

Record of Post Remediation Site Conditions

Johnson Point, NT

Aboriginal Affairs and Northern Development Canada (AANDC)

Part 1: Property Ownership and Administration

Project Number/ IEMS Number:	NM079
FCSI Number:	00000841
Alternative Site Name(s):	Johnson Point
Contaminated Site Manager:	Emma Pike/Katherine Silcock/Bill Coedy
Phone Number:	1-867-669-2793
Project Location:	Johnson Point, Banks Island, NT
NTS Map Sheet Numbers:	88B14

Description of Project Activities and Scope:

Remediation project activities were focussed on the following main tasks:

- Demolition, segregation and containerization of fuel tanks and infrastructure
- Excavation, transport and on-site treatment of hydrocarbon contaminated soils (25,500 m³);
- Pumping, treatment, storage and discharge of Apron Area hydrocarbon-contaminated groundwater;
- Collection and containerization of surface debris;
- Excavation, sorting and containerization of buried waste;
- Regrading and additional cover placed on five existing landfills
- Off-site transport and disposal of all non-hazardous demolition and debris were disposed of at Richmond Steel Recyclers in Fort St John or in local landfills at Tuktoyaktuk or Inuvik (untreated wood);
- Segregation, off-site transport and disposal of all lead painted demolition and debris to a licenced Waste Disposal Facility in Surrey BC (AMIX, SUMAS) for painted items with lead exceeding 600 ppm total lead in paint and 2 tonnes of batteries went to Wide Sky Disposal Ltd I Fort Nelson BC.;
- Segregation, off-site transport and disposal of all hazardous demolition debris and hazardous contaminated soil to CCS Northern Rockies Landfill Plant BC;
- On-site incineration of barrel contents including solid and liquid hazard wastes.

Remediation Project Start Date: 2008 (earlier work considered care and maintenance)

Remediation Project End Date: 2010

Name and Address of All Stakeholders:

Stakeholder	Name	Address
<i>Contaminated Site Remediation Project Manager</i>	Emma Pike, INAC Katherine Silcock, INAC Bill Coedy, INAC Brad Thompson, PWGSC Michael Bernardin, PWGSC	Yellowknife Edmonton
<i>Site Professional/ Environmental Consultant</i>	Barry Fedorak, P.Eng, AECOM Brendon Norrie, PG, AECOM	Edmonton
<i>Prime Remediation Contractor</i>	E. Grubens Transport Ltd	Tuktoyaktuk
<i>AANDC North Mackenzie District Operations Manager</i>	Conrad Baetz	Inuvik
<i>AANDC Regional Director General</i>	Trish Merrithew-Mercredi	Yellowknife
<i>NWT Land and Water Board</i>	Mike Harlow	Inuvik
<i>Aboriginal Organization(s)</i>	Sachs Harbour Hunters and Trappers Committee (IRC)	Sachs Harbour
<i>NCP Director - HQ</i>	Joanna Ankersmit	Ottawa

Part 2: List of Reports

The following reports are the key reports pertaining to the remediation of the property:

- AES Final clean-up report (CIDM#476256)
- Final report on incineration (CIDM#476259)
- Supplementary assessment report Golder (CIDM#476231)
- Remedial Action Plan Johnson Point Staging area, Johnson point, NT, EBA Associates, Report 1740200, Dec 2007. (CIDM#476230)
- Human Health and Ecological Risk Assessment for Johnson Point Staging Facility, Johnson Point, Northwest Territories, Jacques Whitford, January 2007. (CIDM#476227)
- Remediation Completion Report Johnson Point, Northwest Territories, AECOM, Dec 21, 2009. (CIDM#474836)
- Amendment to the 2009 Remediation Completion Report – Johnson point, NT, AECOM, March 24, 2011. (CIDM#474849)

- 2010 Remediation Season Activity Report – Johnson Point, NT, AECOM, March 24, 2011. (CIDM#474852)
- Johnson Point Post-Construction Monitoring Plan, AECOM, June 9, 2010. (CIDM#474845)
- Johnson Point Post Construction Monitoring Program 2010 Report, AECOM, March 2011. (CIDM#474838)
- Johnson Point Post-Construction Monitoring Program 2012 Report, Golder Associates, March 2013.
- Johnson Point Post-Construction Monitoring Program 2014 Report, AECOM, March 2015.

Part 3: Summary of Remediation/Risk Management Plan Close Out

- a) Describe the objectives and elements of the Remediation/Risk Management Plan implemented at the property.

The objectives of the RAP for the site predominantly focused on (1) remediation of hydrocarbon-contaminated soil, (2) removal of hazardous and non-hazardous materials, and (3) securing the five landfills identified. This would be in order to meet the overall project objectives of reducing risk to human health and the environment, and meeting the objectives of the Inuvialuit (especially from Sachs Harbour and Ulukhaktok).

- b) List and describe the risk management control measures that were implemented at the property.

Risks to human health and the environment were mitigated through implementation of the remediation program that included activities described in Part 1. A Site Specific Target Level of 4,570 ppm Total Petroleum Hydrocarbon for risk to ecological receptors was adopted by INAC for the Main Station Area (away from water). This was based on a HHERA analysis by Jacques Whitford (2007). The more protective CCME criteria (F1=230 ppm; F2=150 ppm) for the protection of aquatic life was selected for the Apron Area due to its proximity to water. However some near shore soils were left in place due to risk of flooding and erosion (see Remediation Completion Report).

- c) List any active or passive site monitoring that was completed at the property.

Phase I post-construction monitoring events were designated for Years 1, 3, and 5, after conclusion of remediation operations and began, for Johnson Point, in 2010. The monitoring program consists of geotechnical monitoring and visual inspection of Landfill Areas A, B, C, D, the Former Landfarm Area and Soil Disposal Areas, the Former Tank Farm Pad, the Borrow Areas, and the Former Construction Camp Area, and sampling of groundwater and thermal monitoring at the Apron Area.

Monitoring Program

Monitoring Component	Responsible Organisation	Task Summary
Landfills	CARD-AANDC	Visual Inspection of landfills A,B,C & D
Apron Area	CARD-AANDC	Thermistor profile and groundwater analysis for BTEX hydrocarbons of excavated and backfilled area near river

d) Describe the results of the site monitoring that verify the effectiveness of the control measures and the Remediation/Risk Management Plan.

Groundwater:

- Limited analytical results due to lack of water/frozen wells.
- Of the limited results obtained, some of the wells had an increase in PHC/BTEX parameters from 2009 (baseline sampling) to 2010 (year 1 monitoring); however, these increases were followed by decreases to less than detection limit concentrations from either 2010 or 2012 to 2014. One well (MW09-07) had increases in benzene, toluene and ethylbenzene from 2009 to 2012, and decreases in xylenes and F1/F2 PHCs from 2009 to 2012. No samples were obtained from this well in 2014.

Surface Water:

- Sample from pond adjacent to Landfill B were non-detect in 2012 and 2014.
- Sample from unnamed river were non-detect in 2012 and 2014.

Soil:

- Exceedances measured near (upgradient) Landfill A in 2012 were not replicated in 2014, suggesting that small isolated pockets of contamination may exist upgradient of Landfill A (towards former Tank Farm Pad).
- Results from samples collected downgradient of Landfill D have decrease or remained stable from 2009 to 2014, and are consistent with background/baseline concentrations.
- Results from sample collected from drainage pathway from the Tank Farm Pad have decreased from 2009 to 2014, to non-detect concentrations.
- No indications of contaminated soil or seepage from regrade areas or apron area with residual hydrocarbon contamination.

Geotechnical:

- Landfill A has minor erosion channels on the cap; however they appear stable as they have not been worsening. Erosion channels noted in 2010 and 2012 remain, but do not appear to be affecting the performance of the regrade.
- Landfill B is in good condition and is well armoured. Ponding does not appear to be affecting the integrity of the landfill, nor does it appear to be growing in size. There is the potential for thermokarst progression.
- Landfill C is in good condition and is well armoured. Minor drainage and silty sand deposition along the toe remain stable.

- Landfill D is in good condition overall. Minor erosion channels present since 2010 do not appear to be worsening; areas of moist ground noted in 2010 and 2012 were not observed in 2014; and minor settlement area on north side does not appear to be worsening or affecting the integrity of the landfill.

Thermal:

- Observations in T9-01 and T09-02 indicate that freeze back has re-established steady-state, as the 0°C isotherm appears to have stabilized and follows an annual heating and cooling trend year after year.
- The depth of maximum thaw ranged from 1.01 to 1.37 mbgs at T09-01 and 0.87 to 1.18 mbgs at T09-02

e) The monitoring requirements were terminated based on the following criteria.

- Based on the depth to residual contamination and the max thaw depths measured during the monitoring completed to date, the residual contamination has been encapsulated in the frozen ground, as the permafrost has been re-established in these areas.
- Groundwater results at the Apron Area showed a slight increase in hydrocarbon concentrations (BTEX and F1/F2 PHCs) between the baseline sampling event (2009) and year 1 monitoring (2010), as was anticipated due to the disruption of permafrost during remediation activities; however results in 2012 and 2014 indicated a decrease in hydrocarbon parameters to below detection limit concentrations suggesting that contaminant migration is not occurring.
- Analytical results for the surface water sample collected from the unnamed river suggests that contaminant migration from the Apron Area is not occurring.
- Similarities in the slope profiles completed in 2010, 2012 and 2014 suggest that under normal conditions, significant meandering is unlikely and the river does not pose a significant risk to disturbing the residual hydrocarbon contaminated soil.
- The landfill regrades remain in good condition, with only minor erosion, deposition channels and minor areas of settlement were noted that do not appear to be worsening or affecting the integrity of the regrades.

The remediation strategy is working as the monitoring results appear to be meeting the objectives - the permafrost has re-established at the apron area, there are no indications of contaminant migration occurring at the apron area, and the landfill regrades are performing as intended. There have been no significant issues identified that would indicate monitoring needs to continue under the current form. The areas presenting the biggest risk to the Johnson Point remediation are progression of thermokarst pond development into Landfill B; and meandering of the Unnamed River towards the Apron Area. The results of the monitoring to date have not indicated that either of these issues are a concern now or in the near future. It is recommended that soil and groundwater monitoring be discontinued as they are not providing valuable data regarding the two identified risks. Monitoring the identified risks is not as critical, as they are stable now and potential changes are anticipated to progress slowly. A review of the regional ground and air temperature trends can be used to assess the impact of climate change on the remedial design at this site.

If a peer review of the Remediation/Risk Management Plan was requested, provide the following information:

Peer Reviewer Name: INAC-CSP-HQ, Environment Canada and DFO reviewed the RAP and associated remediation criteria.

Date/Title of Report Reviewed: 2007/ Remedial Action Plan Johnson Point Staging area, Johnson point, NT, EBA Associates, Report 1740200

Were All Comments Addressed?: Yes

Part 4: Property Status

Based on the work completed and the results of the Remediation/Risk Management Plan, the property cited in Part 1 is suitable for the following land use(s)¹

The conventional land use categories do not really apply to Johnson Point because of its remote location and the probable use of the site by the Inuvialuit for traditional purposes. Based on the findings of the JW HHERA, the remediated Johnson Point area does not pose an adverse health risk to either human or terrestrial ecological receptors. The exposure scenario is based on a residency of 3 weeks in any given year. It was assumed that during this period of residency, the Inuvialuit engaged in traditional hunting and gathering activities. It was assumed that all time spent on site was in the non-snow covered period. A total PHC or TPH Site Specific Target Level for ecological risk to receptors was determined to be 4570 mg/kg and this value was used in the clean-up criteria in areas away from water. The receptors selected for evaluation were the ermine, arctic hare, ptarmigan, lemming, snowy owl, arctic fox and Peary caribou.

The site is now suitable for;

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|--|---|
| 1. Residential/Parkland | <i>Yes, with risk scenario considered</i> |
| 2. Industrial/Commercial | <i>Yes; with restrictions Part 4d</i> |
| 3. Wild Lands (i.e., safe for wildlife and fish) | Yes |
| 4. Habitat for Species at Risk | Yes |

b) Is the groundwater on site Potable or Non-Potable?

N/A for this site as permafrost conditions would limit use of groundwater. Testing of the adjacent Unnamed River water quality (for potability) is not part of the long term monitoring program.

c) Are there any Crown investments constructed during remediation that will remain and require protection/maintenance?

¹ If site specific target levels were used, provide a scenario of the exposure scenario that those limits are based on.

- Remediation of the Johnson Point site was completed without the construction of on-site landfill facilities. There are four pre-existing landfills remaining on site that have been re-graded with a cover of gravel and sand (Type 2) and armour (Type 1).
- At the end of remediation, hydrocarbon impacted soils remain at depth in the Apron Area near the river. Two thermistors and seven groundwater wells were installed in the Apron Area and will remain until monitoring is complete.
- Based on the performance of the landfill regrades and permafrost re-establishment at the Apron Area, it has been recommended that future monitoring be limited to desktop review of aerial/satellite imagery, or opportunistic site visits or fly-overs by other federal departments.

d) Are there any site use restrictions?

Site restrictions should be considered by regulators for certain areas of the Johnson remediated site. Restrictions of access are required on old roads between the airstrip and the old tank farm area which generally straddles the Apron Area. These roads have undergone permafrost slumping from remedial activities and are sensitive to vehicular traffic. Restrictions should be placed on future land use and development at or near the landfills as activity may affect erosion protection integrity.

A rationale is provided with the following descriptions for the restricted areas;

- Landfills A, B, C, & D;

Landfills were re-graded to a 1 m thick cap and armoured with Type 1 material to prevent erosion. The integrity of the cap or the armour should not be adjusted. The landfills are visually inspected during monitoring.

- Apron Area;

Due to the risk of flooding and erosion, not all hydrocarbon impacted soil at depth was removed to the CCME protection of Aquatic Life criteria. A monitoring program involved installation of two thermistors to record permafrost freeze-back and seven (7) groundwater wells to monitor hydrocarbon migration at depth within the Apron Area. Site restrictions are necessary as the features require long term monitoring which is used in the evaluation of long term performance of the remediation activities.

- Former tank farm area;

The area was excavated to a depth of at least 0.5 m to remove hydrocarbon contaminated soils above the Site Specific Target Level of 4,570 ppm. Intrusive activities are not recommended in this area to minimize human exposure to hydrocarbons.

- Treated soil disposal areas;

The integrity of the treated soil disposal areas should not be compromised by allowing digging or relocating the soil areas by third party.

Part 5: Inspector's Summary

Inspectors should be aware of the restrictions applying to particular areas identified in Part 4 when considering granting land tenures in the area. Surfaces of landfills, the tank farm area and the monitoring wells located in the Apron Area should not be compromised by intrusive activities, such as excavating sumps, or the excessive use of heavy vehicular traffic. This could create an exposure pathway to residual hydrocarbons or physical hazards.

The hydrocarbon soil piles were a major part of the remediation. There could be long term implications due to possible erosion of the soil piles and hill stability. Regulators were concerned that hydrocarbons could migrate to the Unnamed River if erosion of the treated soil piles were to occur. Samples were collected during the first monitoring campaign in August 2010 to satisfy a request by Environment Canada. Results indicated that no migration of hydrocarbon had occurred from the treated soil piles.

An application for federal crown land has been submitted to AANDC Lands requesting a reserve parcel for Johnson Point.

Regulatory Authorizations

Regulatory Authorization	During Original Operation	During Remediation Work	During Post-remediation monitoring
Land Use Permit No.		N2008X0011	N2008X0011
Water Licence No.		N7L1-1824	
Quarry Permit No.		2009QP0089	

Attachments to the Record of Post Remediation Site Conditions:

- Aerial photo of site after demob August 2010, CIDM# 476033
- Satellite image of site prior to remediation, CIDM# 476049
- Map of the land use area (showing remediated sites) CIDM#474949, #475976

See Summary of Restricted Area location corners (UTM) for accurate coordinates with map datum of the site (centre point).

Summary of Restricted Area location corners (UTM)

Name of restricted area	Center point:	
Landfill Regrade A	E 450 775;	N 08 075 820
Landfill Regrade B	E 450 440	N 08 075 890
Landfill Regrade C	E 450 380	N 08 076 025
Landfill Regrade D	E 449 750	N 08 075 725
Treated soil disposal Area 1	E 450 250	N 08 076 050
Treated soil disposal Area 2	E 450 050	N 08 075 900
Former Tank Farm area	E 450 750	N 08 075 910
Apron Area	E 451 050	N 08 075 550

old road north of Apron Area	E 451 000	N 08 075 675
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Corners of proposed reserve for Johnson

A rectangular reserve, enclosing all the above listed restricted areas, has been suggested to AANDC Lands. The suggested coordinates of the four parcel corners are;

PC1 Eastings 451 545 Northings 8 075 608
PC2 Eastings 450 650 Northings 8 076 408
PC3 Eastings 449 645 Northings 8 075 000

Part 6: Summary Statement of the Site Professional

Please check appropriate statements:

- All work on which this Record of Post Remediation Site Conditions is based was prepared, overseen and/or reviewed by the Site Professional.
- The site was managed in accordance with the current INAC and CCME contaminated site best practices and procedures.
- All reports cited in Part 2 and other related documents that have been prepared by the Site Professional have been delivered to the Contaminated Site Manager.
- The remediation/risk management criteria and objectives as defined by the Site Professional and cited in Part 3 have been achieved for the current or reasonably foreseeable future activities as cited in Part 4.
- The Remediation/Risk Management Plan was peer reviewed by a qualified independent Site Professional.
- Based on the results of the site monitoring activities, remedial action and/or any on-going site management is not required for the current or reasonably foreseeable future site activities.

Due to the timing of reporting, no site sign-off could be obtained. See Johnson Point Closure Report for document signatures.