Implementation of Remedial Action Plan – Year 1, Former U.S. Military Site and Residential Subdivision, Hopedale, Labrador

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EXECUTIVE SUMMARY

Aivek-Stantec Limited Partnership (Stantec) was retained by the Newfoundland and Labrador Department of Environment and Conservation (NLDEC) to supervise environmental site remediation and conduct confirmatory soil/sediment sampling during Years 1 to 3 of the Implementation of the Remedial Action Plan (RAP) at the Former U.S. Military Site and Residential Subdivision in Hopedale, Newfoundland and Labrador (NL) (see Drawing No. 121411777-200-EE-01 in Appendix A). The following report describes activities completed during Year 1 (2011-2012) of the Implementation of the RAP. The current program was carried out in response to a Phase II/III Environmental Site Assessment (ESA), Human Health and Ecological Risk Assessment (HHERA) and Remedial Action Plan / Risk Management Plan (RAP/RMP) conducted at the Former U.S. Military Site and Residential Subdivision by Stantec in 2009-2010 (refer to Stantec Report No. 121410103, dated May 17, 2010) and additional delineation conducted in 2010-2011 (refer to Stantec Report No. 121411170, dated February 28, 2011).

The scope of work for Year 1 of the Implementation of the RAP included environmental site remediation of polychlorinated biphenyl (PCB)-impacted soil and sediment exceeding the calculated site-specific target level (SSTL) of 9 mg/kg in two (2) areas at the Old Dump Pond site and in the stream in the Residential Subdivision in Hopedale, NL and the collection of confirmatory soil/sediment samples. Due to circumstances beyond the control of the site contractor (RJG Construction Ltd. (RJG)) (i.e., freight service delays due to weather and staffing issues), remedial work at the site did not commence until October 30, 2011. As a result, due to time constraints, remediation was only conducted in one area at the Old Dump Pond site. Additional horizontal and vertical delineation of PCB impacted soil and sediment was conducted in the areas that were not remediated in Year 1. These areas will be remediated in conjunction with Year 2 remedial activities to be conducted at the Former U.S. Military Site in Hopedale in 2012.

Site preparation activities consisting of site clearing and grubbing at the Old Dump Pond site and in the stream in the Residential Subdivision, and the excavation of a trench in the stream to enhance drainage were conducted between September and October, 2011.

Between October 30 and on November 16, 2011, RJG removed PCB-impacted soil and buried debris from the area surrounding monitor well MW-61 and test pit ODP-TP2 at the Old Dump Pond site under Stantec's supervision. Soil was loaded into 1 tonne capacity polypropylene soil bags that were tied shut and transported to a laydown area at Pit No. 1 of the Former U.S. Military Site (see Drawing No. 121411777-200-EE-02 in Appendix A). The bags were stacked up to four (4) bags high on a 40 mil polyethylene liner in the laydown area which is surrounded by a natural sand berm, pending transportation to an approved soil treatment/disposal facility. The bags were not transported offsite to an approved PCB treatment/disposal facility in the fall of 2011 as the risk associated with the transportation of the contaminated soil by barge in the

late fall/winter was considered too great. The bags will be transported in Year 2 along with soil removed as part of the Year 2 remedial activities. Confirmatory soil sampling was conducted along the limits of the excavation as soil removal progressed. Concentrations of PCBs detected in confirmatory soil samples collected along the final limits of the remedial excavation at the Old Dump Pond site ranged from 0.41 mg/kg (11-ODP-BS18) to 2.5 mg/kg (11-ODP-BS1) which are below the calculated SSTL of 9 mg/kg. A total of 286 bags (approximately 283 tonnes) were filled and removed from the Old Dump Pond site.

Large pieces of metal debris encountered in the remedial excavation were manually segregated from the soil and were placed in a temporary scrap metal stockpile at the Old Dump Pond site. High visibility caution tape was placed around the metal stockpile to warn potential recreational vehicle users passing through the area. Three (3) PCB swab samples were collected from pieces of metal (11-ODP-SWAB1 to 11-ODP-SWAB3) within the stockpile. PCBs were not detected in any of the swab samples (laboratory reportable detection limit, or RDL = 5 µg/ 100 cm^2).

Following receipt of confirming soil samples, the remedial excavation at the Old Dump Pond site was backfilled using 140 mm minus sized material. Approximately 60 tonnes of material obtained from a rock pit (owned by Max Kinden of Nain) created along the road to the local landfill in Hopedale was placed in the remedial excavation. Fill material was blasted and crushed by Budgell's of St. Anthony, NL under contract to Max Kinden.

On October 31 and November 7, 2011, additional soil sampling was conducted in the area surrounding monitor well MW-32 to further delineate the horizontal and vertical extent of PCB impacts in soil. A total of eleven (11) soil samples were collected from test pits excavated in the vicinity of monitor well MW-32 and were submitted for analysis of PCBs. Concentrations of PCBs were detected in all eleven (11) soil samples at concentrations ranging from 0.94 mg/kg to 67 mg/kg. The detected concentrations of PCBs in soil samples 11-ODP-BS6 (34 mg/kg), 11-ODP-BS8 (67 mg/kg), 11-ODP-BS9 (39 mg/kg), 11-ODP-BS11 (12 mg/kg), 11-ODP-BS15 (39 mg/kg) and 11-ODP-BS16 (28 mg/kg) exceeded the SSTL of 9 mg/kg. Based the results of soil sampling conducted as part of the current and previous investigations, there is an estimated 230 m^3 of PCB-impacted soil requiring remediation in the area surrounding monitor well MW-32 at the Old Dump Pond site. The previous estimate of PCB-impacted soil in this location, as provided in a previous Additional Delineation report (Stantec, 2011) was 150 m^3.

Between October 4 and November 5, 2011, ten (10) sediment samples were collected from the stream to delineate the horizontal and vertical extent of PCB impacted sediment. Concentrations of PCBs were detected in five (5) of the sediment samples at concentrations ranging from 0.02 mg/kg (11-Stream-SED5) to 22 mg/kg (11-Stream-SED3). The detected concentrations of PCBs in sediment sample 11-Stream-SED3 (22 mg/kg) collected from a depth of 0.5 m below the stream bottom exceeded the SSTL of 9 mg/kg. Based on the results of sediment sampling conducted as part of the current and previous investigations, for an assumed excavation width of 1.5 m there is an estimated 54 m^3 of sediment requiring removal from the stream in the Residential Subdivision. The previous estimate of PCB-impacted sediment in this location, as provided the previous Additional Delineation report (Stantec, 2011) was 15 m^3.

Recommendations

Based on the results of confirmatory soil sampling conducted as part of environmental site remediation, no further soil remediation for PCBs is necessary in the area surrounding former monitor well MW-61 and test pit ODP-TP2 at this time. Based on the results of the current and previous site investigations, Stantec makes the following recommendations for the Year 2 remediation program:

1. Complete the removal of PCB-impacted soil and sediment exceeding the SSTL of 9 mg/kg and remove buried debris in areas that were not finished in Year 1, as follows:
    a. ***Old Dump Pond site***: Area surrounding monitor wells MW-32 and MW-33, as shown on Drawing No. 121411777-200-EE-03 in Appendix A (not fully delineated to the east and west), to a depth of 1.0 below ground surface (mbgs). It is recommended that a 2 m soil berm be left in place between the remedial area and the pond to reduce surface water infiltration.
    b. ***Stream***: Area between samples 11-Stream-SED2 and 11-Stream-SED7 to a depth of 0.5 m, area between samples 11-Stream-SED7 and 11-Stream-SED9 to a depth of 1.0 m and area between samples 11-Stream-SED9 and 11-Stream-SED1 to a depth of 0.5 m, as shown on Drawing No. 121411777-200-EE-04 in Appendix A. Collect surface water samples for PCBs and TSS downstream of the remedial area during remedial activities to monitor compliance with CCME criteria.
2. Remove PCB-impacted soil at the ***Wharf Area/Pipeline site***, as per the proposal provided to NLDEC on May 27, 2011.
3. Collect confirmatory soil samples from the final limits of the excavations and submit for analysis of Total PCBs (rush turnaround time);
4. Once confirming results have been received, monitor the backfilling of the excavations with clean fill material (to be sourced from the Inuit Community of Hopedale) or site grading, as necessary.
5. Further evaluation is required prior to determining disposal options for metal debris removed from the remedial excavations.
6. Ensure that PCB-impacted soil removed during the Year 1 and Year 2 remedial programs is transported offsite to an approved soil treatment/disposal facility.
7. Prepare daily field reports while onsite and submit to the NLDEC project manager via email daily.
8. Prepare a written report detailing the remediation work completed in Year 2 (2012-2013) and provide recommendations for the Year 3 remediation program.

The statements made in the Executive Summary are subject to the same limitations included in the Closure Section 5.0 and are to be read in conjunction with the remainder of this report.

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1.0 INTRODUCTION

Aivek-Stantec Limited Partnership (Stantec) was retained by the Newfoundland and Labrador Department of Environment and Conservation (NLDEC) to supervise environmental site remediation and conduct confirmatory soil/sediment sampling during Years 1 to 3 of the Implementation of the Remedial Action Plan (RAP) at the Former U.S. Military Site and Residential Subdivision in Hopedale, Newfoundland and Labrador (NL) (see Drawing No. 121411777-200-EE-01 in Appendix A). The remediation program was carried out in response to a Phase II/III Environmental Site Assessment (ESA), Human Health and Ecological Risk Assessments (HHERA) and Remedial Action Plan / Risk Management Plan (RAP/RMP) conducted at the Former U.S. Military Site and Residential Subdivision by Stantec in 2010 (refer to Stantec Report No. 121410103, dated May 17, 2010).

The following report describes the work completed during Year 1 of the Implementation of the RAP field program and was prepared specifically and solely for the above project. It presents all of the factual findings and laboratory results of the work completed at the site from September to November 2011.

1.1 Site Description and History

1.1.1 Location and Access

The Inuit Community of Hopedale is located on the Labrador coast, 148 air miles to the north of Goose Bay, in Labrador and has no outside road access. Coastal boat service is available to the community from mid-summer to late fall.

The Former U.S. Military Site is located north and west of the main area of Hopedale. The Former U.S. Military Site consists of three main hilltop sites (i.e., BMEWS, Main Base and Mid-Canada Line) as well as several other associated sites. Local access to all the sites is via a gravel road network that is in varying conditions of repair.

1.1.2 Historical Development and Land Use

Construction of a military base and radar site in Hopedale, NL commenced in 1952 and was completed in 1957. The Hopedale military base and radar site was a station on the United States Air Force Pinetree Line and was also the most easterly site on the Mid-Canada Line of antennae stations which had extended across the country. The military base and radar site was one of a series of sites that functioned as a Ballistic Missile Early Warning System (BMEWS) where enemy aircraft penetrating the northeastern approaches to the continent were identified and information was communicated to the United States. It has been reported that during peak operations, the site housed 300 personnel.

The military base and radar site in Hopedale were operated from 1957 until 1969 by the United States government. The base was closed down in 1969 and the radome and radar antennae were removed. Portions of the remaining site were operated by Canadian Marconi as a telecommunications site until 1972 and by ITT as a telecommunications site until 1975. The complex was finally closed in 1975. Most of the remaining aboveground structures were demolished and buried in several locations around the site in the mid 1980s. At that time, limited clean-up efforts were carried out and included the removal and disposal of PCB containing transformers. With the exception of infrastructure at the Mid-Canada Line site, only the foundations and floor slabs of buildings and the foundations and bases of antennae currently remain on the Former U.S. Military Site. Two antennae and an associated operations building are currently being operated by Bell Aliant at the Mid-Canada Line site.

The Old Dump Pond site is located east of a pond that was historically used for storage of various metal waste and debris (i.e., wastes were stored in and around the pond) and downgradient of Reservoir Lake (the community's main water supply source), as shown on Drawing No. 121411777-200-EE-02 in Appendix A. The shore of the pond is heavily vegetated with some bedrock outcroppings. In 2009, steel debris, glass bottles and rusted drums were encountered in test pits excavated at the site indicating that the area may have been previously used as a waste dump site for the military site. The Old Dump Pond site is bordered to the southeast by a relatively new area of residential development on an elevated gravel pad, to the southwest by the waters of Old Dump Pond and by undeveloped land to the north. The site is accessible via a narrow gravel road to the northeast. Photos taken of the Old Dump Pond site during the current program are presented in Appendix B.

The stream in the Residential Subdivision originates in a small pond and boggy area (the Small Pond Bog), and flows through the east side of the subdivision in a north to south direction where it meets the Old Dump Pond outlet and eventually empties into Hopedale Harbour, located approximately 200 m south of the Residential Subdivision, as shown on Drawing No. 121411777-200-EE-02 in Appendix A. The stream bank is heavily vegetated with some areas of rocks and cobbles. A previously identified landfill area is present adjacent to the stream on the northeast side of the Residential Subdivision site. Photos taken of the stream during the current program are presented in Appendix B.

The Pit No. 1/Helipad site is located off of the main access road, as shown on Drawing No. 121411777-200-EE-02 in Appendix A and was used as a laydown area during the current project. The site is a heavily worked area consisting of gravel and boulders with low vegetation along the perimeter. Photos taken of Pit No. 1 during the current program are presented in Appendix B.

1.1.3 Topography, Drainage and Soils

The natural environment in Hopedale is typical of Labrador Coastal Barrens. Bedrock is granite and gneiss, and is largely exposed. Soil cover on the hills is relatively thin (generally < 0.5 m), with accumulations of rock, gravel, sand and organic matter in low lying areas. Deeply incised

U-shaped valleys occur in conjunction with steep-sided, rounded mountains and fjords that extend well inland. Large bogs can be found in the low-lying areas.

The Former U.S. Military Site is dominated by three (3) installations on hilltops elevated between 100 m and 150 m above sea level, including (from west to east): the BMEWS site, the Main Base and the Mid-Canada Line antennae site. Much of the area around the sites is exposed bedrock, with limited soil cover. Drainage from the BMEWS site is in all directions (i.e., to the north, east, south and west), including to the south towards Reservoir Lake (approximately 300 m to the south). Drainage from the Main Base and Mid-Canada Line sites is in all directions, including to the south and southwest towards the Small Pond Bog, which empties into the stream that flows through the Residential Subdivision and empties into Hopedale Harbour.

Based on the results of the current and previous subsurface investigations, the depth to bedrock at the Old Dump Pond site ranges from surface level (i.e., exposed bedrock) to approximately 2.8 m below ground surface (mbgs). Terrain in the vicinity of the Old Dump Pond site slopes to the west towards the pond. Surface drainage (apparent local groundwater flow direction) near the Old Dump Pond site is expected to be towards the pond which discharges to the southeast into Hopedale Harbour via a small stream.

Terrain at the Pit No. 1 site is relatively flat and slopes steeply to the east along the east boundary. Surface drainage (apparent groundwater flow direction) at the Pit No. 1 site is expected to be to the east towards Pit No. 3.

1.2 Previous Environmental Investigations

Several environmental assessment reports have been produced (mainly since 1996) relating to potential and actual contamination at and in the vicinity of the Former U.S. Military Site and Residential Subdivision in Hopedale, Labrador. In 2009 and 2010, Stantec conducted a Phase II/III ESA, HHERA and RAP/RMP at the Former U.S. Military Site and Residential Subdivision on behalf of the NLDEC (refer to Stantec Report No. 121410103, dated May 17, 2010). Stantec also supervised limited-remediation of PCB-impacted tar in three (3) areas of former military and radar site at that time and the removal of total of three (3) tandem dump truck loads of debris from the stream in the Residential Subdivision (surficial and partially buried debris) and from test pits excavated in the residential subdivision (buried debris).

Based on a review of site conditions and land uses conducted as part of the HHERA, residents of Hopedale would be expected to spend a majority of their time in the Inuit Community of Hopedale. This “Residential Area” was defined as including the Subdivision, the Wharf, Old Dump Pond, the Pipeline, and Small Pond Bog. Residents of Hopedale would be expected to visit the “Former Radar Site” occasionally for recreational purposes (*e.g.*, berry picking, hunting, walking). For the purposes of the human health risk assessment, the Residential Area and the Former Radar Site were assessed separately based on the expected human exposure time (i.e., human receptors would be expected to spend less time on the Former Radar Site than in the Residential Area) and activities (*e.g.*, hunting is expected to be limited to the Former Radar

Site). The results of the HHERA indicated the potential for adverse risks to human and/or ecological receptors from exposure to total petroleum hydrocarbons (TPH), PCBs and/or metals impacts at the Former Radar Site and the Residential Area; therefore, precautionary actions, remedial activities and risk management strategies were recommended for the control of hazards identified at the overall site. Priorities were assigned to different areas requiring remediation, with the highest priority assigned to PCB-impacted areas near residential areas and the PCB-impacted area located up-gradient of the community water supply source (the BMEWS site). The site-specific target levels (SSTLs) generated for the site are provided in Table 1.1.

Table 1.1 Summary of SSTLs to be applied to the Former Radar Site and Residential Area

Chemical	SSTL (mg/kg)	Source	Areas Requiring Remediation
Residential Area			
PCBs	9	HHRA	Old Dump Pond Wharf Area
Antimony	30	HHRA	Old Dump Pond
Former Radar Site			
PCBs	22	HHRA	BMEWS Old Base1 Main Base
TPH	1,700	ERA	BMEWS Main Base Pit No. 3 POL Compound
Metals	Lead: 75 Antimony: 5 Chromium: 20 Cadmium: 1.3	ERA	BMEWS Main Base Mid Canada Line POL Compound

It was recommended that SSTLs be used as remediation criteria at the site. Based on the remedial options evaluation, the preferred options for soil remediation at the Former U.S. Military Site and Residential Subdivision in Hopedale are as follows:

- ***PCB-Impacted Soil***: Stock-pile soil and transport to an existing out-of-province licensed hazardous waste landfill.
- ***TPH-Impacted Soil***: Pre-treat soil in temporary on-site biopile, then place soil in the local landfill.
- ***Metals-Impacted Soil***: Prior to selecting a remedial option, perform bioaccessibility testing on metals impacted soil requiring remediation and re-evaluate the SSTLs for metals within the HHERA.

In 2010-2011, Stantec conducted additional soil and sediment delineation, soil vapour monitoring, and a preliminary marine sampling program at the site to address data gaps and/or actions recommended in the 2010 Phase II/III ESA and HHERA report, and recommendations provided through consultation with the Nunatsiavut Government (NG) (refer to Stantec Report

No. 121411170, dated February 28, 2011). Volume estimates were refined for areas requiring soil remediation. Elevated concentrations of PCBs were detected in sediment and fish samples collected from Hopedale Harbour and from selected sediment samples collected from freshwater ponds and streams at the site; therefore, a comprehensive marine study was recommended.

The Government of Newfoundland and Labrador has committed funds over the next three (3) years to support ongoing remediation efforts in Hopedale and the completion of a Marine Study. Each year of site remediation and investigative work is to be conducted in accordance with NLDEC budget allowances. A Stakeholder Scientific Advisory Working Group (referred to as the "Stakeholder Committee") consisting of representatives from the Inuit Community Government of Hopedale, NG, Labrador Grenfell Health, the Department of Labrador and Aboriginal Affairs, NLDEC and technical advisors was established in 2011 to advise on go-forward work plans at the site. The data collected to date was discussed by a Stakeholder Committee in May, 2011, and a mutually-agreeable plan for Years 1 to 3 of the site remediation and investigative work was determined. The following scope of work has been proposed for Years 1 to 3 of the Implementation of the RAP:

<u>Year 1 (2011-2012)</u>

- Conduct hot-spot removal of PCB-impacted sediment in the stream running through the Residential Subdivision (estimated 15 m^3).
- Conduct remediation of PCB-impacted soil in the vicinity of Old Dump Pond (estimated 350 m^3).

<u>Year 2 (2012-2013)</u>

- Complete the remediation of PCB-impacted soil in areas that were not finished in Year 1, if necessary.
- Conduct the remediation of PCB-impacted soil at the pipeline site (estimated 350 m^3).

<u>Year 3 (2013-2014)</u>

- Complete the remediation of PCB-impacted soil in area(s) that were not finished in Year 2, if necessary.
- Start the remediation of PCB-impacted soil at the BMEWS site (estimated 850 m^3 total).

The work scope was meant to be revised each year and was meant to be flexible based on the results of a marine study (reported under separate cover) and recommendations provided by the Stakeholder Committee.

1.3 Scope of Work

The scope of work for Year 1 of the Implementation of the Remedial Action Plan, as described in Stantec's proposal submitted to NLDEC on May 27, 2011, included the remediation of PCB-impacted soil and sediment at the Former U.S. Military Site and Residential Subdivision in areas closest to current residential areas, as follows:

- In the stream running through the Residential Subdivision (estimated 15 m^3).
- In two (2) areas at the Old Dump Pond site (estimated 350 m^3).

In August, 2011, Stantec prepared tender documents using Municipal Affairs templates and master specifications for remedial work at the Former U.S. Military Site and Residential Subdivision in Years 1 to 3. The successful contractor was RJG Construction Ltd. (RJG) of St. John's, NL. RJG were responsible for site preparation, the excavation of impacted soil, sediment and debris from specified areas, and the proper disposal of impacted materials. RJG was also responsible for providing all necessary heavy equipment, including excavators, loaders, laborers, and dump trucks and for providing a scale system in Hopedale to record soil weights.

Due to circumstances beyond the control of RJG (i.e., freight service delays due to weather and staffing issues), remedial work at the site did no commence until October 30, 2011. It was initially planned to remediate soil in two (2) areas at the Old Dump Pond site and in the stream in the Residential Subdivision in the fall of 2011 as per the proposed scope of work; however, due to time constraints, remediation was only conducted in one (1) area at the Old Dump Pond site. Additional horizontal and vertical delineation of PCB impacted soil and sediment was conducted in the areas that were not remediated in Year 1 in preparation for future remediation of these areas. These areas will be remediated in conjunction with Year 2 remedial activities to be conducted at the Former U.S. Military Site in Hopedale in 2012.

1.4 Regulatory Framework

NLDEC *Policy Directive PPD05-01* allows a site owner to use either of two approaches when remediating chemical impacts on a site. Remediation of chemical impacts in various site media (*e.g.*, soil, sediment, groundwater, surface water) can be completed using a criteria-based approach or a risk-based approach. Under the criteria-based remedial approach, the defined site impacts are remediated to levels below existing regulatory guidelines for the appropriate media. Under the risk-based remedial approach, the defined site impacts are remediated to levels below site-specific target levels (SSTLs) that are developed for the site during a site-specific human health risk assessment (HHRA) and ecological risk assessment (ERA) (if necessary).

For simple sites and sites with limited impacts, a criteria-based approach to remediation is often applied to guide the extent of removal of impacted media from the site. For more complex sites and sites with extensive impacts from multiple chemicals of concern (COCs), a human health and/or ecological risk assessment is often completed, based on the actual site conditions and

the actual human and ecological usage of the site, to derive SSTLs to determine remedial options or a risk management strategy for the site. Experience at other former military Pinetree sites in Newfoundland and Labrador indicates that a risk-based remedial approach is the most appropriate for a complex site such as the one in Hopedale.

As part of the HHERA (Stantec, 2010), SSTLs were calculated for certain metals, petroleum hydrocarbons and PCBs. Where necessary, SSTLs were derived in accordance with the methods presented in *A Protocol for the Derivation of Environmental and Human Health Soil Quality Guidelines* (Canadian Council of Ministers of the Environment (CCME), 2006). The specific methods employed to develop the SSTLs are consistent with CCME and Health Canada protocols as referenced above, and with standard human health risk assessment methodologies. The derivation of SSTLs for petroleum hydrocarbons (TPH, BTEX) was made with the aid of Groundwater Services, Inc. (GSI) RBCA Toolkit for Atlantic Canada, Version 2.1. The spreadsheet model is based on the exposure and mass transport equations presented in the appendix of the ASTM PS-104 *Standard Provisional Guide for Risk-Based Corrective Action* (ASTM 2002). Table 1.1 in Section 1.2 summarizes the SSTLs to be applied at the Former Radar Site and Residential Area based on the results of the HHERA (Stantec, 2010).

Concentrations of total suspended solids (TSS) in surface water have been compared to the criteria based Canadian Council of Ministers of the Environment (CCME) *Canadian Water Quality Guidelines* (CWQG) *for the Protection of Aquatic Life* (CCME Guidelines; 1999 and subsequent updates) and its associated documents. The CCME CWQG states that for clear flow (i.e., stream water), there should not be more than a 25 mg/L increase in suspended solids and an 8 NTU increase in turbidity from background levels for any short-term exposure (24-hr. period); while for long term exposure, there should not be more than a 5 mg/L increase in suspended solids and a 2 NTU increase in turbidity from background levels. There are currently no provincial or federal guidelines for PCBs in surface water.

2.0 SITE WORK – OLD DUMP POND

2.1 Description of Site Work

Site remediation activities at the Old Dump Pond site consisting of site preparation, the excavation and removal of PCB-impacted soil and buried debris, site reinstatement and confirmatory soil sampling and additional delineation were carried out between September 23 and November 16, 2011 in conjunction with remedial work completed at the Old School Site in Hopedale (reported under separate cover). Stantec personnel were onsite from September 27 to October 4, 2011 and October 22 to November 16, 2011. An additional site visit was conducted on December 15, 2011 to verify the overall status of the site. Stantec personnel were onsite for the duration of PCB-impacted soil remediation at the Old Dump Pond site.

Remedial activities were undertaken by RJG of St. John's, NL under separate contract to NLDEC and were supervised by Stantec personnel, who maintained a record of activities while

on-site and collected confirmatory soil samples. Stantec personnel documented subsurface observations during remediation, including the dimensions, location and depth of the remedial excavation and the depth and location of confirmatory soil samples.

Based on the results of previous investigations, two (2) areas required remediation at the Old Dump Pond site. The first area surrounded monitor well MW-61 (PCBs = 29 mg/kg) and test pit ODP-TP2 (PCBs = 50 mg/kg) and the second area surrounded monitor well MW-32 (PCBs = 25 mg/kg). Due to circumstances beyond the control of RJG (i.e., freight service delays), remedial work at the Old Dump Pond site did not commence until October 30, 2011. It was initially planned to remediate soil in the two areas at the Old Dump Pond site in the fall of 2011; however, due to time constraints, remediation was only conducted in the area surrounding monitor well MW-61 and test pit ODP-TP2. Additional soil sampling was conducted in the area surrounding monitor well MW-32 as part of the current program to further delineate PCB impacts horizontally and vertically. This area will be remediated in conjunction with Year 2 remedial activities to be conducted at the Former U.S. Military Site in Hopedale in 2012.

2.1.1 Site Preparation

Prior to commencing any remedial activities, the Old Dump Pond site was prepared to facilitate soil and debris segregation and removal. Site preparation was conducted between mid-September and early October 2011. The following site preparations were undertaken prior to the commencement of the remedial activities:

- Site clearing and grubbing was conducted throughout the two (2) areas requiring remediation and along the access road to the Old Dump Pond site. All trees and shrubs were removed and transported to the local landfill for disposal.
- The access road to the site was re-graded to facilitate heavy equipment access.
- The areas requiring remediation were marked out in the field using survey stakes and spray paint, based on the results of previous investigations.
- Once the areas were marked out, clearances for underground services were obtained by Stantec personnel in conjunction with the Hopedale Water and Sewer Department.
- A metal chute was constructed to facilitate the loading of soil into bags.
- Temporary storage pads were created at the Old Dump Pond site using 40 mil high density polyethylene (HDPE) base liners that extended over sand perimeter berms.
- Large rocks present along the side slope of the elevated subdivision pad were present along the eastern edge of the area requiring remediation. These rocks were removed and placed along the side slope to the north and south of the area requiring remediation as shown in Photo 6 in Appendix B.

2.1.2 Excavation of PCB-Impacted Soil

Between October 30 and November 5, 2011, RJG removed PCB-impacted soil and buried debris from the area surrounding monitor well MW-61 and test pit ODP-TP2 at the Old Dump

Pond site under Stantec's supervision. Confirmatory soil sampling was conducted along the limits of the excavation as soil removal progressed to verify that concentrations of PCBs in soil remaining on the site was below the SSTL of 9 mg/kg. Based on the results of an initial round of confirmatory soil sampling, additional soil removal was required to the west of sample 11-ODP-BS10 (as shown on Drawing No. 121411777-200-EE-03 in Appendix A). Additional soil removal was conducted in this area on November 16, 2011.

Soil and debris was excavated using a tack-mounted Case 210X excavator. Soil was loaded into 1 tonne capacity polypropylene soil bags using the metal chute (as shown in Photo 8 in Appendix B). The bags are UN certified and have a 3 year lifespan. The bags were tied shut and transported to a laydown area at Pit No. 1 of the Former U.S. Military Site (see Drawing No. 121411777-200-EE-02 in Appendix A) for temporary storage until they are shipped out of Hopedale. The bags were moved using a Yanmar tractor, a Case 210X excavator, rock trucks and a boom truck. The bags were stacked up to four (4) bags high on a 40 mil polyethylene liner in the laydown area which is surrounded by a natural sand berm.

A substantial amount of buried metal debris was encountered in the remedial excavation. Metal debris consisted of empty 45 gallon drums, poles, girders, rebar, vehicle parts and other small pieces of metal. Broken glass and amber glass bottles were also encountered in the remedial excavation. Large pieces of metal were manually segregated from the soil as it poured down the chute into the bags and were placed in a temporary scrap metal stockpile at the Old Dump Pond site. Smaller pieces of debris were placed in the bags with soil. Swab samples were collected from the large pieces of unwashed metal debris to verify PCB concentrations on metal.

The eastern portion of the final excavation extended to bedrock at depths ranging from approximately 0.1 mbgs to 1.0 mbgs. The western corner of the final excavation in the vicinity of samples 11-ODP-BS10 and 11-ODP-BS18 extended to approximately 1.0 mbgs. Bedrock was not encountered at this location. Groundwater seepage was encountered in the western corner of the excavation at a depth of approximately 0.5 mbgs. No sheening was observed on groundwater.

Soil removal progressed until concentrations of PCBs in confirming samples collected along the final limits of the excavation were below the SSTL of 9 mg/kg. A total of 286 bags were filled with PCB-impacted soil, which represents approximately 283 tonnes. The daily number of soil bags filled during site remediation is provided in Table 2.1 below.

Table 2.1 Summary of Soil Bags Filled – Old Dump Pond

Date	Number of Bags Filled
30-Oct-11	1
31-Oct-11	14
1-Nov-11	62
2-Nov-11	18
3-Nov-11	60
4-Nov-11	56
5-Nov-11	64
16-Nov-11	11
TOTAL:	**286 bags (283 tonnes)**

Photos taken during remedial excavation, including photos of the laydown area are provided in Appendix B.

2.1.3 Confirmatory Soil Sampling

On October 4, 2011, two (2) test pits (11-ODP-TP1 and 11-ODP-TP2) were excavated in the vicinity of MW-61 and ODP-TP2 prior to the commencement of remedial activities to verify the extent of soil requiring remediation (as shown on Drawing No. 121411777-200-EE-03 in Appendix A). Test pits were excavated using a Case CX210B track-mounted excavator operated by RJG under the supervision of Stantec personnel. The test pits were excavated to 0.5 mbgs, and were backfilled with excavated material upon completion. Groundwater seepage was observed at the base of both test pits. Soil samples were recovered from the surface to the base of the test pits by bulk sample methods. The samples were visually examined in the field for any evidence of impacts and were placed in clean glass jars with Teflon liners. Samples were placed on ice in sample coolers which were promptly shipped to Maxxam Analytics Inc. in Bedford, NS for analysis of PCBs.

Confirmatory soil sampling was conducted as remedial activities progressed between October 31 and November 7, 2011. Five (5) confirmatory soil samples (11-ODP-BS1 to 11-ODP-BS5 and 11-ODP-BS10) were collected from the sidewalls of the excavation near the base and one (1) soil sample (11-ODP-BS6) was collected from the base of the excavation just above bedrock to verify PCB concentrations at 1 m depth. All soil in the vicinity of base sample 11-ODP-BS6 was removed to bedrock following sample collection. The samples were collected by bulk sample methods. The samples were visually examined in the field for any evidence of impacts and were placed in clean glass jars with Teflon liners. Samples were placed on ice in sample coolers which were promptly shipped to Maxxam Analytics Inc. in Bedford, NS for analysis of PCBs. Soil sample locations are shown on Drawing No. 121411777-200-EE-03 in Appendix A.

On November 16, 2011, additional soil was removed to the west of sample 11-ODP-BS10. Groundwater seepage was encountered at approximately 0.5 mbgs at this location. Soil was removed to a depth of approximately 1.0 mbgs. An additional confirmatory soil sample was

collected from the final sidewall of the excavation (11-ODP-BS18) just above the groundwater interface between approximately 0.3 and 0.5 mbgs, as shown on Drawing No. 121411777-200-EE-03 in Appendix A. The samples were collected by bulk sample methods. The samples were visually examined in the field for any evidence of impacts and were placed in clean glass jars with Teflon liners. Samples were placed on ice in sample coolers which were promptly shipped to Maxxam Analytics Inc. in Bedford, NS for analysis of PCBs.

A summary of all test pit and confirmatory soil samples collected from the remedial excavation at the Old Dump Pond site is provided in Table 2.2.

Table 2.2 Summary of Confirmatory Soil Samples Collected – Old Dump Pond

Sample I.D	Date Collected	Sample Depth (mbgs)	Groundwater Seepage Depth (mbgs)	Notes	Laboratory Analysis Conducted
11-ODP-TP1	4-Oct-11	0.0 – 0.5	0.5	Glass and metal debris encountered.	PCBs
11-ODP-TP2	4-Oct-11	0.0 – 0.5	0.5	Rusted barrel and metal pipe encountered. Sheen on water.	PCBs
11-ODP-BS1	31-Oct-11	0.0 – 0.1	-	Bedrock encountered at 0.1 mbgs.	PCBs
11-ODP-BS2	31-Oct-11	0.0 – 0.5	-	Rusted barrel encountered.	PCBs
11-ODP-BS3	31-Oct-11	0.0 – 0.5	-	Glass bottles, steel girders, crushed barrels encountered. Stained soil (black).	PCBs
11-ODP-BS4	31-Oct-11	0.0 – 0.5	-	Metal debris encountered.	PCBs
11-ODP-BS5[1]	31-Oct-11	0.9 – 1.0	0.5	Bedrock encountered at 1.0 mbgs. Metal debris, orange rust encountered. Stained soil (black).	PCBs
11-ODP-BS10	7-Nov-11	0.0 – 0.7	0.7	Orange rust.	PCBs
11-ODP-BS18	16-Nov-11	0.0 – 0.7	-	-	PCBs

Notes:
mbgs = meters below ground surface
1. Sample collected to verify PCB concentrations at 1.0 m depth (i.e., not a confirmatory soil sample)

2.1.4 PCB-Swab Sampling

Three (3) swab samples were collected from the large pieces of unwashed metal debris (11-ODP-SWAB1 to 11-ODP-SWAB3) removed from the remedial excavation. Each sample was swabbed over a 10 cm by 10 cm area (i.e., 100 cm^2) using swabs prepared by Maxxam Analytics Inc. for PCB content. Swab samples were frozen and shipped to Maxxam Analytics Inc. in Bedford, NS for analysis of the mass of PCBs present in each sample.

2.1.5 Backfilling and Reinstatement Activities

The remedial excavation at the Old Dump Pond site was backfilled between November 14 and 16, 2011 using 140 mm minus sized material. Approximately 60 tonnes (3 truckloads) of material was placed in the remedial excavation. Backfill material was compacted with the

excavator bucket. Fill material was obtained from a rock pit (owned by Max Kinden of Nain) created along the road to the local landfill, as shown on Drawing No. 121411777-200-EE-02 in Appendix A. Fill material was blasted and crushed by Budgell's of St. Anthony, NL under contract to Max Kinden.

2.1.6 Additional Delineation

On October 30 and November 7, 2011, additional soil sampling was conducted in the area surrounding monitor well MW-32 to further delineate PCB impacted soil. A total of eleven (11) soil samples were collected by bulk sample methods from shallow test pits (11-ODP-BS6 to 11-ODP-BS9 and 11-ODP-BS11 to 11-ODP-BS17), as shown on Drawing No. 121411777-200-EE-03 in Appendix A. Test pits were excavated using a Case CX210B track-mounted excavator operated by RJG under the supervision of Stantec personnel. The test pits were excavated to depths ranging from 0.5 to 1.5 mbgs, and were backfilled with excavated material upon completion.

A total of eight (8) soil samples were collected from test pits excavated to delineate the horizontal extent of PCB-impacted soil (11-ODP-BS6, 11-ODP-BS7, 11-ODP-BS8, 11-ODP-BS11, 11-ODP-BS13, 11-ODP-BS15, 11-ODP-BS17 and 11-ODP-BS18) and three (3) soil samples were collected from test pits excavated to delineate the vertical extent of PCB-impacted soil (11-ODP-BS9, 11-ODP-BS12 and 11-ODP-BS14). Soil samples were recovered from continuous intervals within the test pits by bulk sample methods. All soil samples were visually examined in the field for any evidence of impacts. The samples were collected by bulk sample methods and were placed in clean glass jars with Teflon liners. Samples were placed on ice in sample coolers which were shipped to Maxxam Analytics Inc. in Bedford, NS for analysis of PCBs. A summary of the additional soil samples collected in the area surrounding monitor well MW-32 at the Old Dump Pond site is provided in Table 2.3.

Table 2.3 Summary of Additional Soil Samples Collected – Old Dump Pond

Sample I.D	Date Collected	Sample Depth (mbgs)	Groundwater seepage? (mbgs)	Notes	Laboratory Analysis Conducted
11-ODP-BS6	31-Oct-11	0.0 – 0.5	0.5	Metal debris and orange rust encountered. Stained soil (black). Sheen on water.	PCBs
11-ODP-BS7	31-Oct-11	0.0 – 0.5	0.5	Metal debris and orange rust encountered. Stained soil (black).	PCBs
11-ODP-BS8	31-Oct-11	0.0 – 0.5	0.5	Metal debris encountered.	PCBs
11-ODP-BS9	31-Oct-11	0.7	0.7	Metal debris encountered.	PCBs
11-ODP-BS11	7-Nov-11	0.0 – 0.5	0.5	Metal debris, glass and orange rust encountered.	PCBs
11-ODP-BS12	7-Nov-11	1.3 – 1.4	0.7	-	PCBs
11-ODP-BS13	7-Nov-11	0.0 – 0.5	0.5	Metal debris encountered.	PCBs
11-ODP-BS14	7-Nov-11	1.4 – 1.5	0.8	Metal debris encountered from 0.0 to 0.8 mbgs.	PCBs

Sample I.D	Date Collected	Sample Depth (mbgs)	Groundwater seepage? (mbgs)	Notes	Laboratory Analysis Conducted
11-ODP-BS15	7-Nov-11	0.0 – 0.5	0.5	Metal debris and orange rust encountered.	PCBs
11-ODP-BS16	7-Nov-11	0.0 – 0.5	0.6	Metal debris, orange rust and a barrel encountered.	PCBs
11-ODP-BS17	7-Nov-11	0.0 – 0.5	-	Metal debris and a barrel encountered.	PCBs
Notes: mbgs = meters below ground surface					

With the exception of test location 11-ODP-BS17, groundwater seepage was observed in all the test pits at depths ranging from 0.5 to 0.8 mbgs. A substantial amount of buried metal debris and rust on soil was observed at the test locations.

2.2 Laboratory Analytical Results – Confirmatory Soil and Swab Sampling

2.2.1 PCBs in Soil

PCB analysis was conducted on nine (9) confirmatory soil samples collected from the remedial excavation in the vicinity of former monitor well MW-61 at the Old Dump Pond site (11-ODP-TP1, 11-ODP-TP2, 11-ODP-BS1 to 11-ODP-BS5, 11-ODP-BS10 and 11-ODP-BS18). Results of the laboratory analysis of confirmatory soil samples for PCBs are presented in Table C.1 in Appendix C. The corresponding analytical reports from Maxxam Analytics Inc. are presented in Appendix D.

Concentrations of PCBs were detected in all nine (9) confirmatory soil samples at concentrations ranging from 0.41 mg/kg (11-ODP-BS18) to 34 mg/kg (11-ODP-BS5). The detected concentrations of PCBs in soil samples 11-ODP-TP1 (11 mg/kg), 11-ODP-TP2 (14 mg/kg), 11-ODP-BS5 (34 mg/kg) and 11-ODP-BS10 (18 mg/kg) exceeded the SSTL of 9 mg/kg. Concentrations of PCBs detected in confirmatory soil samples collected along the final limits of the remedial excavation ranged from 0.41 mg/kg (11-ODP-BS18) to 2.5 mg/kg (11-ODP-BS1) which are below the calculated SSTL of 9 mg/kg.

2.2.2 PCBs on Metal

PCB analysis was conducted on three (3) swab samples collected from metal debris removed from the remedial excavation at the Old Dump Pond site (11-ODP-SWAB1 to 11-ODP-SWAB3). Results of the laboratory analysis of soil samples for total PCB content are presented in Table C.2 in Appendix C. The corresponding analytical reports from Maxxam Analytics Inc. are presented in Appendix D.

PCBs were not detected in any of the swab samples above the laboratory reportable detection limit of 5 µg/100 cm^2.

2.3 Laboratory Analytical Results – Additional Delineation

2.3.1 PCBs in Soil

PCB analysis was conducted on eleven (11) soil samples collected in the vicinity of monitor well MW-32 at the Old Dump Pond Site (11-ODP-BS6 to 11-ODP-BS9 and 11-ODP-BS11 to 11-ODP-BS17). Results of the laboratory analysis of soil samples for PCBs are presented in Table C.1 in Appendix C. The corresponding analytical reports from Maxxam Analytics Inc. are presented in Appendix D.

Concentrations of PCBs were detected in all eleven (11) soil samples collected in the vicinity of monitor well MW-32 at concentrations ranging from 0.94 mg/kg (11-ODP-BS14) to 67 mg/kg (11-ODP-BS8). The detected concentrations of PCBs in soil samples 11-ODP-BS6 (34 mg/kg), 11-ODP-BS8 (67 mg/kg), 11-ODP-BS9 (39 mg/kg), 11-ODP-BS11 (12 mg/kg), 11-ODP-BS15 (39 mg/kg) and 11-ODP-BS16 (28 mg/kg) exceeded the SSTL of 9 mg/kg. None of the remaining detected concentrations of PCBs exceeded the calculated SSTL.

2.3.2 Soil Sample Exceedances

Table 2.4 summarizes the soil concentrations from the current and previous investigations for soil remaining at the site (i.e., soil surrounding monitor wells MW-32 and MW-33) that exceeded the calculated SSTL of 9 mg/kg. The estimated area of PCB-impacted soil requiring remediation based on soil sample exceedances is shown on Drawing No. 121411777-200-EE-03 in Appendix A.

Table 2.4 Soil Sample Exceedances

Parameter	Sample No.	Sample Depth (m)	Concentration	Guideline
PCBs	11-ODP-BS6	0.0 – 0.5	64 mg/kg	9 mg/kg (SSTL)
	11-ODP-BS8	0.0 – 0.5	67 mg/kg	
	11-ODP-BS9	0.7	39 mg/kg	
	11-ODP-BS11	0.0 – 0.5	12 mg/kg	
	11-ODP-BS15	0.0 – 0.5	39 mg/kg	
	11-ODP-BS16	0.0 – 0.5	28 mg/kg	
Referenced Guideline: SSTL calculated in the HHERA (Stantec, 2010)				

Based on an estimated area of impacts of 230 m^2 and a depth of impacts of 1 m, there is an estimated 230 m^3 of PCB-impacted soil requiring remediation that remains at the Old Dump Pond site. The previous estimate of PCB-impacted soil in this location, as provided in the Additional Delineation report (Stantec, 2011) was 150 m^3.

2.4 Temporary Storage of PCB-Impacted Soil

It was RJG's intention to transfer the soil bags offsite to an approved PCB treatment/disposal facility this year; however, the increased risk associated with transportation of the contaminated

soil by sea barge in the late fall/early winter was considered too great, and therefore the material has been stored at a laydown area (contained in bags, on a liner) until the material can be safely transported in 2012.

A total of 14 discrete soil samples collected from a combination of test pits, monitoring wells and the remedial excavation sidewalls were collected in the area of the remedial excavation at the Old Dump Pond site as part the current soil remediation program and previous investigations. PCB concentrations ranged from non-detect (RDL = 0.05 mg/kg) to a maximum concentration of 50 mg/kg (found in one sample only (ODP-TP2 BS1)).

Stantec reviewed the *Toxic Substances Management Policy* (Environment Canada, 1997) as well as the *PCB Regulations* (Canada Environmental Protection Act, 1999) to determine the applicability of Federal requirements for interim storage of PCB-impacted soil removed from the Old Dump Pond site in Hopedale, NL. Stantec also contacted Rita Mroz at Environment Canada to discuss PCB management practices at other federal contaminated sites.

Based on Stantec's understanding of the regulations and confirmation based on verbal discussions between John Henderson of Stantec (Senior Engineer, Environmental Remediation) and Rita Mroz of Environment Canada, the PCB Regulations (with respect to storage requirements) do not apply to materials containing PCB at concentrations of less than 50 mg/kg. Also, it is understood that Environment Canada would determine the PCB concentration based on the total mass of material being stored. So, based on the results of the analytical testing from the current and previous sampling programs, the concentration of PCB in the mass of soil from the remedial excavation in any of the bags is expected to be less than the 50 mg/kg which would trigger the Storage requirements of the PCB Regulations. Therefore, the Federal *PCB Regulations* do not apply to the temporary storage of this material. Notwithstanding this, the excavated soil has been loaded into secure soil bags and placed on a 40 mil liner in a low traffic area as part of due diligence measures taken to protect the soil from the elements over the winter months pending final transport to the disposal facility. Permission to store the bags at Pit No. 1 over the winter months was granted by Wayne Piercy, *AngajukKâk* (i.e., mayor) for the Inuit Community of Hopedale.

Photos of the temporary storage area are provided in Appendix B.

2.5 Temporary Storage of Scrap Metal

Large pieces of scrap metal that were encountered in the remedial excavation at the Old Dump Pond site were stockpiled next to the remedial excavation. High visibility caution tape was placed around the metal stockpile and the excavator bucket was placed over the pile to warn potential recreational vehicle users passing through the area (Photo 17, Appendix B). Three (3) PCB swab samples were collected from pieces of metal (11-ODP-SWAB1 to 11-ODP-SWAB3) within the stockpile. PCBs were not detected in any of the swab samples (RDL = 5 µg/100 cm^2). Photos of the metal stockpile are provided in Appendix B.

Further evaluation is required prior to the selection of a disposal option for metal.

3.0 SITE WORK – STREAM

3.1 Description of Site Work

Based on the results of previous investigations, one (1) PCB hot-spot was identified in sediment in the stream running through the Residential Subdivision that required remediation (PCBs = 17 mg/kg in sample SED4-10). Site preparation activities were conducted between September and October, 2011. It was initially planned to remediate sediment in this area in the fall of 2011; however, due to time constraints caused by freight service delays, remediation was not conducted in this area in 2011.

While on-site, Stantec conducted additional sediment sampling in the stream to refine the horizontal and vertical extent of the area requiring remediation. This area will be remediated in conjunction with Year 2 remedial activities to be conducted at the Former U.S. Military Site in Hopedale in 2012.

3.1.1 Site Preparation

The stream in the Residential Subdivision was prepared to facilitate soil and debris segregation and removal. The following site preparations were undertaken prior to the commencement of the remedial activities:

- Site grubbing and clearing were conducted throughout the area requiring remediation within the stream between September 28 and October 4, 2011. All trees and shrubs were removed and transported to the local landfill for disposal.
- A trench was excavated in the stream and a trail downstream of the area requiring remediation was removed to increase drainage in the area on October 29 and 31, 2011. Excavated materials were placed along the bank to drain.

3.1.2 Sediment Sampling

Prior to the commencement of remedial activities, additional sediment sampling was conducted to verify the extent of sediment requiring remediation in the stream. On October 4, 2011 two (2) sediment samples were collected to verify the horizontal extent of the area requiring remediation (11-Stream-SED1 and 11-Stream-SED2). On October 31, 2011 three (3) sediment samples were collected from the presumed base of the remedial excavation to confirm the vertical extent of sediment requiring remediation (11-Stream-SED3 to 11-Stream-SED5). Based on the results of the October 31, 2011 sampling, additional vertical delineation, consisting of the collection of five (5) sediment samples (11-Stream-SED6 to 11-Stream-SED10), was conducted on November 5, 2011.

Sediment samples were collected with a hand-held stainless steel shovel. Sediment samples were recovered by bulk sample methods. All sediment samples were visually examined in the field for any evidence of impacts. The samples were placed in clean glass jars with Teflon

liners. Samples were placed on ice in sample coolers which were shipped to Maxxam Analytics Inc. in Bedford, NS for analysis of PCBs. A summary of the sediment samples collected from the stream in the Residential Subdivision is provided in Table 3.1.

Table 3.1 Summary of Sediment Samples Collected – Stream

Sample I.D	Date Collected	Sample Depth (m below stream bottom)	Notes	Laboratory Analysis Conducted
11-Stream-SED1	4-Oct-11	0.0 – 0.15	-	PCBs
11-Stream-SED2	4-Oct-11	0.0 – 0.15	-	PCBs
11-Stream-SED3	31-Oct-11	0.5	-	PCBs
11-Stream-SED4	31-Oct-11	0.5	-	PCBs
11-Stream-SED5	31-Oct-11	0.5	-	PCBs
11-Stream-SED6	5-Nov-11	1.0	-	PCBs
11-Stream-SED7	5-Nov-11	0.5	-	PCBs
11-Stream-SED8	5-Nov-11	1.0	-	PCBs
11-Stream-SED9	5-Nov-11	0.5	-	PCBs
11-Stream-SED10	5-Nov-11	1.0	-	PCBs

Sediment sample locations are shown on Drawing No. 121411777-200-EE-03 in Appendix A.

3.1.3 Baseline Surface Water Sampling

On October 30, 2011 a surface water sample was collected from the stream, approximately 90 m downstream of the area requiring remediation (11-SUBDIV-OCT30) to determine baseline concentrations of TSS and PCBs in water to ensure compliance with regulatory requirements during sediment removal. The surface water sample was collected into clean, new laboratory-supplied bottles. The bottles were placed on ice in a sample cooler and were shipped to Maxxam Analytics Inc.'s laboratory in Bedford, NS for analysis of TSS and PCBs. The location of the surface water sample is shown on Drawing No. 121411777-200-EE-02 in Appendix A.

3.2 Laboratory Analytical Results - Sediment and Surface Water Sampling

3.2.1 PCBs in Sediment

PCB analysis was conducted on ten (10) sediment samples collected from the stream, including two (2) samples collected near the surface (11-Stream-SED1 and 11-Stream-SED2), five (5) samples collected from 0.5 mbgs (11-Stream-SED3, 11-Stream-SED4, 11-Stream-SED5, 11-Stream-SED7 and 11-Stream-SED9) and three (3) samples collected from 1.0 mbgs (11-Stream-SED6, 11-Stream-SED8 and 11-Stream-SED10). Results of the laboratory analysis

of sediment samples for PCBs are presented in Table C.3 in Appendix C. The corresponding analytical reports from Maxxam Analytics Inc. are presented in Appendix D.

Concentrations of PCBs were detected in five (5) of the sediment samples at concentrations ranging from 0.02 mg/kg (11-Stream-SED5) to 22 mg/kg (11-Stream-SED3). The detected concentration of PCBs in sediment sample 11-Stream-SED3 (22 mg/kg) exceeded the SSTL of 9 mg/kg. None of the remaining detected concentrations of PCBs exceeded the calculated SSTL.

3.2.2 PCBs in Water

PCB analysis was conducted on one (1) water sample collected from the stream to document baseline conditions (11-SUBDIV-OCT30). Results of the laboratory analysis of samples for PCBs are presented in Table C.4 in Appendix C. The corresponding analytical reports from Maxxam Analytics Inc. are presented in Appendix D.

PCBs were not detected in the water sample.

3.2.3 TSS in Water

TSS analysis was conducted on one (1) water sample collected from the stream to document baseline conditions (11-SUBDIV-OCT30). Results of the laboratory analysis of samples for PCBs are presented in Table C.4 in Appendix C. The corresponding analytical reports from Maxxam Analytics Inc. are presented in Appendix D.

The concentration of TSS detected in the water sample was 2 mg/L. The CCME guidelines state that for clear flow, concentrations of TSS in surface water should not increase by more than 25 mg/L from background levels for any short-term exposure (*e.g.*, 24-h period) or by an average of 5 mg/L from background levels for longer term exposures (*e.g.*, inputs lasting between 24 h).

3.3 Sediment Sample Exceedances

Table 3.2 summarizes the sediment concentrations from the current and previous investigations that exceeded the calculated SSTL of 9 mg/kg. The estimated area of PCB-impacted sediment requiring remediation based on sediment sample exceedances is shown on Drawing No. 121411777-200-EE-04 in Appendix A.

Table 3.2 Sediment Sample Exceedances

Parameter	Sample No.	Sample Depth (m)	Concentration	Guideline
PCBs	SED4-10	0.0 – 0.15	17 mg/kg	9 mg/kg (SSTL)
	11-Stream-SED3	0.5	22 mg/kg	
Referenced Guideline: SSTL calculated in the HHERA (Stantec, 2010)				

Based on the above noted exceedances is it is recommended that sediment between samples 11-Stream-SED2 and 11-Stream-SED7 and between samples 11-Stream-SED9 to 11-Stream – SED1 be removed to a depth of 0.5 m and that sediment between samples 11-Stream-SED7 and 11-Stream-SED9 be removed to a depth of 1.0 m. Based on an assumed excavation width of 1.5 m, an estimated 54 m^3 of sediment requires removal from the stream in the Residential Subdivision. The previous estimate of PCB-impacted sediment in this location, as provided in the Additional Delineation report (Stantec, 2011) was 15 m^3.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

Stantec supervised environmental site remediation and conducted confirmatory soil sampling in the area surrounding monitor well MW-61 and test pit ODP-TP2 at the Old Dump Pond site in Hopedale, Newfoundland and Labrador during Year 1 of remedial activities conducted at the Former U.S. Military Site and Residential Subdivision. Due to time constraints, remediation was not conducted in the area surrounding monitor well MW-32 at the Old Dump Pond site and in the stream in the Residential Subdivision in Year 1 as planned. These areas will be remediated in conjunction with Year 2 remedial activities to be conducted in 2012. Additional horizontal and vertical delineation of PCB impacts in soil and sediment was conducted in the area surrounding monitor well MW-32 and in the stream in preparation for next year's remediation program.

Based on the observations and results obtained from the work completed at the site during Year 1 of the Implementation of the RAP, the following conclusions are made:

- A total of 286 1-tonne capacity polypropylene soil bags (approximately 283 tonnes) were filled with PCB-impacted soil from the area surrounding former monitor well MW-61 and test pit ODP-TP2 at the Old Dump Pond site. The bags were tied shut and transported to a laydown area at Pit No. 1 of the Former U.S. Military Site. The soil bags will be stored at the laydown area until 2012 when they will be transported to an approved soil treatment/disposal facility.
- Concentrations of PCBs detected in confirmatory soil samples collected along the final limits of the remedial excavation at the Old Dump Pond site ranged from 0.41 mg/kg (11-ODP-BS18) to 2.5 mg/kg (11-ODP-BS1) which are below the calculated SSTL of 9 mg/kg.
- Large pieces of metal debris encountered in the remedial excavation were manually segregated from the soil and were placed in a temporary scrap metal stockpile at the Old Dump Pond site. High visibility caution tape was placed around the metal stockpile and the excavator bucket was placed over the pile to warn potential recreational vehicle users passing through the area.
- Three (3) PCB swab samples were collected from pieces of metal within the stockpile. PCBs were not detected in any of the swab samples (RDL = 5 µg/100 cm^2).

- The remedial excavation at the Old Dump Pond site was backfilled using approximately 60 tonnes of 140 mm minus sized material obtained from a rock pit (owned by Max Kinden of Nain) created along the road to the local landfill in Hopedale.
- Based the results of soil sampling conducted as part of the current and previous investigations, there is an estimated 230 m^3 of PCB-impacted soil requiring remediation in the area surrounding monitor well MW-32 at the Old Dump Pond site. The previous estimate of PCB-impacted soil in this location, as provided in the Additional Delineation report (Stantec, 2011) was 150 m^3.
- Based on the results of sediment sampling conducted as part of the current and previous investigations, for an assumed excavation width of 1.5 m, there is an estimated 54 m^3 of sediment requiring removal from the stream in the Residential Subdivision. The previous estimate of PCB-impacted sediment in this location, as provided in the Additional Delineation report (Stantec, 2011) was 15 m^3.

4.2 Recommendations

Based on the results of confirmatory soil sampling conducted as part of environmental site remediation, no further soil remediation for PCBs is necessary in the area surrounding former monitor well MW-61 and test pit ODP-TP2 at this time. Based on the results of the current and previous site investigations, Stantec makes the following recommendations for the Year 2 remediation program:

1. Complete the removal of PCB-impacted soil and sediment exceeding the SSTL of 9 mg/kg and remove buried debris in areas that were not finished in Year 1, as follows:
    a. ***Old Dump Pond site***: Area surrounding monitor wells MW-32 and MW-33, as shown on Drawing No. 121411777-200-EE-03 in Appendix A (not fully delineated to the east and west), to a depth of 1.0 mbgs. It is recommended that a 2 m soil berm be left in place between the remedial area and the pond to reduce surface water infiltration.
    b. ***Stream***: Area between samples 11-Stream-SED2 and 11-Stream-SED7 to a depth of 0.5 m, area between samples 11-Stream-SED7 and 11-Stream-SED9 to a depth of 1.0 m and area between samples 11-Stream-SED9 and 11-Stream-SED1 to a depth of 0.5 m, as shown on Drawing No. 121411777-200-EE-04 in Appendix A. Collect surface water samples for PCBs and TSS downstream of the remedial area during remedial activities to monitor compliance with CCME criteria.
2. Remove PCB-impacted soil at the **Wharf Area/Pipeline Site**, as per the proposal provided to NLDEC on May 27, 2011.
3. Collect confirmatory soil samples from the final limits of the excavations and submit for analysis of Total PCBs (rush turnaround time);

4. Once confirming results have been received, monitor the backfilling of the excavations with clean fill material (to be sourced from the Inuit Community of Hopedale) or site grading, as necessary.
5. Further evaluation is required prior to determining disposal options for metal debris removed from the remedial excavation.
6. Ensure that PCB-impacted soil removed during the Year 1 and Year 2 remedial programs is transported offsite to an approved soil treatment/disposal facility.
7. Prepare daily field reports while onsite and submit to the NLDEC project manager via email daily.
8. Prepare a written report detailing the remediation work completed in Year 2 (2012-2013).

5.0 CLOSURE

This report has been prepared for the sole benefit of the Newfoundland and Labrador Department of Environment and Conservation. The report may not be used by any other person or entity without the express written consent of Stantec Consulting Ltd. and the Newfoundland and Labrador Department of Environment and Conservation.

Any use which a third party makes of this report, or any reliance on decisions made based on it, is the responsibility of such third parties. Stantec accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

The information and conclusions contained in this report are based upon work undertaken by trained professional and technical staff in accordance with generally accepted engineering and scientific practices current at the time the work was performed. Any site-specific information provided by other parties and used or referenced by Stantec has been assumed by Stantec to be accurate. The conclusions are based on the site conditions encountered by Stantec at the time the work was performed at the specific testing and/or sampling locations, and can only be extrapolated to an undefined limited area around these locations. The extent of the limited area depends on the soil and groundwater conditions, as well as the history of the site reflecting natural, construction and other activities. In addition, analysis has been carried out for a limited number of chemical parameters, and it should not be inferred that other chemical species are not present. Due to the nature of the investigation and the limited data available, Stantec cannot warrant against undiscovered environmental liabilities. Conclusions presented in this report should not be construed as legal advice.

Should any conditions at the site be observed or discovered that differ from those at the sample locations, or should the land use surrounding the identified hazards change significantly, we request that we be notified immediately to reassess the conclusions provided herein. This report was prepared by Anna Roy, B.Sc.E., MIT and reviewed by Jim Slade, P.Eng., P.Geo.

Respectfully submitted,

STANTEC CONSULTING LTD.

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6.0 REFERENCES

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