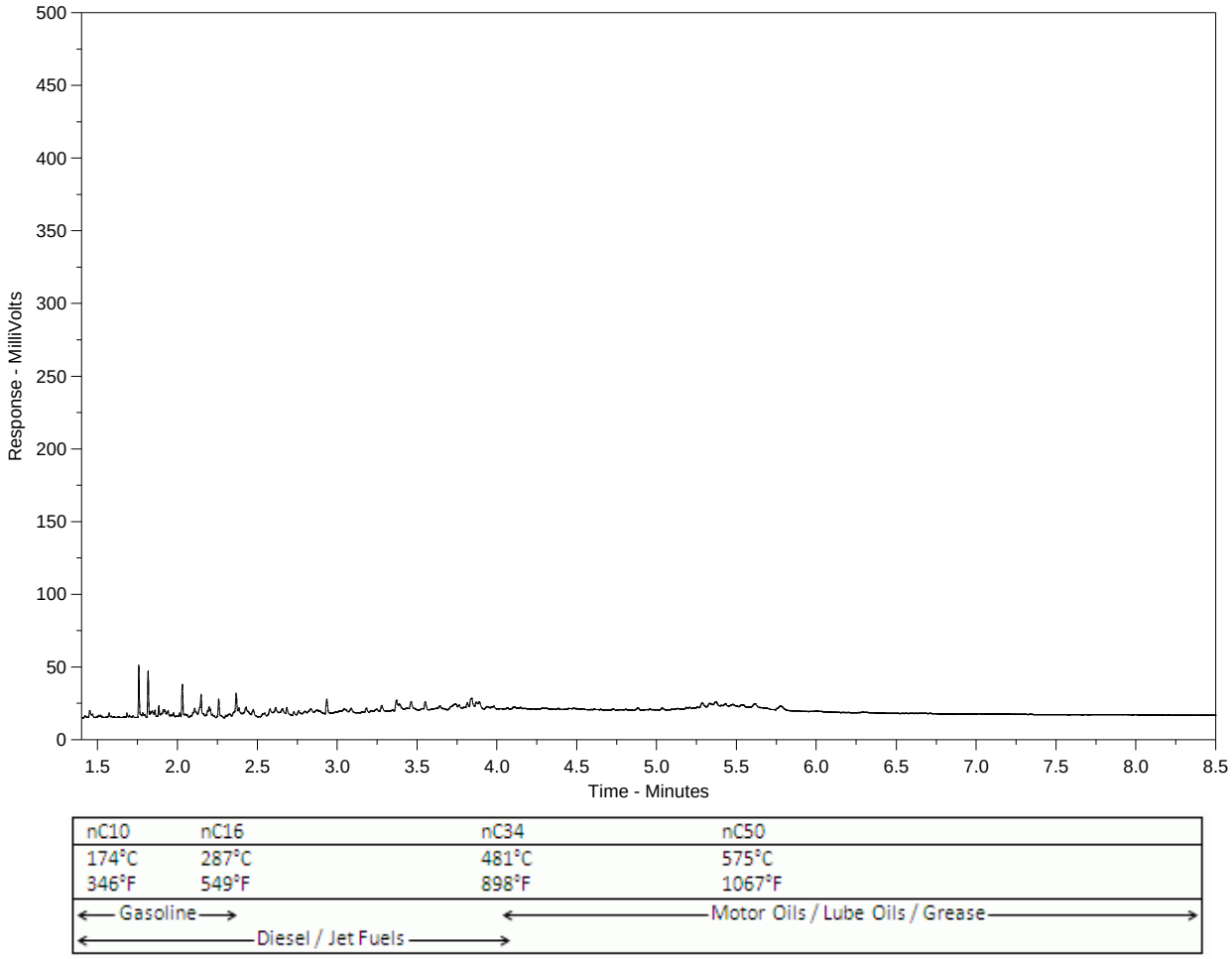
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-24
Client Sample ID: TP8-5



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

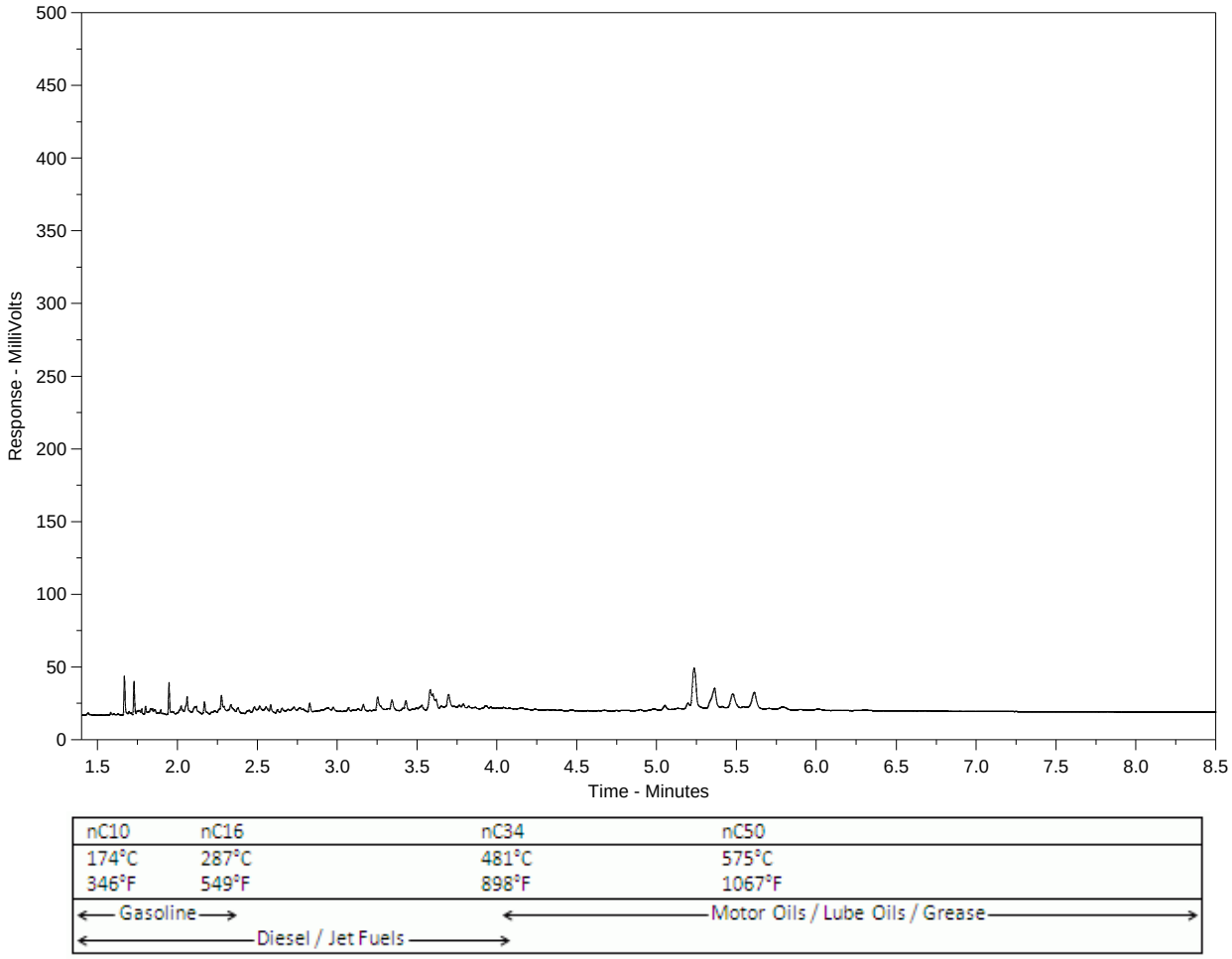
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-25
Client Sample ID: TP10-1



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

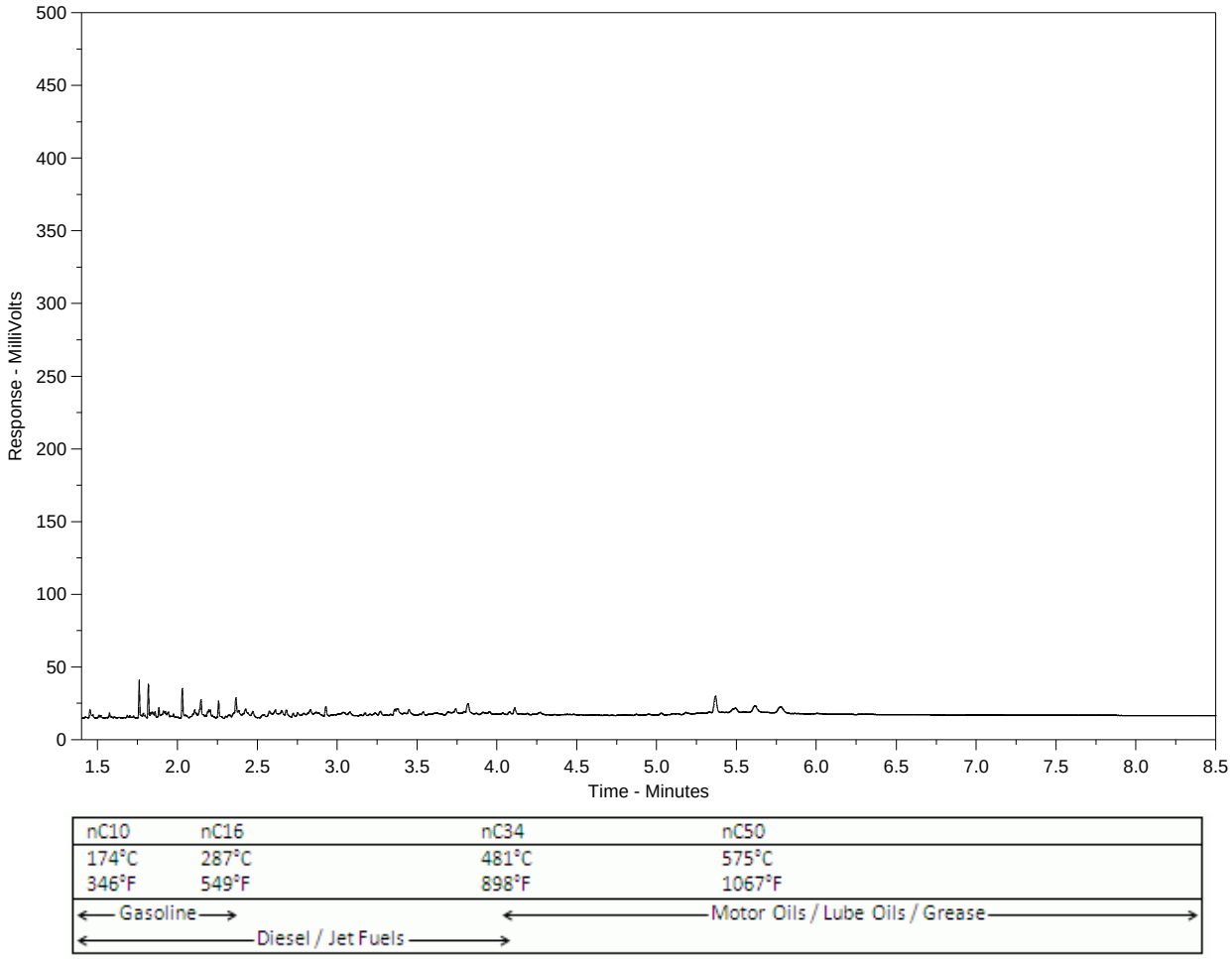
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-26
Client Sample ID: TP11-1



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

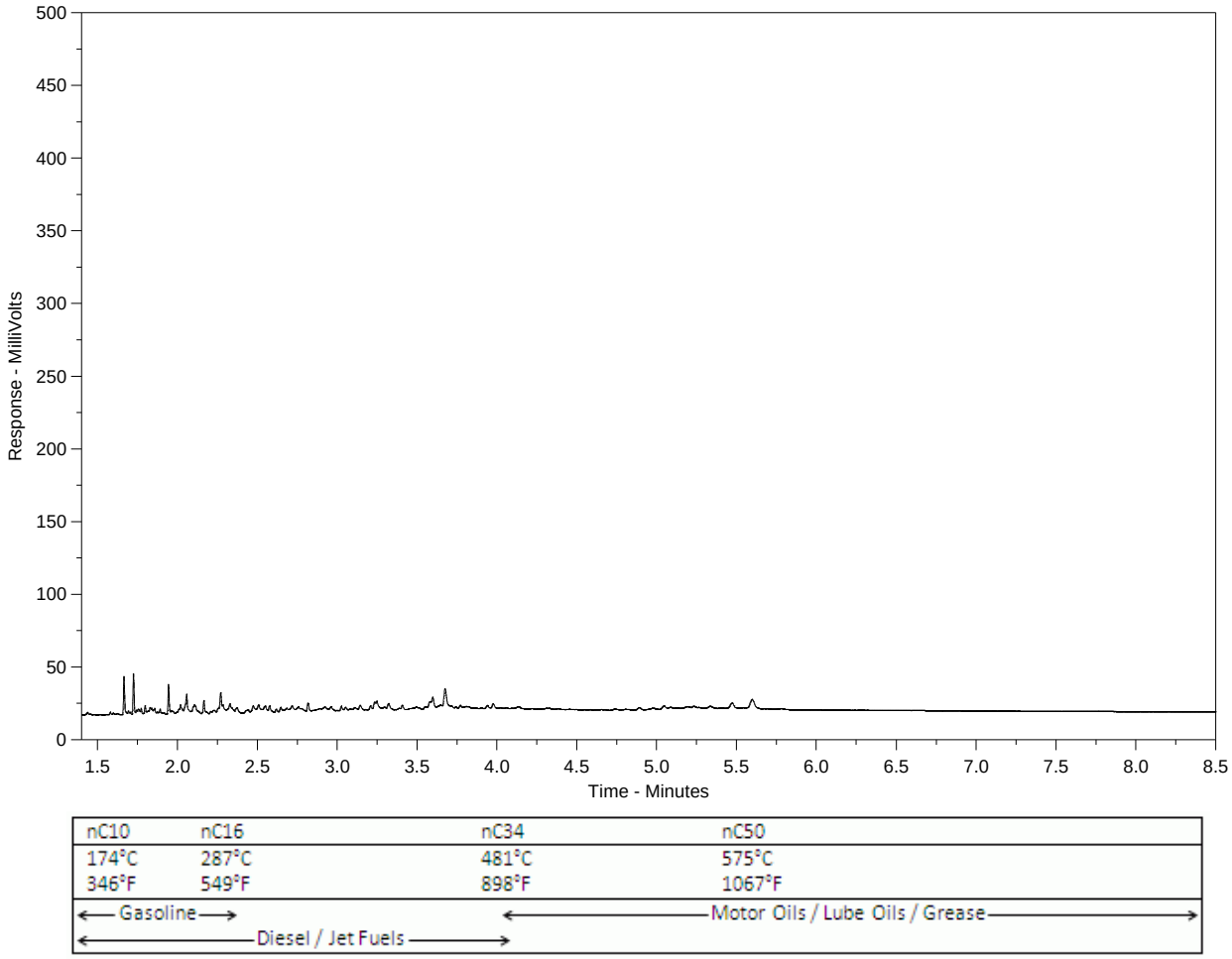
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-27
Client Sample ID: TP11-2



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

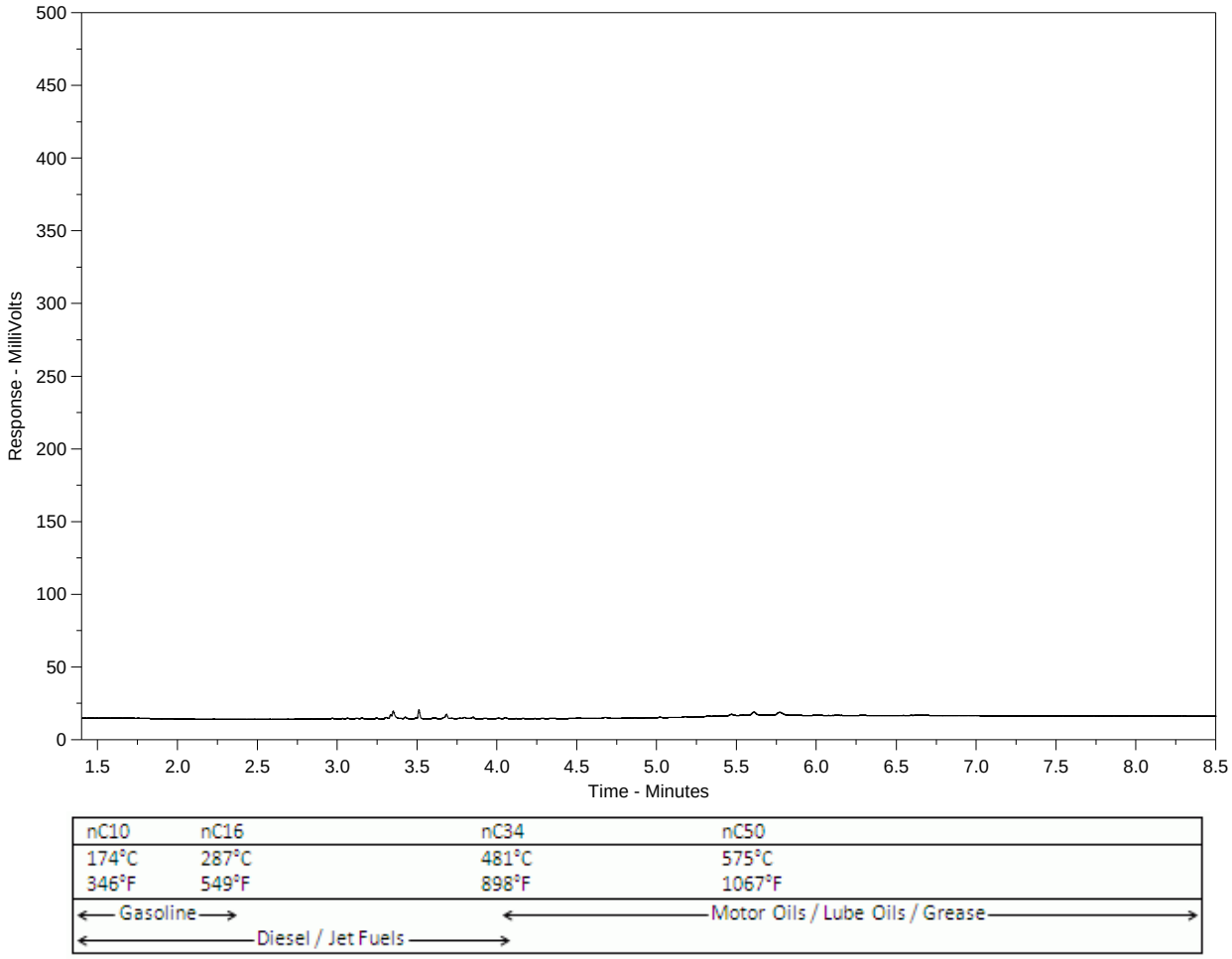
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-28
Client Sample ID: TP11-3



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

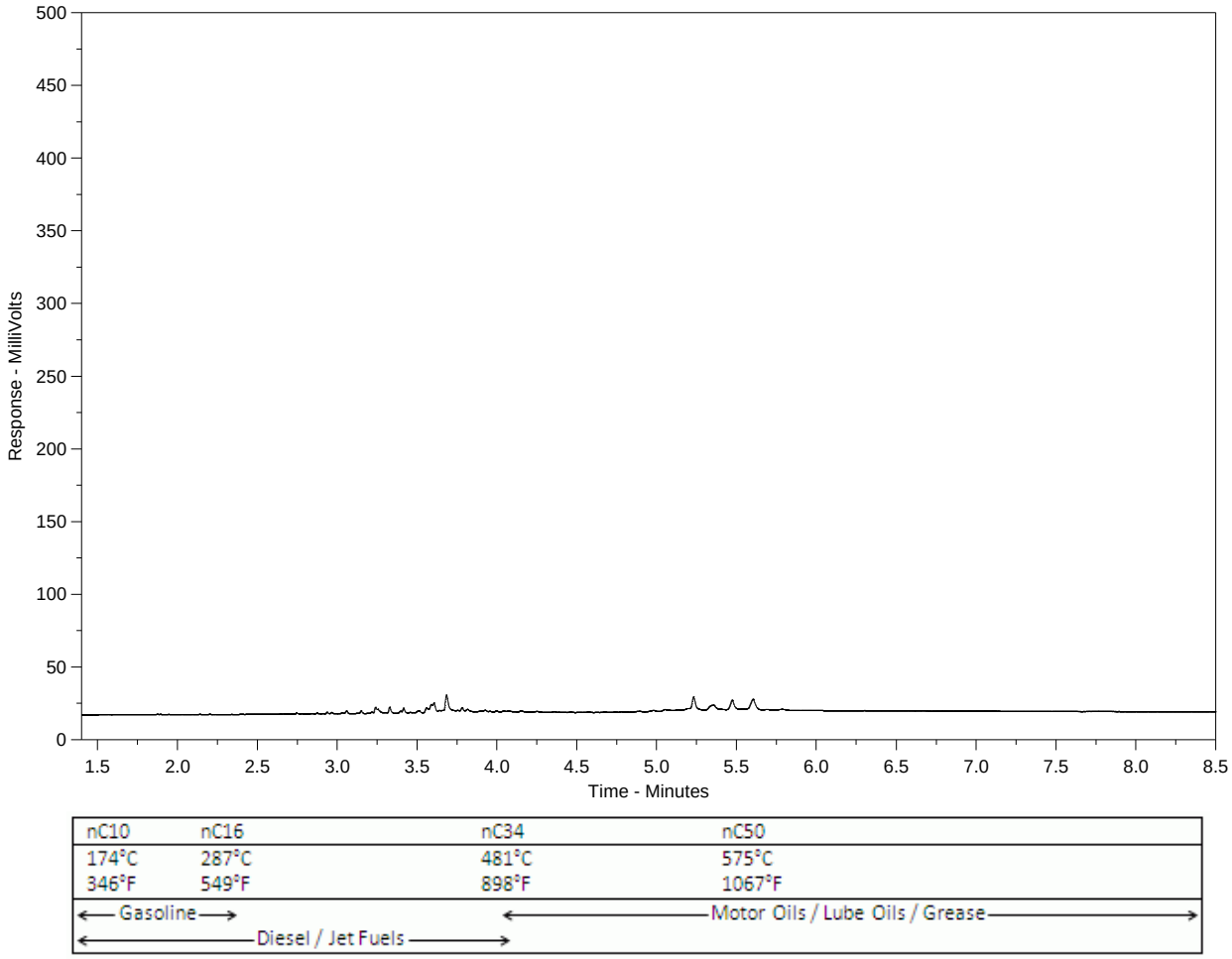
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-29
Client Sample ID: TP12-1



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

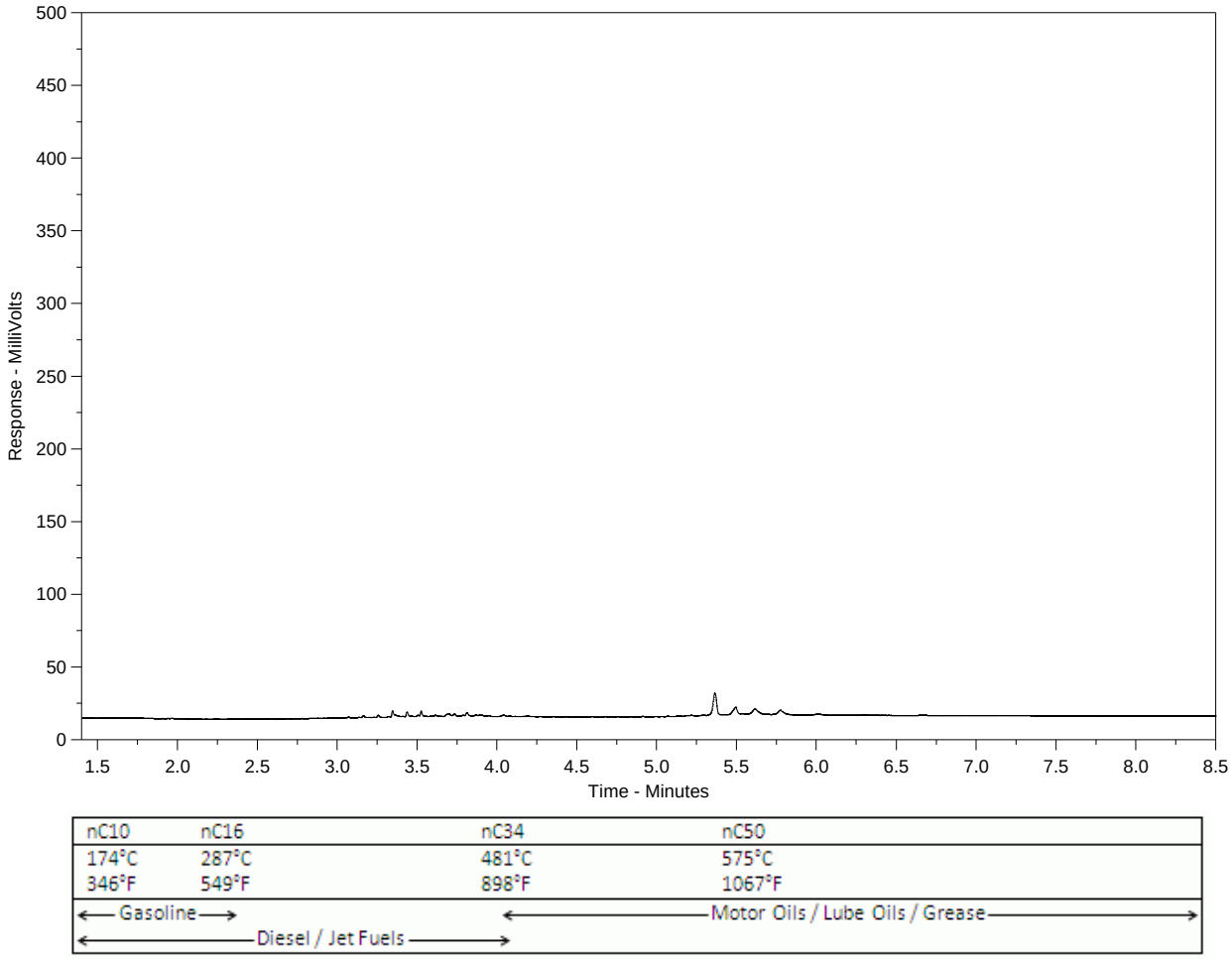
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-31
Client Sample ID: TP13-1



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

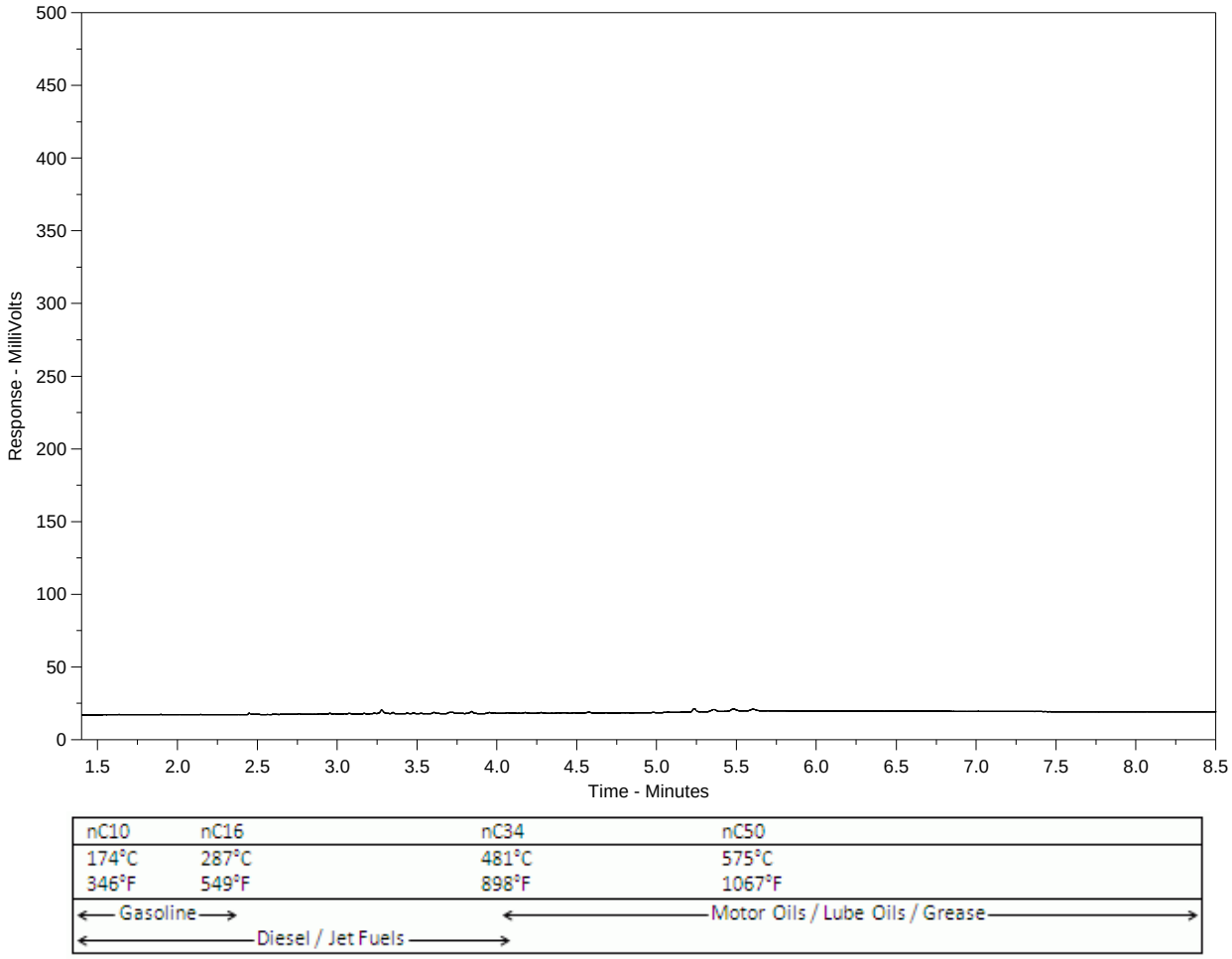
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-32
Client Sample ID: TP14-1



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

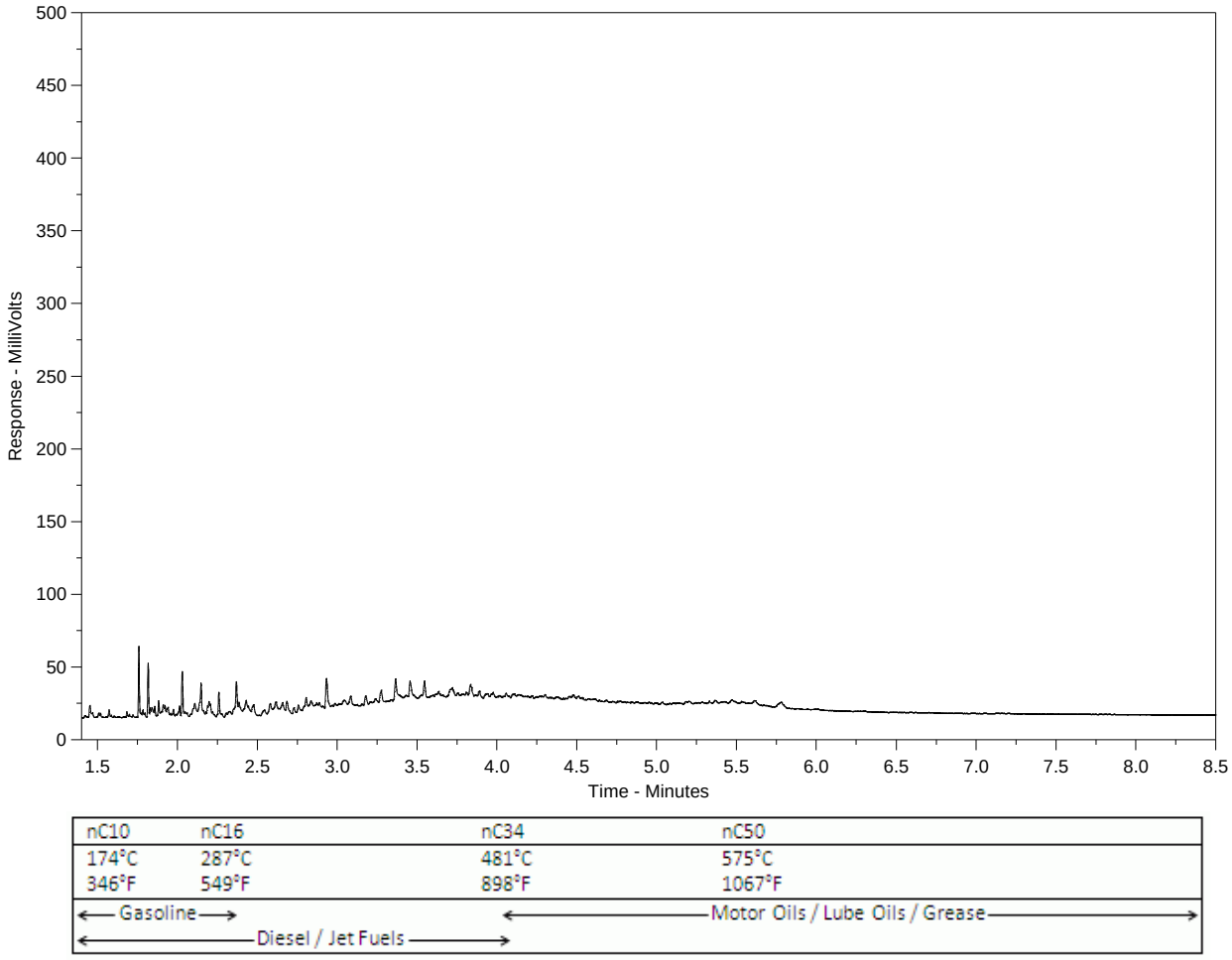
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-33
Client Sample ID: DUP A



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

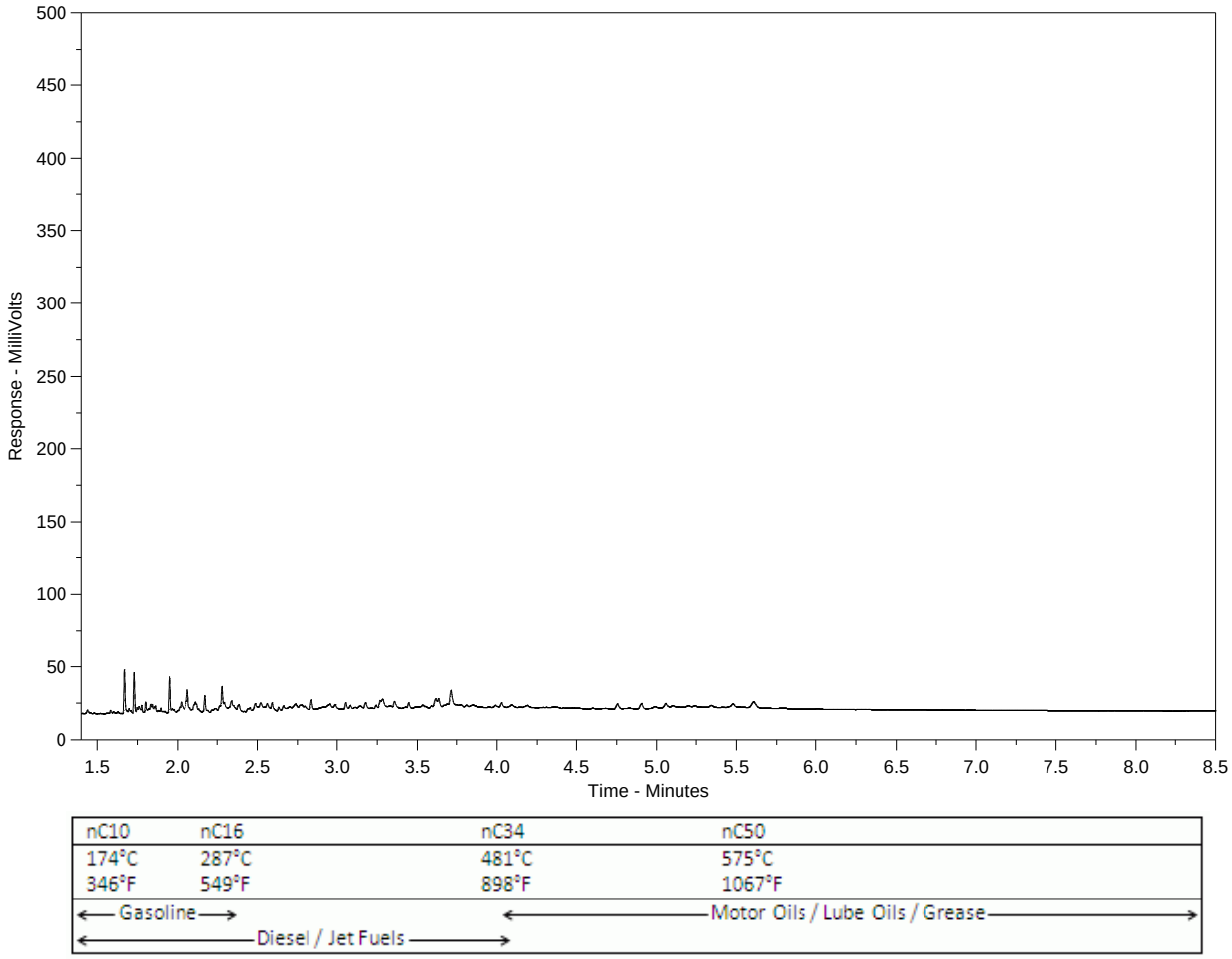
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-34
Client Sample ID: DUP B



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

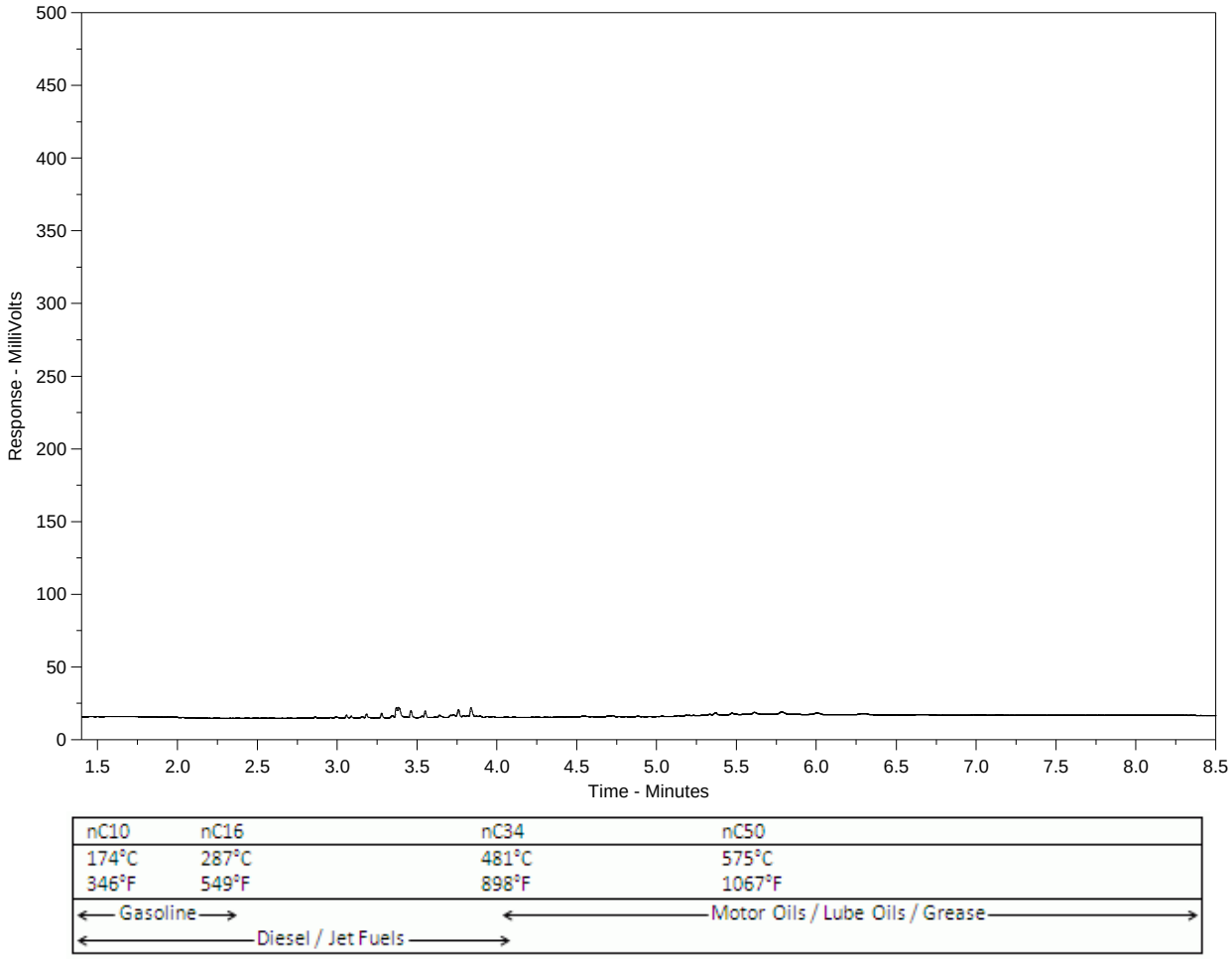
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-35
Client Sample ID: DUP C



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

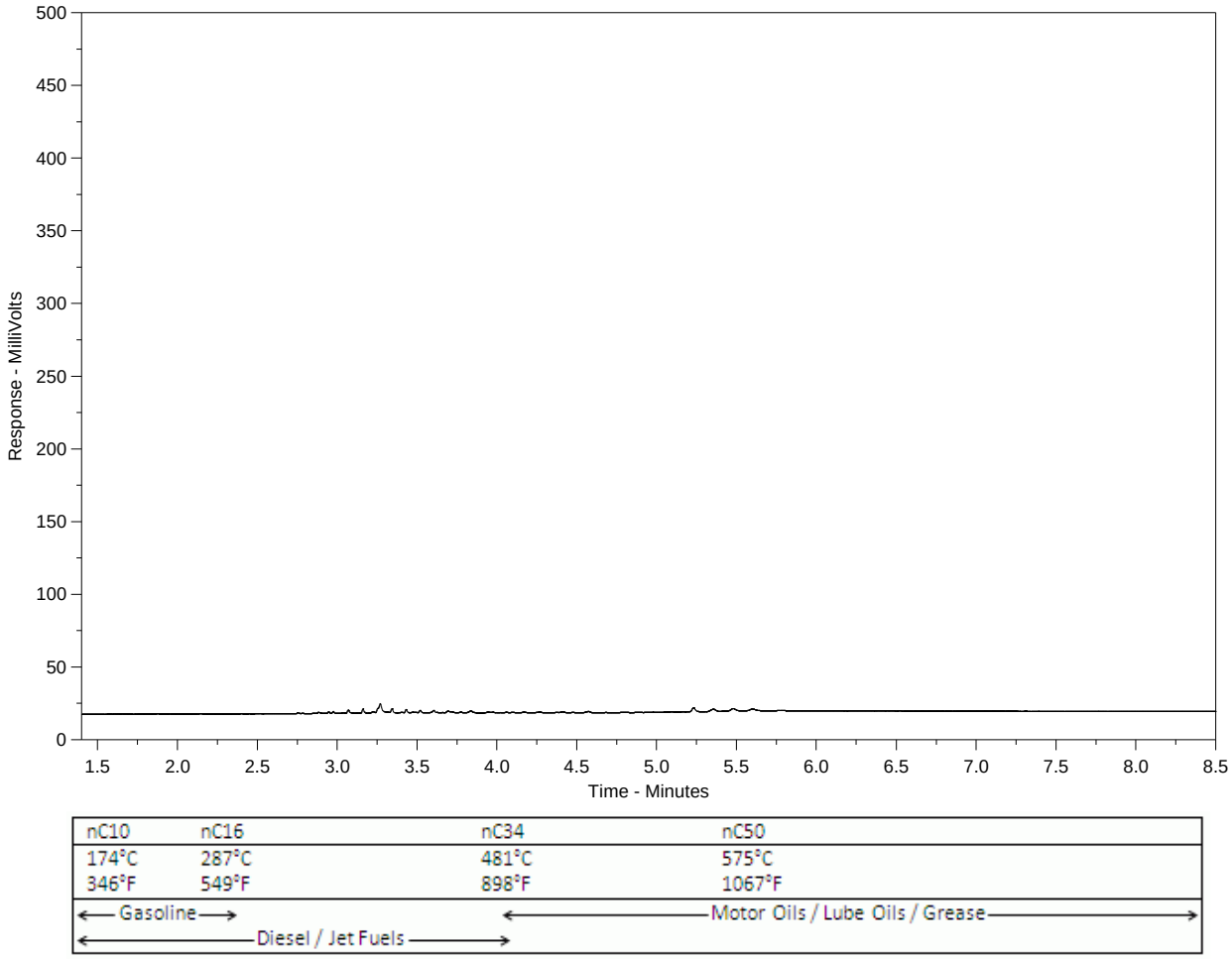
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-36
Client Sample ID: DUP D



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

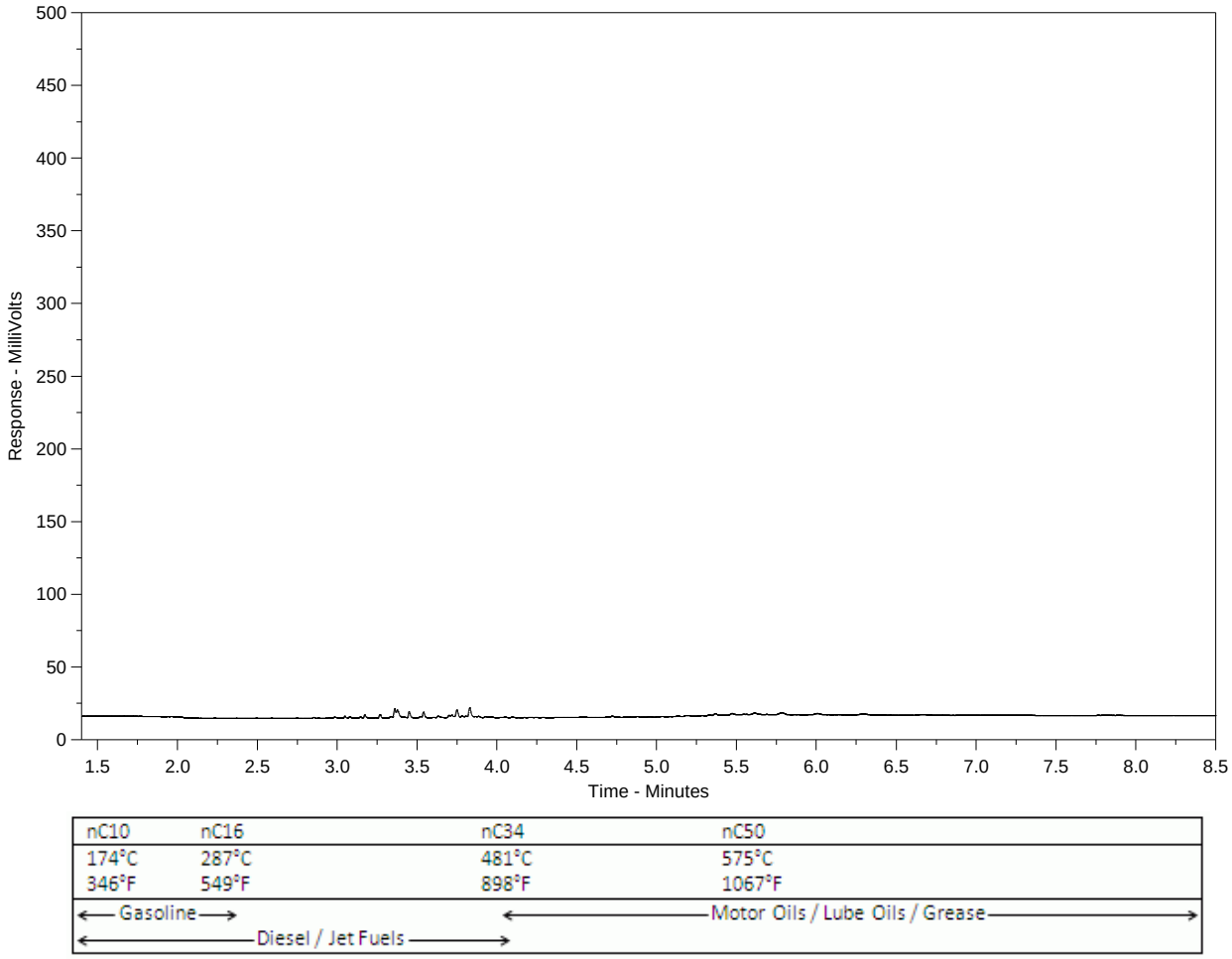
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-37
Client Sample ID: RA1



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

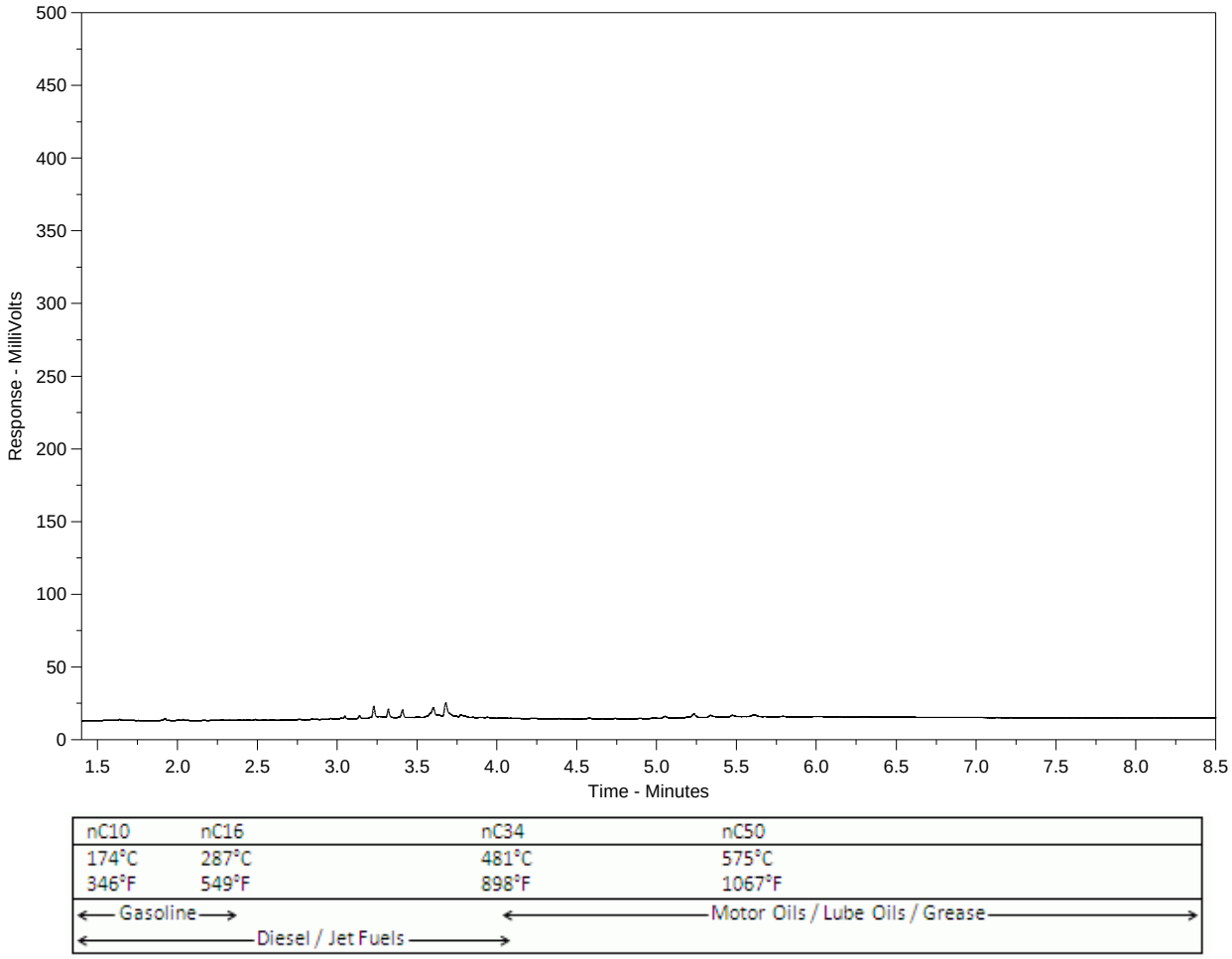
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-38
Client Sample ID: RA2



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

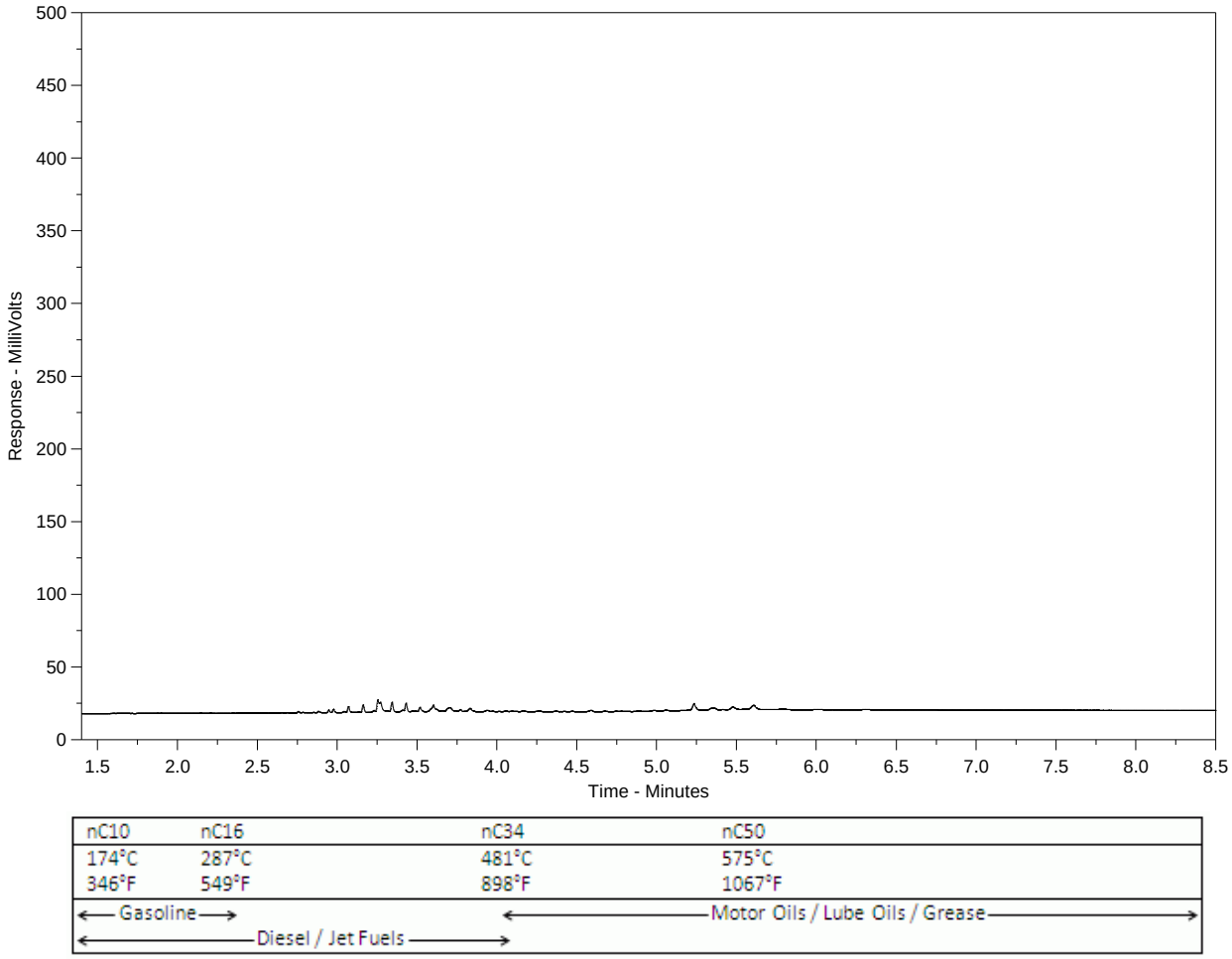
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-39
Client Sample ID: RA3



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

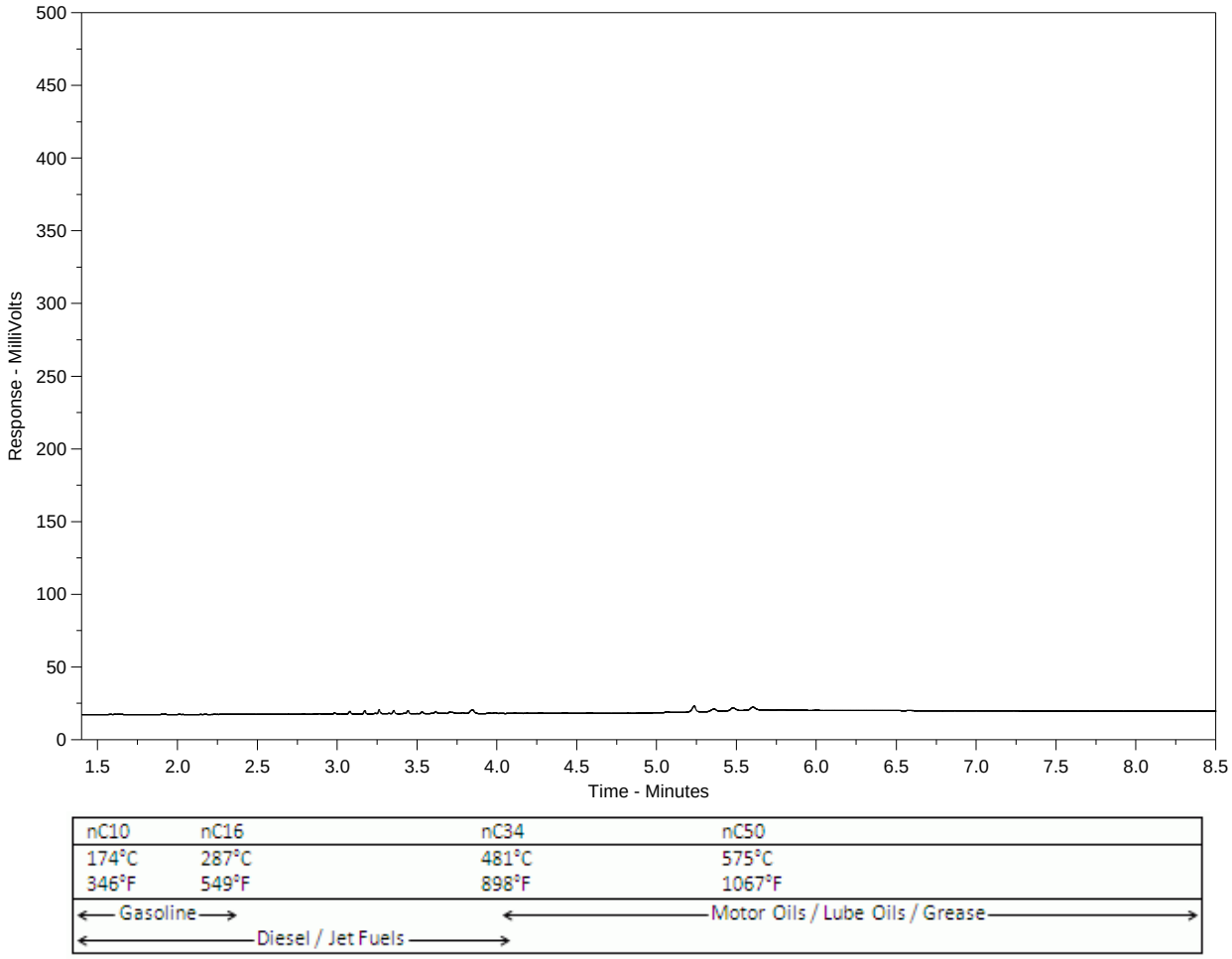
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-40
Client Sample ID: RA4



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

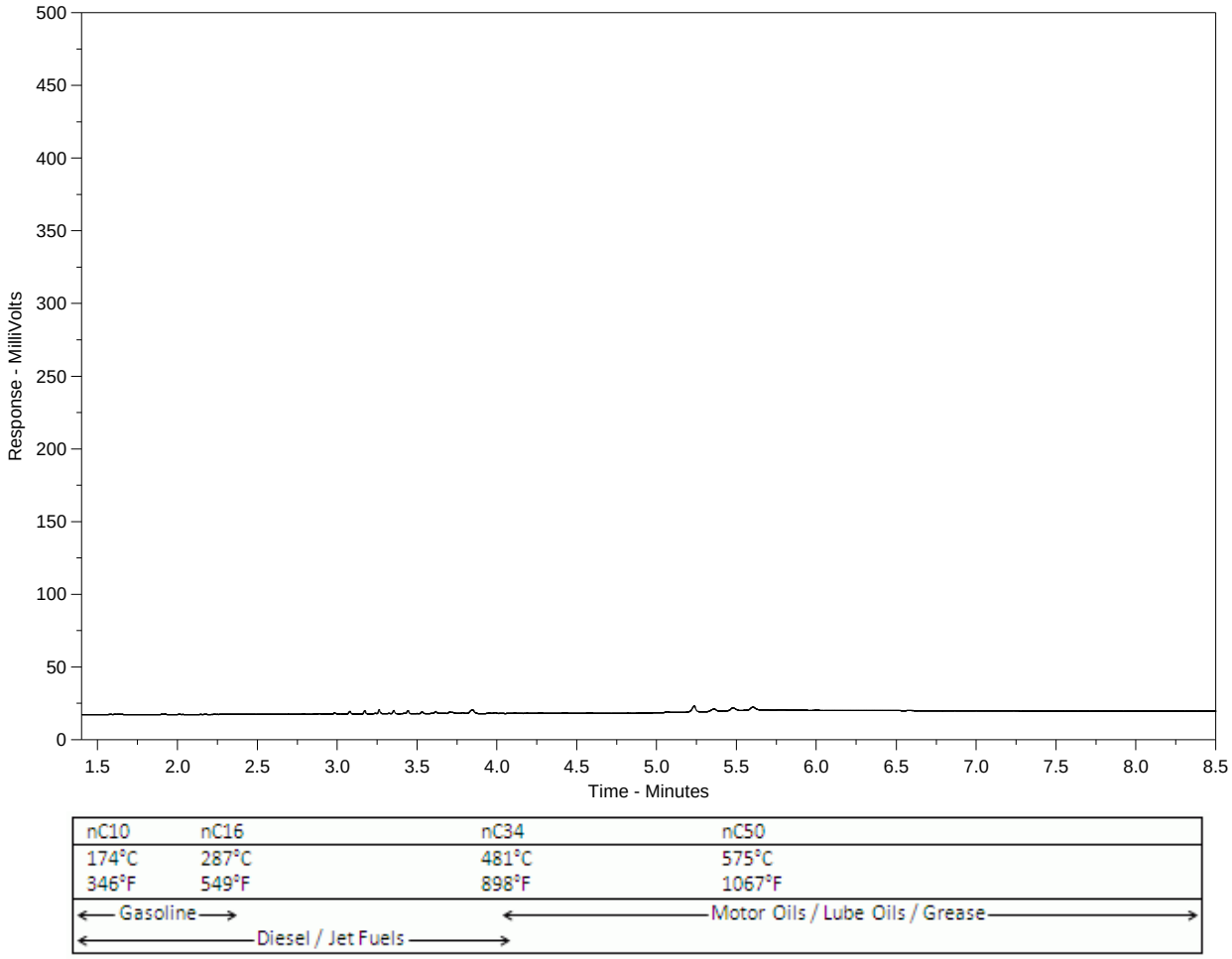
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-40
Client Sample ID: RA4



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

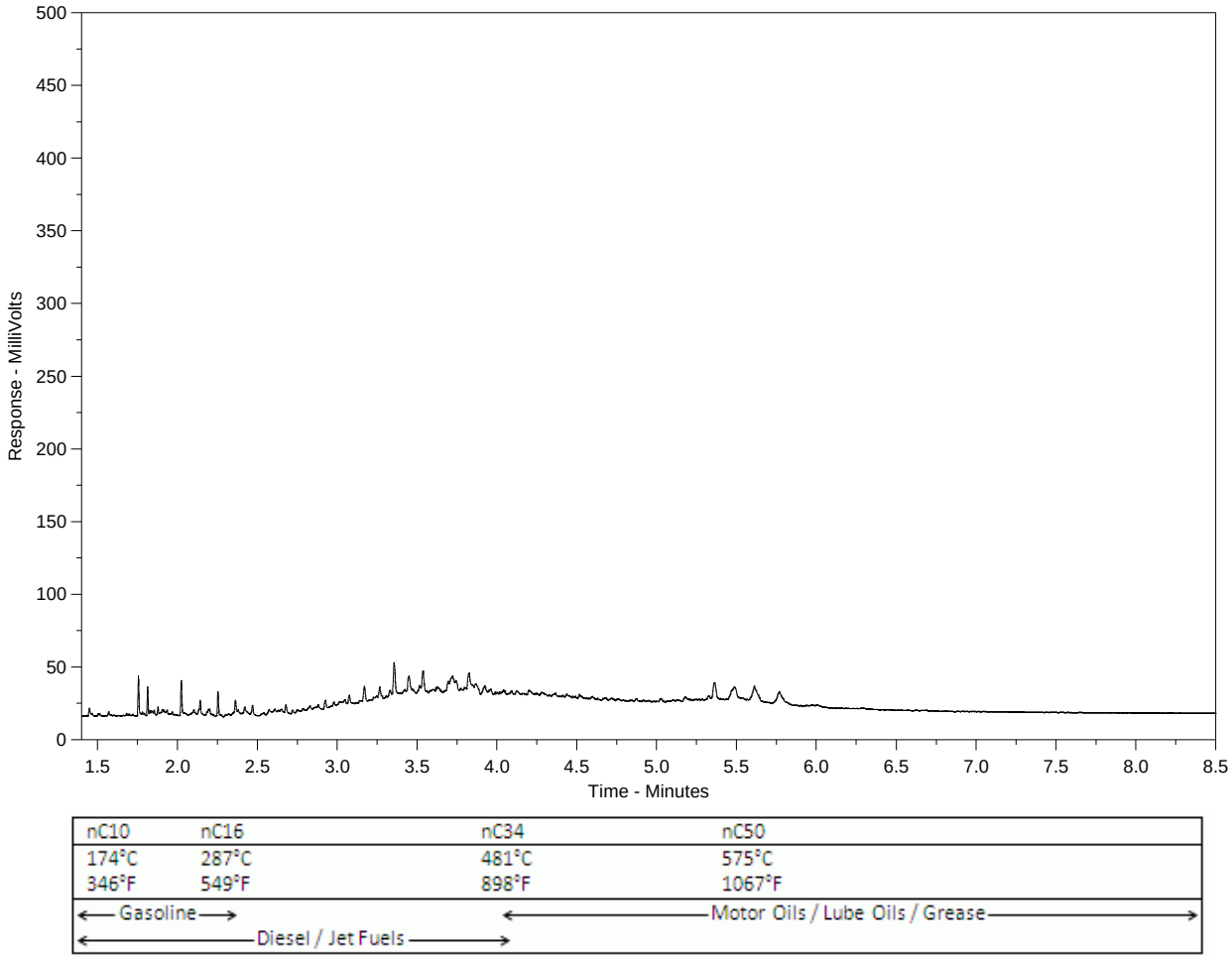
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-41
Client Sample ID: RA5



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

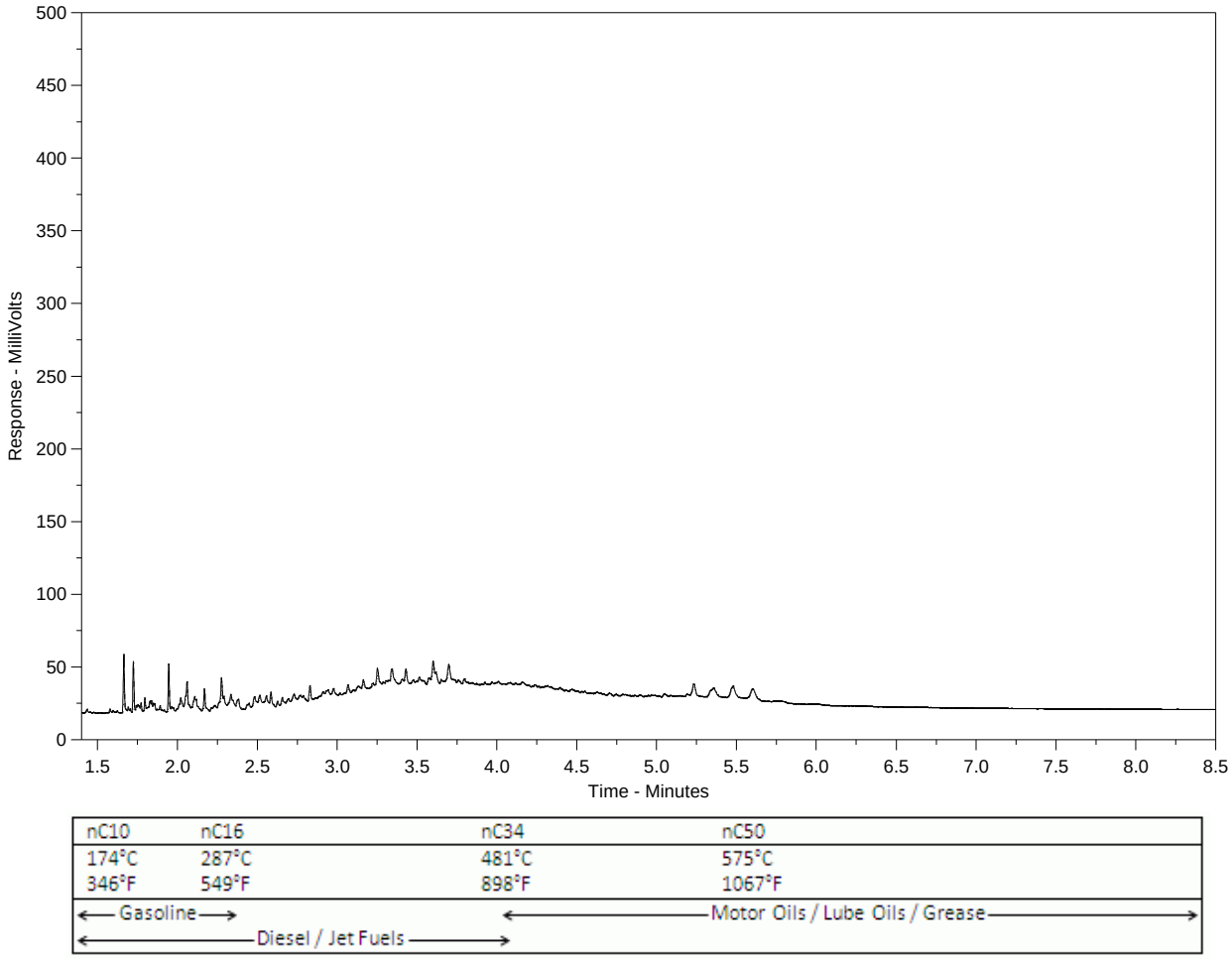
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: WG1782140-C-4#L1386542-C-41
Client Sample ID: RA5



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

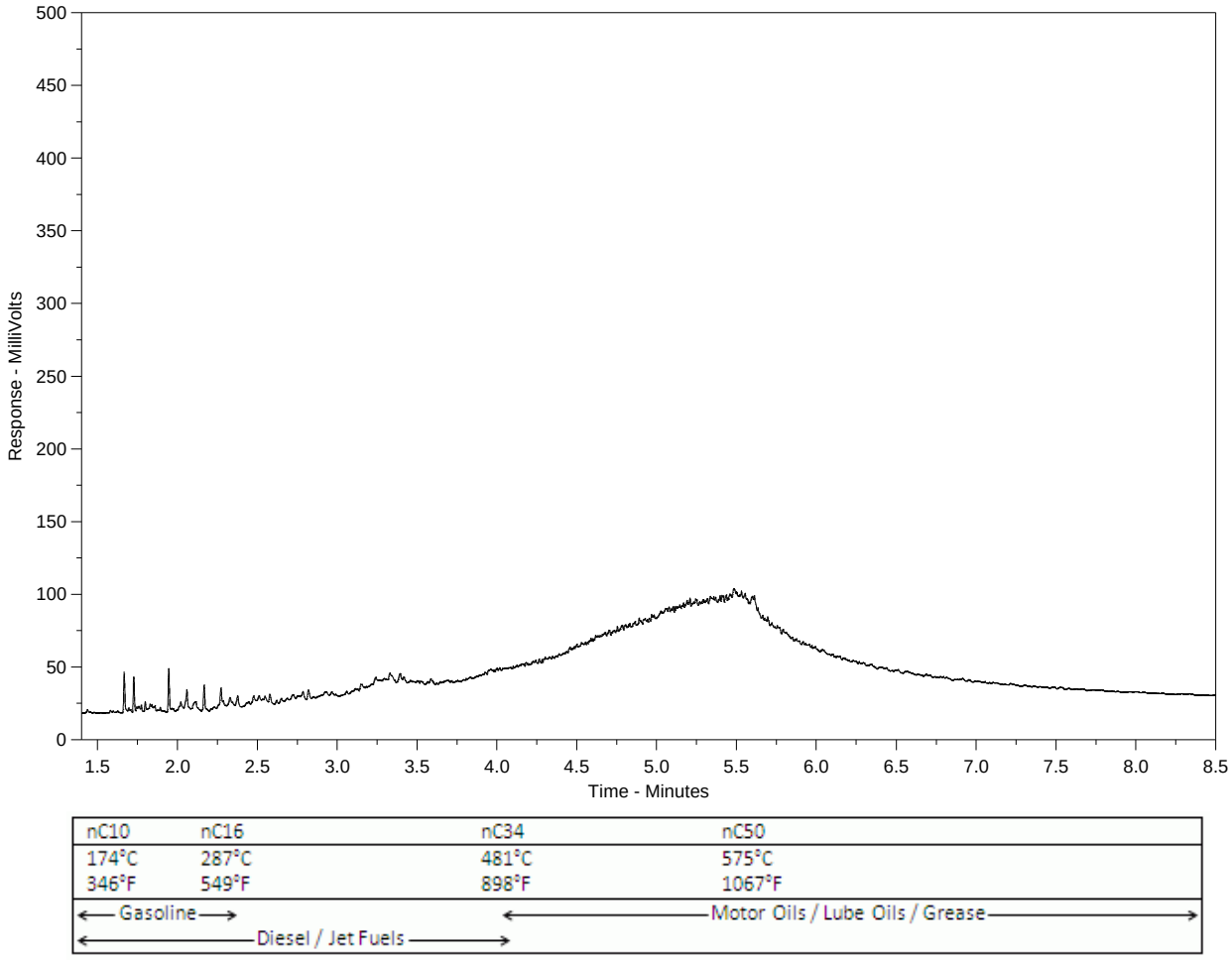
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-42
Client Sample ID: RA6



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

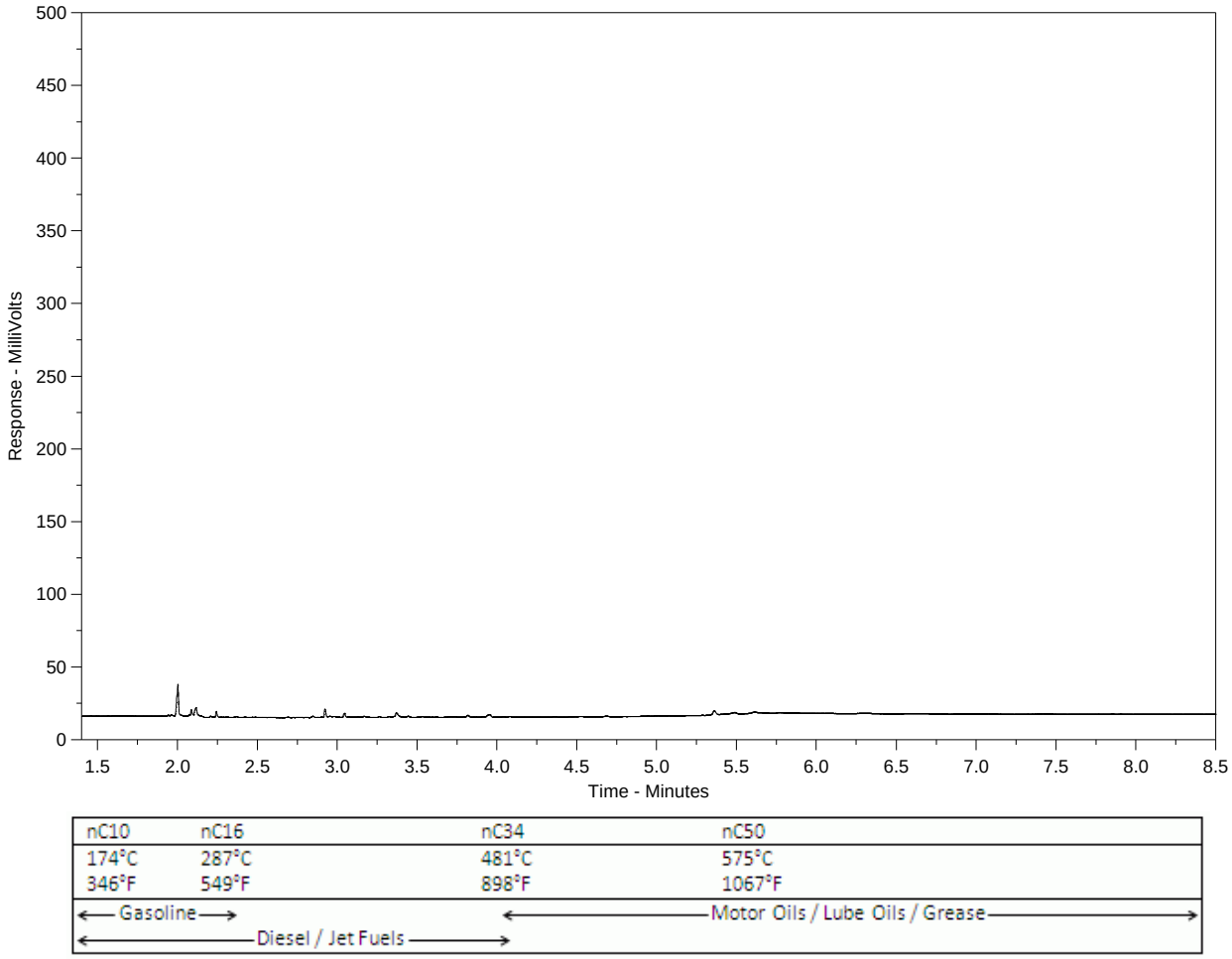
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-43
Client Sample ID: RA7



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

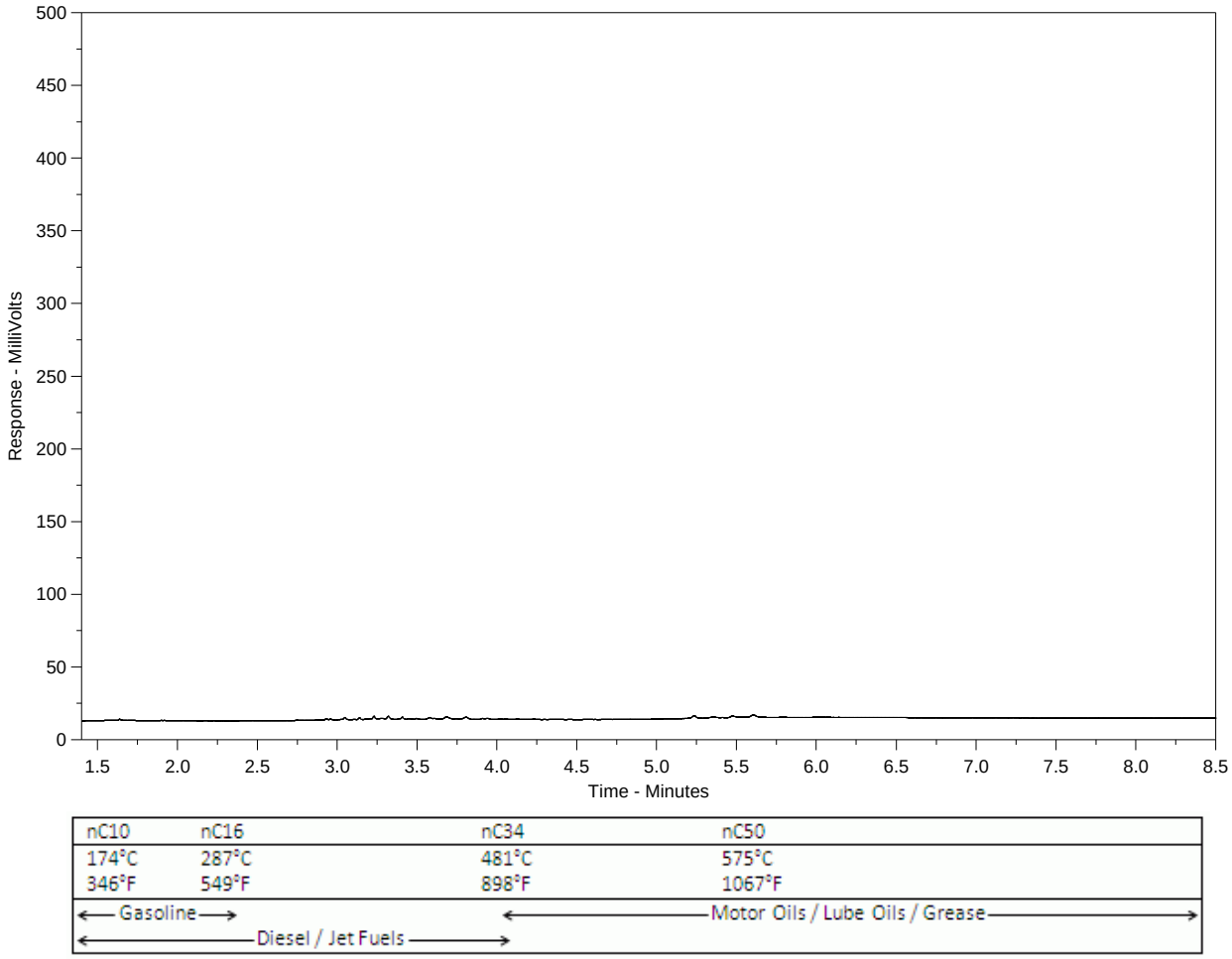
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-44
Client Sample ID: RA8



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

10- 334342

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

Page 1 of 4

Report To	Report Format / Distribution	Service Request: (Rush subject to availability - Contact ALS to confirm TAT)
Company: SLR	Standard: ✓ Other (specify):	✓ Regular (Standard Turnaround Times - Business Days)
Contact: L Paterson	Select: PDF ✓ Excel Digital Fax	Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address: 200 - 1475 Ellis St., Kelowna BC	Email 1: lpaterson@slrconsulting.com	Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
	Email 2:	Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone: 250 - 762-7202 Fax: 250 - 763-7303		
Invoice To Same as Report ? (circle) Yes or No (if No, provide details)	**Client / Project Information**	**Analysis Request**
Copy of Invoice with Report? (circle) Yes or No	Job #: 219.05112.00008	(Indicate Filtered or Preserved, F/P)
Company:	PO / AFE: KEL 1322	
Contact:	LSD:	
Address:		
Phone: Fax:	Quote #:	
Lab Work Order # (lab use only) L1386542	**ALS Contact:** ERIN **Sampler:** KA	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HOLD FOR ANALYSIS	Number of Containers
	TP1-1	29-OCT-13		SOIL	X	3
	TP1-2				X	2
	TP1-3				X	2
	TP1-4				X	2
	TP2-1				X	2
	TP2-2				X	3
	TP2-3				X	2
	TP2-4				X	2
	TP2-5				X	2
	TP3-1				X	2
	TP3-2				X	3
	TP4-1				X	2

L1386542-COFC

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

HOLD

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 back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
KA	31-OCT-13	3pm	B.H	Nov.1	9:20	2.5/2.8/3.5 °C				

10- 334341

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

Report To		Report Format / Distribution		Service Request: (Rush subject to availability - Contact ALS to confirm TAT)	
Company:	SLR Consulting (Canada) Ltd	Standard: ✓	Other (specify):	L	Regular (Standard Turnaround Times - Business Days)
Contact:	L Paterson	Select: PDF ✓	Excel Digital Fax		Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address:	200-1475 Ellis St., Kelowna	Email 1:	lpaterson@slrconsulting.com		Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
		Email 2:			Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	250-762-7202 Fax: 250-763-7303				

Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information	
	Copy of Invoice with Report? (circle) Yes or No	Job #:	219.05112.00008
Company:		PO / AFE:	KEL1322
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)	L1386542	ALS Contact: ERIN	Sampler: KA

Analysis Request (Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HOLD FOR ANALYSIS	Number of Containers
	TP5-1	29-OCT-13		SOIL	X	2
	TP6-1				X	2
	TP7-1				X	
	TP7-2				X	
	TP7-3				X	
	TP7-4				X	
	TP7-5				X	
	TP8-1				X	
	TP8-2				X	
	TP8-3				X	
	TP8-4				X	
	TP8-5				X	

L1386542-COFC

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ 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 back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	31-OCT-13	3pm	B...	Nov. 1	9:20	3.5 °C				

10- 334338

ALS Environmental

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Page 3 of 4

Report To	Report Format / Distribution	Service Request: (Rush subject to availability - Contact ALS to confirm TAT)
Company: SLR Consulting (Canada) Ltd.	Standard: ✓ Other (specify):	✓ Regular (Standard Turnaround Times - Business Days)
Contact: L. Paterson	Select: PDF ✓ Excel Digital Fax	Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address: 100-1475 Ellis St., Kelowna BC	Email 1: lpaterson@slrconsulting.com	Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
	Email 2:	Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone: 250-762-7202 Fax: 250-763-7303		
Invoice To Same as Report ? (circle) Yes or No (if No, provide details)	**Client / Project Information**	**Analysis Request**
Copy of Invoice with Report? (circle) Yes or No	Job #: 219.05112.00008	(Indicate Filtered or Preserved, F/P)
Company:	PO / AFE: KEL1322	
Contact:	LSD:	
Address:		
Phone: Fax:	Quote #:	
Lab Work Order # (lab use only) L1386542	**ALS Contact:** Erin **Sampler:** KA	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HOLD FOR ANALYSIS	Number of Containers
	TP10-1	30-OCT-13		SOIL	X	3
	TP11-1				X	2
	TP11-2				X	1
	TP11-3				X	
	TP12-1				X	
	TP12-2				X	
	TP13-1				X	
	TP14-1				X	3
	DUP A	29-OCT-13			X	X
	DUP B	30-OCT-13			X	X
	DUP C				X	X
	DUP D				X	X

L1386542-COFC

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/E ...etails

HOLD

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: KA	Date: 31-OCT-13	Time: 3pm	Received by: B. ++	Date: Nov. 1	Time: 9:20	Temperature: 3.5 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

10-334339

ALS Environmental

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Page 4 of 4

Report To		Report Format / Distribution		Service Request: (Rush subject to availability - Contact ALS to confirm TAT)	
Company:	SLR Consulting (Canada) Ltd	Standard: ✓	Other (specify):	✓	Regular (Standard Turnaround Times - Business Days)
Contact:	L Paterson	Select: PDF ✓	Excel Digital Fax		Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address:	200-1475 Ellis St, Kelowna BC	Email 1:	LPaterson@slrconsulting.com		Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
		Email 2:			Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	250-762-7202 Fax: 250-763-7303			Analysis Request	
Invoice To	Same as Report ? (circle) (Yes) or No (if No, provide details)	Client / Project Information		(Indicate Filtered or Preserved, F/P)	
	Copy of Invoice with Report? (circle) (Yes) or No	Job #:	219.05112.00008		
Company:		PO / AFE:	KEL 1322		
Contact:		LSD:			
Address:					
Phone:	Fax:	Quote #:			
Lab Work Order # (lab use only)	L1386542	ALS Contact:	Erin	Sampler:	KA

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HOLD FOR ANALYSIS	Number of Containers
	RA1	30-OCT-13		SOIL	X	2
	RA2				X	3
	RA3				X	2
	RA4				X	3
	RA5				X	2
	RA6				X	2
	RA7				X	3
	RA8				X	2

L1386542-COFC

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ET ... ails

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	31-OCT-13	3pm	B. H	Nov 1	9:20	3.5 °C				

10- 334342

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Page 1 of 4

Report To	Report Format / Distribution	Service Request: (Rush subject to availability - Contact ALS to confirm TAT)
Company: SLR	Standard: ✓ Other (specify):	✓ Regular (Standard Turnaround Times - Business Days)
Contact: L Peterson	Select: PDF ✓ Excel Digital Fax	Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address: 200 - 1475 Ellis St, Kelowna BC	Email 1: lpeterson@slrconsulting.com	Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
	Email 2:	Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone: 250 - 762-7202 Fax: 250 - 763-7303		
Invoice To Same as Report ? (circle) Yes or No (If No, provide details)	**Client / Project Information**	**Analysis Request**
Copy of Invoice with Report? (circle) Yes or No	Job #: 219.05112.00002	(Indicate Filtered or Preserved, F/P)
Company:	PO / AFE: KCL 1.2	
Contact:	LSD:	
Address:		
Phone: Fax:	Quote #:	
Lab Work Order # (lab use only) L1386542	**ALS Contact:** ERIN **Sampler:** KA	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HOLD FOR ANALYSIS	ccme low level PAH	CCME BTEX/F1	CCME F2-F4	CCME metals-AL	CCME Hex.Chromium (Cr6+)	sieve - fine/coarse	hold organic carbon	Number of Containers
	TP1-1	29-OCT-13		Soil	X	X	X	X	X	X	X	X	3
	TP1-2	"		"	X	X	X	X	X				2
	TP1-3	"		"	X	ignore							2
	TP1-4	"		"	X	X	X	X					2
	TP2-1	"		"	X	X	X	X	X	X			2
	TP2-2	"		"	X	X	X	X			X	X	3
	TP2 3	"		"	X	X	X	X					2
	TP2-4	"		"	X	X	X	X					2
	TP2-5	"		"	X	X	X	X					2
	TP3-1	"		"	X	X	X	X	X				2
	TP3-2	"		"	X	X	X	X			X	X	3
	TP4-1	"		"	X	X	X	X					2

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

~~HOLD~~ CCME Agricultural land use standards

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L1386542-COFC

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)						
Released by: KA	Date: 31-OCT-13	Time: 3pm	Received by:	Date:	Time:	Temperature: °C	Ve...	Date:	Time:	Observations: Yes / No ? If Yes add SIF

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION | WHITE - LABORATORY COPY | YELLOW - CLIENT COPY | GENF 18.01 Front

10 - 334341

ALS Environmental

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Page 2 of 4

Report To		Report Format / Distribution		Service Request: (Rush subject to availability - Contact ALS to confirm TAT)
Company:	SLR Consulting (Canada) Ltd.	Standard: ✓	Other (specify):	L Regular (Standard Turnaround Times - Business Days)
Contact:	L Paterson	Select: PDF ✓	Excel Digital Fax	Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address:	200-1475 Ellis St., Kelowna	Email 1:	lpaterson@slrconsulting.com	Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
		Email 2:		Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	250-762-7202 Fax: 250-763-7303			**Analysis Request**
Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	**Client / Project Information**		(Indicate Filtered or Preserved, F/P)
	Copy of Invoice with Report? (circle) Yes or No	Job #:	217, 05112.0008	
Company:		PO / AFE:	KEL 1302	
Contact:		LSD:		
Address:				
Phone:	Fax:	Quote #:		
Lab Work Order # (lab use only)		**ALS Contact:**	ERIN	**Sampler:** KA

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HOLD FOR ANALYSIS	CCME Extended PAH	CCME BTEX/F1	CCME F2-F4	CCME Metals-AL	CCME Hex Chromium	Sieve - fine/coarse	Total organic carbon	Number of Containers
	TP5-1	29-OCT-13		SOIL	X	X	X	X	X				2
	TP6-1	"	"	"	X	X	X	X	X				2
	TP7-1	"	"	"	X	X	X	X	X	X			1
	TP7-2	"	"	"	X	X	X	X	X				1
	TP7-3	"	"	"	X	X	X	X	X				1
	TP7-4	"	"	"	X	X	X	X	X				1
	TP7-5	"	"	"	X	X	X	X	X				1
	TP8-1	"	"	"	X	X	X	X	X	X			1
	TP8-2	"	"	"	X	X	X	X	X				1
	TP8-3	"	"	"	X	X	X	X	X				1
	TP8-4	"	"	"	X	X	X	X	X				1
	TP8-5	"	"	"	X	X	X	X	X				1

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

CCME Agricultural land use standards

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)						inly)
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Observations: Yes / No ? If Yes add SIF
	31-OCT-13	3pm				°C			

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Report To	Report Format / Distribution	Service Request:(Rush subject to availability - Contact ALS to confirm TAT)
Company: SLR Consulting (Canada) Ltd.	Standard: ✓ Other (specify):	✓ Regular (Standard Turnaround Times - Business Days)
Contact: L Patterson	Select: PDF ✓ Excel Digital Fax	Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address: 200-1475 Ellis St, Kelowna BC	Email 1: lpatterson@slrconsulting.com	Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
	Email 2:	Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone: 250-762-7004 Fax: 250-763-7305		**Analysis Request**
Invoice To Same as Report ? (circle) Yes or No (if No, provide details)	**Client / Project Information**	(Indicate Filtered or Preserved, F/P)
Copy of Invoice with Report? (circle) Yes or No	Job #: 217.05112 rcmc8	
Company:	PO / AFE: KEL 1222	
Contact:	LSD:	
Address:		
Phone: Fax:	Quote #:	
Lab Work Order # (lab use only)	**ALS Contact:** Erin **Sampler:** KA	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HOLD FOR	ANALYSIS	CCME low level PAH	CCME BTEX/F1	CCME F2-F4	CCME Metals - AL	CCME Hex. chromium Cr6+	sieve - fine/coarse	total organic carbon				Number of Containers
	TP10-1	30 OCT 13		SOIL	X		X	X	X	X		X	X				2 (3)
	TP11-1	"		"	X		X	X	X	X	X						2
	TP11-2	"		"	X		X	X	X	X							1
	TP11-3	"		"	X		X	X	X	X							1
	TP12-1	"		"	X		X	X	X	X	X						1
	TP12-2	"		"	X												1
	TP13-1	"		"	X		X	X	X	X	X						1
	TP14-1	"		"	X		X	X	X	X		X	X				3
	DUP A	29-OCT-13		"	X		X	X	X	X							1
	DUP B	30-OCT-13		"	X		X	X	X	X							1
	DUP C	"		"	X		X	X	X		X						1
	DUP D	"		"	X		X	X	X	X		X	X				1

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

HOLD — CCME Agricultural land use Standards

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)							
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature: °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	31	2 p.m								

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ALS Environmental

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Report To	Report Format / Distribution	Service Request: (Rush subject to availability - Contact ALS to confirm TAT)
Company: SLR Consulting (Canada) (4)	Standard: ✓ Other (specify):	✓ Regular (Standard Turnaround Times - Business Days)
Contact: L Patterson	Select: PDF ✓ Excel Digital Fax	Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address: 1000 - 1675 Ellis St. Kelowna BC	Email 1: LPatterson@slrconsulting.com	Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
	Email 2:	Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone: 250-763-7202 Fax: 250-763-7703		
Invoice To Same as Report ? (circle) (Yes) or No (If No, provide details)	**Client / Project Information**	**Analysis Request**
Copy of Invoice with Report? (circle) (Yes) or No	Job #: 209.05112.00008	(Indicate Filtered or Preserved, F/P)
Company:	PO / AFE: KEL 1332	
Contact:	LSD:	
Address:		
Phone: Fax:	Quote #:	
Lab Work Order # (lab use only)	**ALS Contact:** Erin **Sampler:** KA	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HOLD For Analysis	CCME low level PAH	CCME BTEX/F1	CCME F2-F4	CCME metals-AL	CCME Hexavalent chromium	Sieve - fine/coarse	total organic carbon	Number of Containers
	KA1	30-OCT-13		SOIL	X	X	X	X		X			2
	RA2	↓		↓	X	X		X			X	X	3
	RA3				X	X	X	X					2
	RA4				X	X		X			X	X	3
	RA5				X	X	X	X	X	X			2
	RA6				X	X	X	X	X	X			2
	RA7				X	X	X	X			X	X	3
	RA8	✓		✓	X	X		X					2

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Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commer

Hold CCME - Agricultural land use standards

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature: °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
KA	31 OCT 13	3pm								

SLR CONSULTING (CANADA) LTD.

Review of Field and Lab Quality Assurance / Quality Control Data (QA/QC)

Laboratory **ALS Laboratory Group**
SLR Project No. **219.05112.00008**

Analytical Certificate No. L1386542 Date Certificate Issued 2013/12/04

Medium	Soil	Water	Air	Other:
No. of Samples	43	0	0	0

SLR CONSULTING (CANADA) LTD. Field QA/QC

Arrival temperature 2.2/2.8/3.5 °C

Travel blank (Y/N) N Contaminant detected? (Y/N) N/A

Total number of blind field duplicates analyzed: 4

Sample ID	Duplicate ID	RPD Acceptable (Y/N)
TP7-2	DUP A	Y
TP11-2	DUP B	Y
RA1	DUP C	N/A
TP14-1	DUP D	Y

Laboratory QA/QC

	Completed (Y/N)	Acceptable (Y/N)
Method Blank	Y	Y
Lab Duplicates	Y	Y
Lab Control Sample	Y	Y
Surrogate Recovery	Y	Y
Reference Materials	Y	Y

Laboratory data acceptable (Y/N) Y
If no, has a data quality waiver been supplied? (Y/N) N/A
Date of waiver: N/A

Notes
One of the lab's duplicate samples, which was taken from SLR sample DUP A (blind field duplicate of TP7-2), had RPDs outside of the lab's acceptable limits. The lab verified that this was due to sample heterogeneity. SLR's blind field duplicate RPDs for DUPA and TP7-2 were generally the highest of the duplicates analyzed and confirm the likely heterogeneity of the sample.

Date: 03 March 2014
Reviewed by: Krystal Ashworth

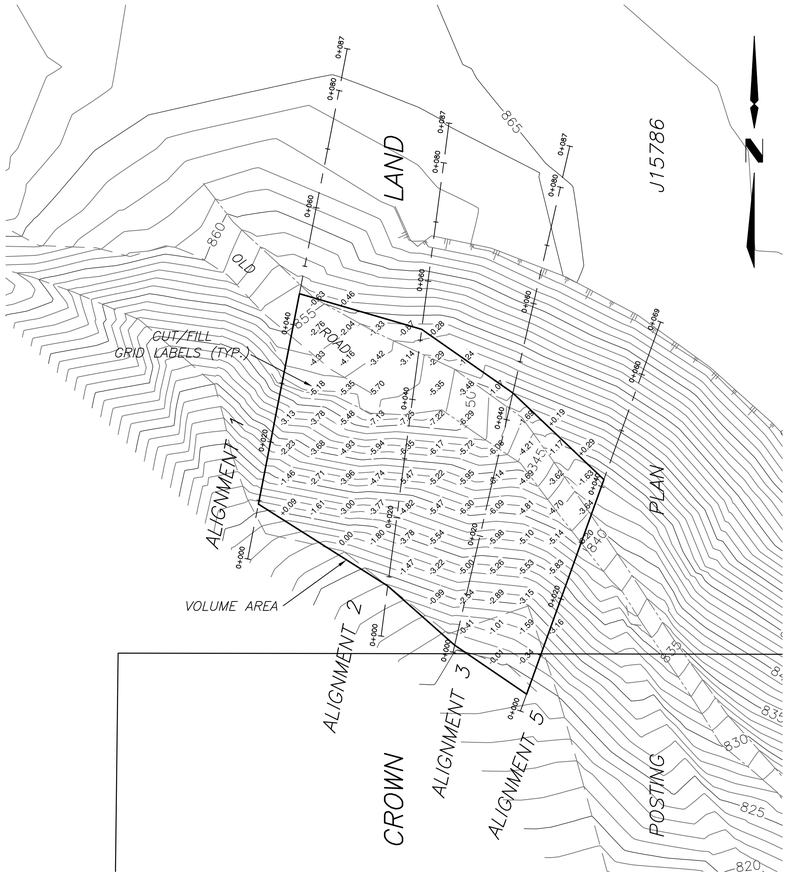
APPENDIX K

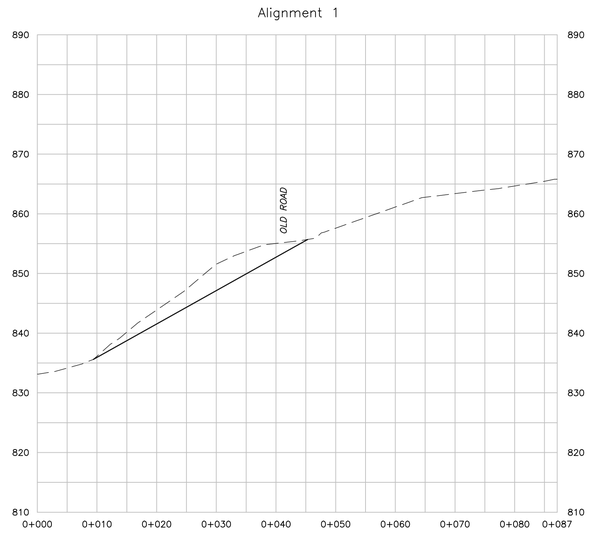
FOCUS Surveys

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008





Scale = 1:500

10 5 0 10 20 30 40

Metres

1:500 Horizontal 1:500 Vertical

LEGEND

Date of field survey: March 22 & 23, 2010

Elevations are derived from GPS observations on Invermere ACP 16448, Elevation = 843.962M

Parcel boundaries shown heron are derived from Land Title office records. Boundaries are approximate.

Contours shown are existing ground surface March 23, 2010

Contour Interval = 1.0 meter

All distances are in metres and decimals thereof unless otherwise noted.

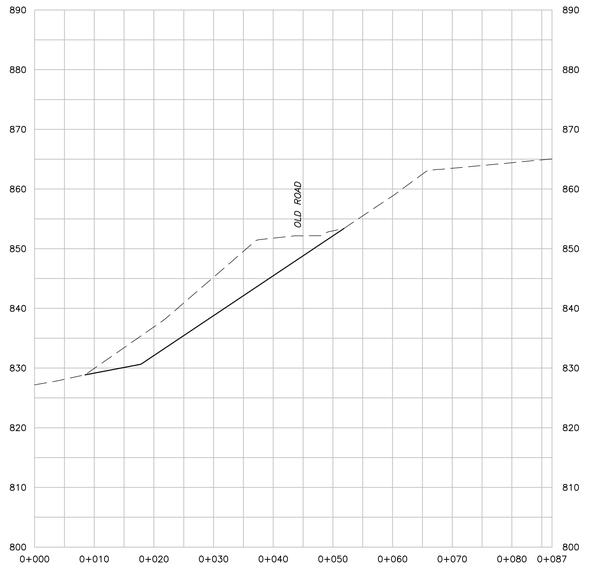
—— —— denotes Bottom of Slope

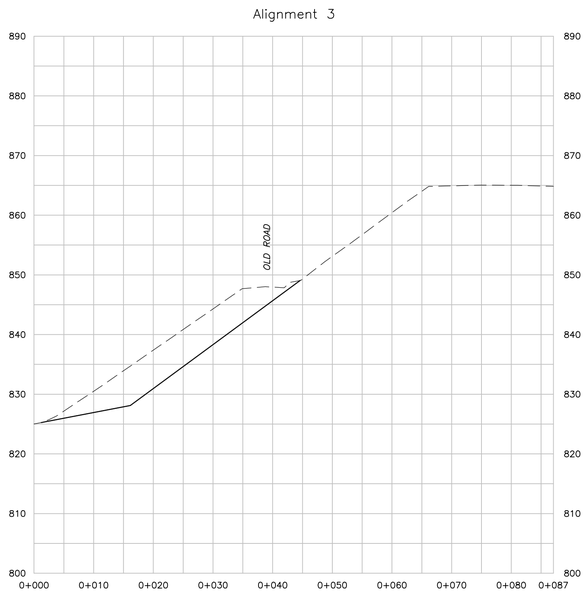
—— denotes Top of Slope

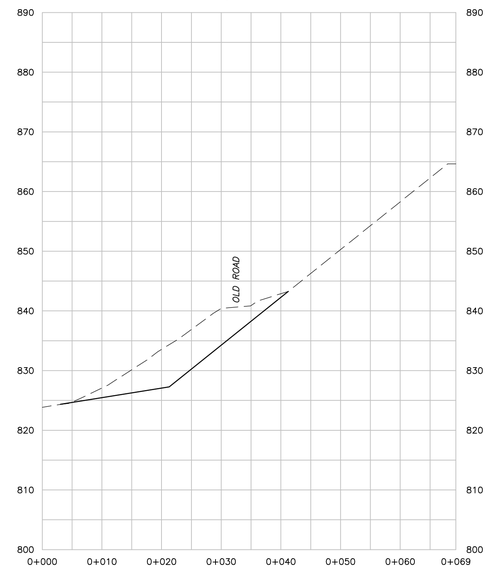
— — — denotes existing ground surface March 23, 2010

——— denotes surface for volume calculations (normal slope angle as per SLR pdf markup received February 14, 2014)

Volume = 8200m3 cut







FOCUS
Focus Surveys (BC) Limited Partnership
7120 – 10th Street, Invermere, BC
t: 250-342-9767 www.focus.co

PROJECT
SLR CONSULTING

PROJECT REF. 010047749

SHEET TITLE
VOLUME CALCULATION
AREA BETWEEN ALIGNMENT 1
AND ALIGNMENT 5

DRAWN	DATE	CHECKED	SCALE
BKS	2014.02.18	VL	1:500

SHEET No. 010047749-MCSI01-R02

SLR

global environmental solutions

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Calgary, AB T2Z 4E6
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Fax: (403) 263-7906

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Edmonton, AB
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Edmonton, AB T6B 3H9
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Kamloops, BC V2C 1G1
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Kelowna, BC V1Y 2A3
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Fax: (905) 415-1019

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Nanaimo, BC V9V 1N1
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Prince George, BC
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Prince George, BC V2N 1W9
Canada
Tel: (250) 562-4452
Fax: (250) 562-4458

Regina, SK
1054 Winnipeg Street
Regina, SK S4R 8P8
Canada
Tel: (306) 525-4690
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Saskatoon, SK
620, 3530 Millar Avenue
Saskatoon, SK S7P 0B6
Canada
Tel: (306) 374-6800
Fax: (306) 374-6077

Sydney, NS
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122-45 Wabana Court
Sydney, NS B1P 6J1
Canada
Tel: (902) 564-7911
Fax: (902) 564-7910

Vancouver, BC (Head Office)
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Vancouver, BC V6J 1V4
Canada
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Fax: (604) 738-2508

Victoria, BC
6 - 40 Cadillac Avenue
Victoria, BC V8Z 1T2
Canada
Tel: (250) 475-9595
Fax: (250) 475-9596

Winnipeg, MB
Unit D, 1420 Clarence Avenue
Winnipeg, MB R3T 1T6
Canada
Tel: (204) 477-1848
Fax: (204) 475-1649

Whitehorse, YT
6131 6 Avenue
Whitehorse, YT Y1A 1N2
Canada
Tel: (867) 689-2021

Yellowknife, NT
Unit 44, 5022 49 Street
Yellowknife, NT X1A 3R8
Canada
Tel: (867) 765-5695