2008 Annual Report

to the

Nunavut Water Board

Licensee: **Department of National Defence, Government of Canada**

Licence: **NWB6BAF0409 - Type "B"**

Location: **BAF-3 North Warning System Site, Brevoort Island, Baffin Region, Nunavut**

Report submitted by: **Nasittuq Corporation, 31 March 2009**

2008 Annual Report to the Nunavut Water Board

Licensee: Department of National Defence,

Licence: NWB6DYE0409 - Type "B"

Location: DYE-M North Warning System Site,
Cape Dyer, Baffin Region, Nunavut

Report submitted by: Nasittuq Corporation,
31 March 2009

Executive Summary

This 2008 Annual Report to the Nunavut Water Board (NWB) is submitted as required by Licence Number NWB6BAF0409 – Type "B", Part B. General Conditions, para. 1.

BAF-3 is an unattended (unmanned) North Warning System radar site on Brevoort Island, Nunavut. The site is visited quarterly for preventive maintenance inspections and as required for other work by Nasittuq staff based out of the Logistics Support Site - Iqaluit (LSS-Q), Iqaluit, Nunavut. The site was temporarily attended (manned) due to project activity from April to September. The main project was clean-up and remediation of a fuel spill that occurred in 2007; this was the second year of this work.

The annual water usage was 589 cubic meters of water.

Hazardous waste was removed from the site for disposal outside of Nunavut. The waste went to Clean Harbors, Thurso, Quebec. The waste was 48 drums of assorted waste (oil, glycol, etc.) and 7 cylinders**.**

Nonhazardous domestic solid waste was flown out to the Logistics Support Site - Iqaluit and disposed of at Iqaluit's landfill.

The sewage effluent was sent for laboratory analysis.

There were no spills at BAF-3 in 2008.

The Spill Contingency Plan was revised. The main changes were: spills are now immediately reported to the NWSCC, and the Nasittuq Emergency Contact List (used only by Nasittuq Corp. staff) was updated to reflect changes in personnel.

Introduction

This 2008 Annual Report to the Nunavut Water Board (NWB) is submitted as required by Licence Number NWB6BAF0409 – Type "B", Part B. General Conditions, para. 1.

BAF-3 is an unattended (unmanned) North Warning System radar site on Brevoort Island, Nunavut. The site is visited quarterly for preventive maintenance inspections and as required for other work by Nasittuq staff based out of the Logistics Support Site - Iqaluit (LSS-Q), Iqaluit, Nunavut. The site was temporarily attended (manned) due to project activity from April to September. The main project was remediation of a fuel spill that occurred in 2007; this is the second year of this remediation work.

Water Usage

The annual water usage was 589.0 cubic meters which is an average of 1.6 cubic meters per day, well below the maximum of 10 cubic meters per day allowed by the licence.

Records for tank dips began October 2008. Therefore, for January to September, the water usage in Table 1 below was calculated based on 150 liters per person per day multiplied by the actual daily site population.

Table 1. Monthly and annual water usage in 2008 at BAF-3.

Month	Water usage in cubic meters (m3)
January	0
February	0
March	0
April	8.4
May	70.2
June	90.5
July	89.4
August	89.4
September	64.6
October	-
November	87.9
December	88.6
TOTAL for 2008	589.0

Hazardous Waste and Waste Oil Disposal

Hazardous waste and waste oil were sent to an approved hazardous waste disposal site outside of Nunavut as required by the licence. The waste was sent to Clean Harbors, 200-7305 blvd Marie-Victorin, Brassard, QC, J4W 1A6. The receiving site address is Clean Harbors, 400 Galipeau, Rang 5, Thurso, QC, J0X 3B0.

Table 2 below lists the items sent for disposal.

Table 2. Summary of waste sent for disposal in 2008 from BAF-3.

Site	Description	Quantity
BAF-3	Waste paint	1 drum
BAF-3	Waste oil	9 drums
BAF-3	Waste fuel contaminated soil	2 drums
BAF-3	Waste fuel	9 drums
BAF-3	Waste varsol	5 drums
BAF-3	Waste gasoline and tank cleaning effluent	14 drums
BAF-3	Waste fuel and water mixture	1 drum
BAF-3	Waste glycol	3 drums
BAF-3	Waste glycol and oil mixture	1 drum
BAF-3	Waste fuel and oil mixture	2 drums
BAF-3	Waste fuel filters	1 drum
BAF-3	Acetylene	3 cylinders
BAF-3	Oxygen	4 cylinders

Nonhazardous Solid Waste Disposal

Nonhazardous domestic solid waste was flown out to LSS-Q and disposed of at Iqaluit's landfill. Some solid waste was deposited at the on-site landfill (see Annex C).

Monitoring Program

See Annex A for the location of the sewage effluent outfall, BAF-2.
See Annex B for analysis of sewage effluent.
See Annex C for the location of the landfill.

Spills (Unauthorized Discharges)

There were no spills at BAF-3 in 2008.

Revisions to the Spill Contingency Plan

The Spill Contingency Plan was revised as follows:
- spills are immediately reported to the NWSCC instead of the LSS Manager;
- Spill Response Flow Chart was updated to show the immediate report to NWSCC;
- all spills, indoors and outdoors, must be reported;
- all statements about burning (i.e. burning recovered fuel, fuel soaked sorbent, etc.) and burn bins were removed; and
- two names (I. Wawryk, S. Cheng) were removed from the Nasittuq Emergency Contact List. This List is used only by Nasittuq Corp. staff.

Progressive reclamation work undertaken

2008 was Year 2 of the on-going clean-up and remediation of the January 2007 Jet A1 fuel spill (reported in the 2007 Annual Report). See Annex D for key activities for 2008.

To date, it appears that 2009 will be the final year to complete this phase of the work with monitoring being the main activity from 2010 onwards.

Annex A

BAF-3 Sewage Outfall Location with GPS Co-ordinates

Annex B

Analysis of Sewage Effluent in 2008 for DYE-M
(samples taken monthly when sewage actively discharged)

January 2008 – page 1 of 1

ACCUTEST LABORATORIES LTD

REPORT OF ANALYSIS

Client: Nasittuq Corp. (Ottawa)
100-170 Laurier Ave. West
Ottawa, ON
K1P 5V5

Attention: Mr. Sam Chang

Report Number: 2803213
Date: 2008-02-25
Date Submitted: 2008-02-13

Project:

P.O. Number:
Matrix: Sewage

Chain of Custody Number: 72169

			LAB ID:	604480	604481					GUIDELINE		
			Sample Date:	2008-01-25	2008-01-25							
			Sample ID:	DYKE-M	B-3							
	PARAMETER	UNITS	MRL							TYPE	LIMIT	UNITS
	Biochemical Oxygen Demand	mg/L	1	847	3860							
	Conductivity	uS/cm	5	1130	523							
	N-NH3 (Ammonia)	mg/L	2.0	94.4	19.8							
	NO2 + NO3 as N	mg/L	0.10	<0.10	<0.10							
	pH			6.81	5.32							
	Phenols	mg/L	0.001	0.395	0.038							
	Sulphate	mg/L	1	7	11							
	Total Suspended Solids	mg/L	2	466	876							
	Calcium	mg/L	1	52	8							
	Magnesium	mg/L	1	5	2							
	Potassium	mg/L	1	23	50							
	Sodium	mg/L	2	64	43							
	Arsenic	mg/L	0.05	0.06	<0.05							
	Cadmium	mg/L	0.01	<0.01	<0.01							
	Chromium	mg/L	0.02	0.06	<0.02							
	Copper	mg/L	0.01	1.86	1.92							
	Iron	mg/L	0.1	4.4	2.3							
	Lead	mg/L	0.01	0.08	0.02							
	Mercury	mg/L	0.05	<0.05	<0.05							
	Nickel	mg/L	0.01	0.08	0.02							
	Zinc	mg/L	0.05	0.58	0.88							

MRL = Method Reporting Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration

Comment:
Metals analysis performed on aqua-regia digest of sample material.

APPROVAL:
Lorna Wilson
Agriculture Lab Supervisor

June 2008 – page 1 of 1

ACCUTEST LABORATORIES - A New Bodycote Company

REPORT OF ANALYSIS

Client: Nasittuq Corp. (Ottawa)
100-170 Laurier Ave. West
Ottawa, ON
K1P 5V5

Attention: Ms. Carolyn Telewiak

Report Number: 2817734
Date: 2008-08-07
Date Submitted: 2008-07-22

Project: LSSG Iqaluit

P.O. Number: 250350
Matrix: Wastewater

Chain of Custody Number: 65712

			LAB ID:	643532						GUIDELINE		
			Sample Date:	2008-06-17								
			Sample ID:	BAF3 Sewage Outfall								
PARAMETER	UNITS	MRL								TYPE	LIMIT	UNITS
Biochemical Oxygen Demand	mg/L	1	1330									
Conductivity	uS/cm	5	1450									
N-NH3 (Ammonia)	mg/L	2.0	108									
NO2 + NO3 as N	mg/L	1.0	<1.0									
pH			6.49									
Sulphate	mg/L	1	12									
Total Suspended Solids	mg/L	2	6050									
Calcium	mg/L	1	60									
Magnesium	mg/L	1	11									
Potassium	mg/L	1	35									
Sodium	mg/L	2	69									
Arsenic	mg/L	0.05	<0.05									
Cadmium	mg/L	0.01	<0.01									
Chromium	mg/L	0.05	0.16									
Copper	mg/L	0.01	3.24									
Iron	mg/L	0.1	119									
Lead	mg/L	0.01	0.15									
Mercury	mg/L	0.0001	<0.0001									
Nickel	mg/L	0.01	0.17									
Zinc	mg/L	0.05	1.64									

MRL = Method Reporting Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration

Comment:
643532: N-NO2+N-NO3 MRL elevated due to matrix interference.Holding time for N-NO2+N-NO3 analysis was exceeded.

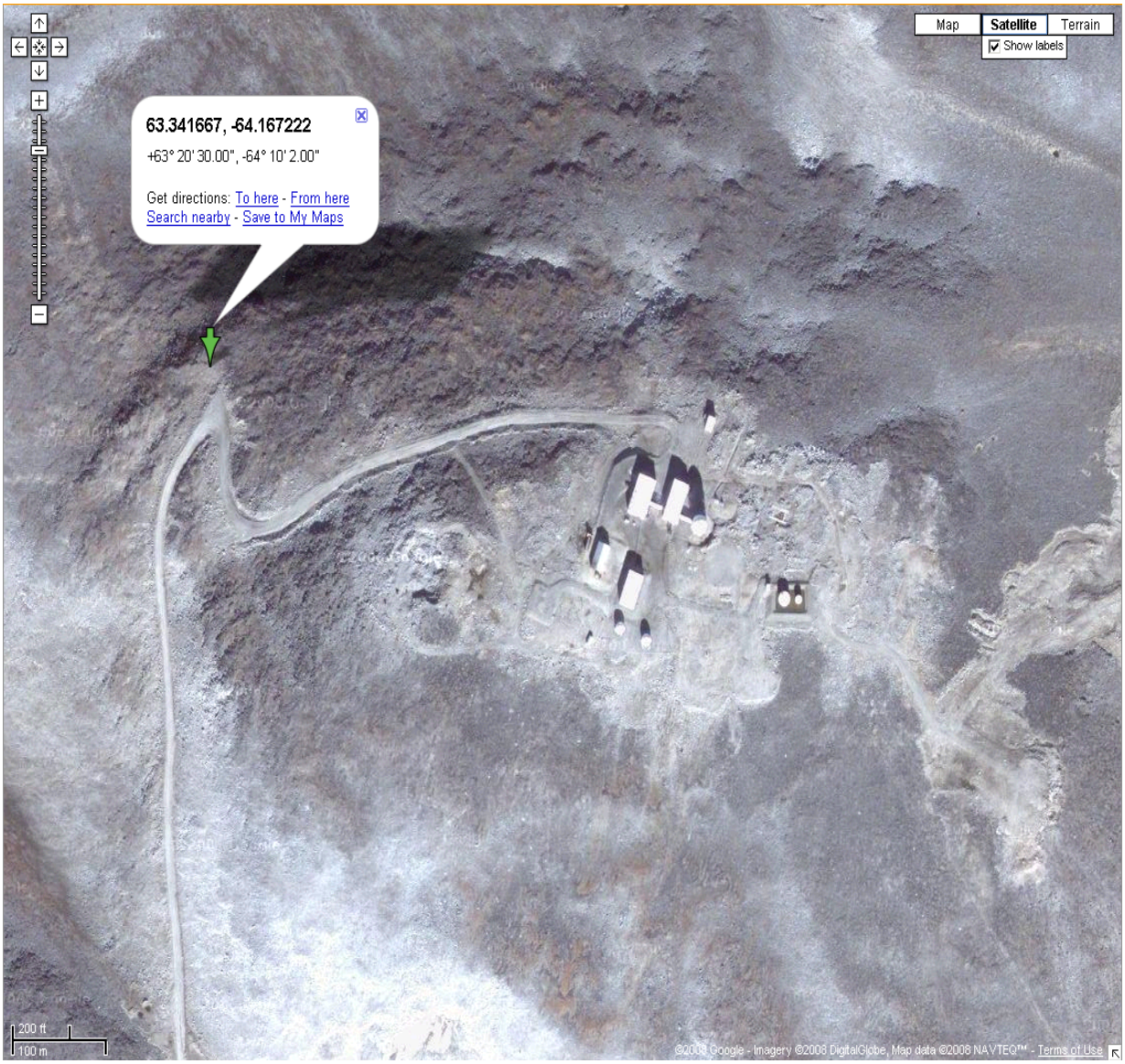
APPROVAL:
Ewen McRobbie
Inorganic Lab Supervisor

Results relate only to the parameters tested on the samples submitted for analysis

8-148 Colonnade Road Ottawa ON K2E 7Y4 888 North Front Kingston ON K7P 0B8 1 of 1

Annex C

Location of Landfill at BAF-3
with GPS Co-ordinates



Annex D

2008 (Year 2) Clean-up and Remediation Activities of 2007 Jet A1 Fuel Spill at BAF-3

NASITTUQ

NUNAMI

JACQUES WHITFORD LIMITED

BAF-3
2008 Spill Clean-Up
Summary

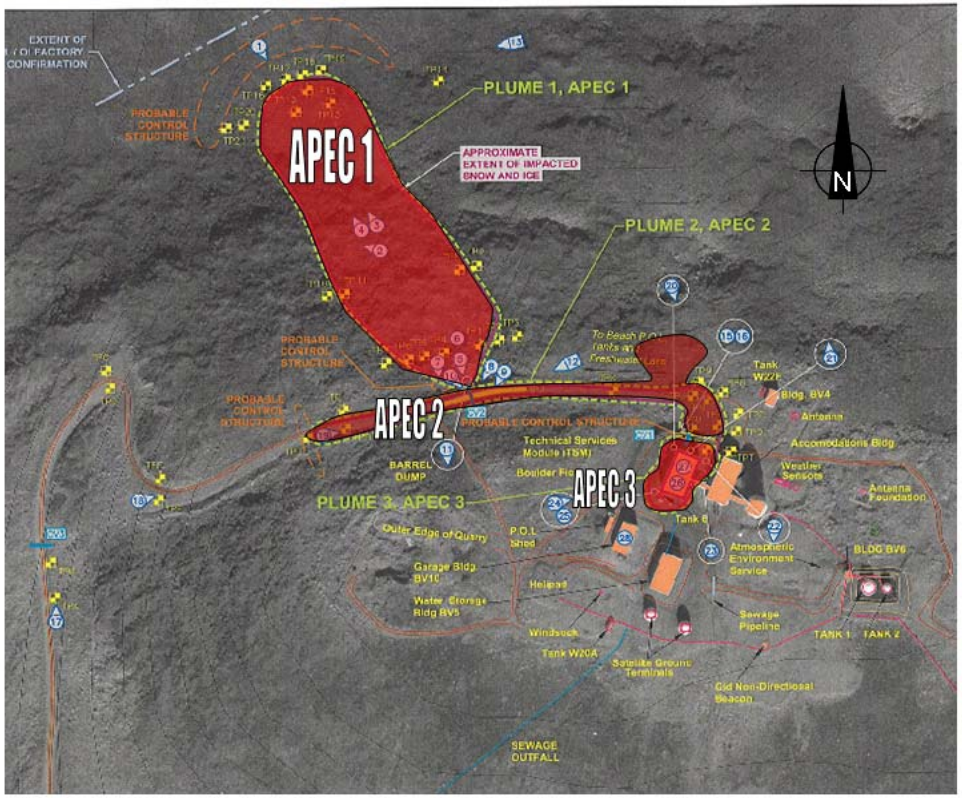
Outline of Presentation

- 2008 Workplan
- 2008 Results:
  - Control and Mitigation
  - Remediation
  - Technical/Scientific Support

Site Location and Spill

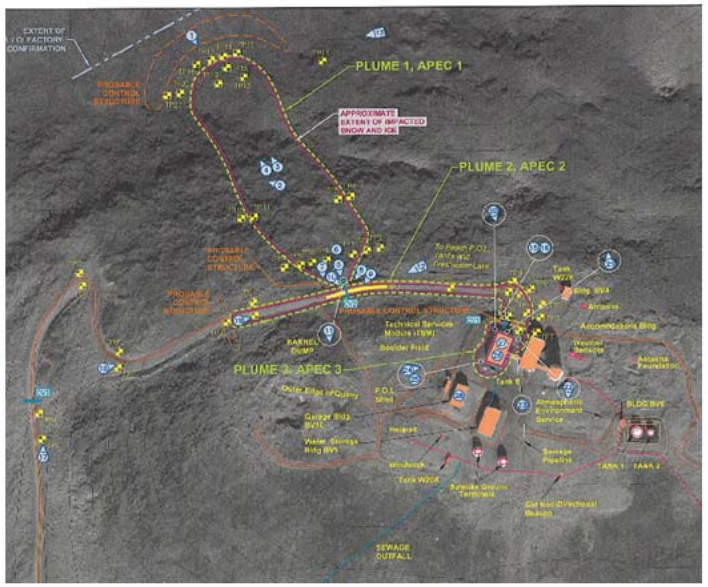
12 Jan 2007, 150,000 L

Impacts


EXTENT OF
CONFIRMATION
PROBABLE
CONTROL
STRUCTURE
PLUME 1, APEC 1
APEC 1
APPROXIMATE
EXTENT OF IMPACTED
SNOW AND ICE
N
PLUME 2, APEC 2
PROBABLE
CONTROL
STRUCTURE
APEC 2
PROBABLE CONTROL STRUCTURE
Tank
W22A
Bldg BV4
Antenna
Technical Services
Module (TSM)
Accomodations Bldg
BARREL
DUMP
Boulder Pile
APEC 3
Weather
Sensors
Antenna
Foundation
PLUME 3, APEC 3
Tank 6
Outer Edge of Quarry
P.O.L
Shed
Atmospheric
Environment
Service
BLDG BV6
Garage Bldg
BV10
Helipad
Water Storage
Bldg BV5
Sewage
Pipeline
Windsock
TANK 1
TANK 2
Tank W20A
Satellite Ground
Terminals
Old Non-Directional
Beacon
SEWAGE
OUTFALL

2008 Workplan

1. Snow Clearing
2. Control and Mitigation
3. Impacted Soil and Water PHC Monitoring
4. Water Treatment
5. Engineered Biopiles
6. Remediation Activities
7. Site winterization
8. Engineering and scientific support in relation to regulatory requirements
9. Reporting



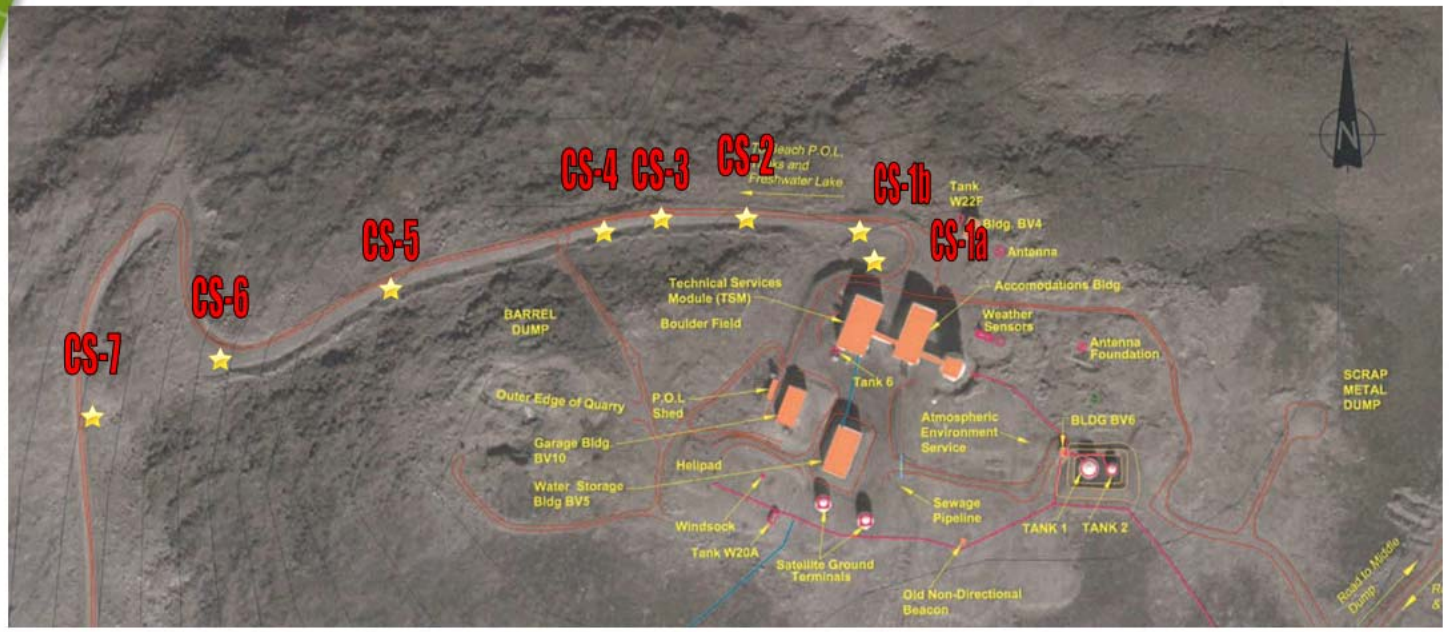
2008 Workplan: Snow Clearing

- Snow clearing in accordance with snow clearing plan

2008 Workplan: Control and Mitigation

- Major tasks continued in 2008:
  - keeping underflow dams free of snow and ice
  - changing spent booms and pads
  - collecting free product
  - control structure maintenance, and
  - managing impacted water and recovered product

Control and Mitigation Design



2008 Workplan: Control and Mitigation

Free Product Collection

Flex Tank at CS-2

Trench by TSM

2008 Results: Water Treatment

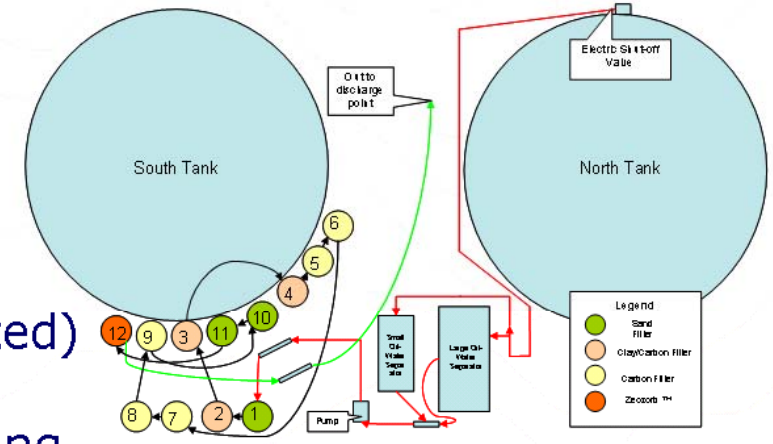
- An approximate volume of 2,385,720 litres of impacted water was treated between June 8 and September 13, 2008

Week	End Tank Vol. (L)	Approx. Treated Vol. (L)	Week	End Tank Vol. (L)	Approx. Treated Vol. (L)
May 18-24	125,000	-	Jul 20-26	342,520	72,618
May 25-31	150,870	-	Jul 27-Aug 2	-	-
Jun 1-7	462,690	-	Aug 8-16	282,283	124,215
Jun 8-14	775,000	4,200	Aug 17-23	273,600	272,640
Jun 15-21	716,350	47,300	Aug 24-30	235,200	295,680
Jun 22-28	607,087	267,100	Aug 31-Sep 6	502,000	302,400
Jun 29-Jul 5	491,339	267,100	Sep 7-13	301,170	280,000*
Jul 6-12	418,110	267,100	Sep 14-20	355,500	-
Jul 13-19	370,886	185,367			

* estimated based on up-time

2008 Workplan: Water Treatment

- Major tasks included:
  - Backwash and filter maintenance;
  - Fixing leaks; and
  - System adjustments
- Start- and end-season sampling of raw (untreated) water
- Regular effluent monitoring (5 events) to ensure system efficacy and satisfy regulatory requirements
  - Last round failed: likely cause sediment re-suspension, need to optimize system operation



2008 Workplan: Water Treatment

2008 Results: Remediation

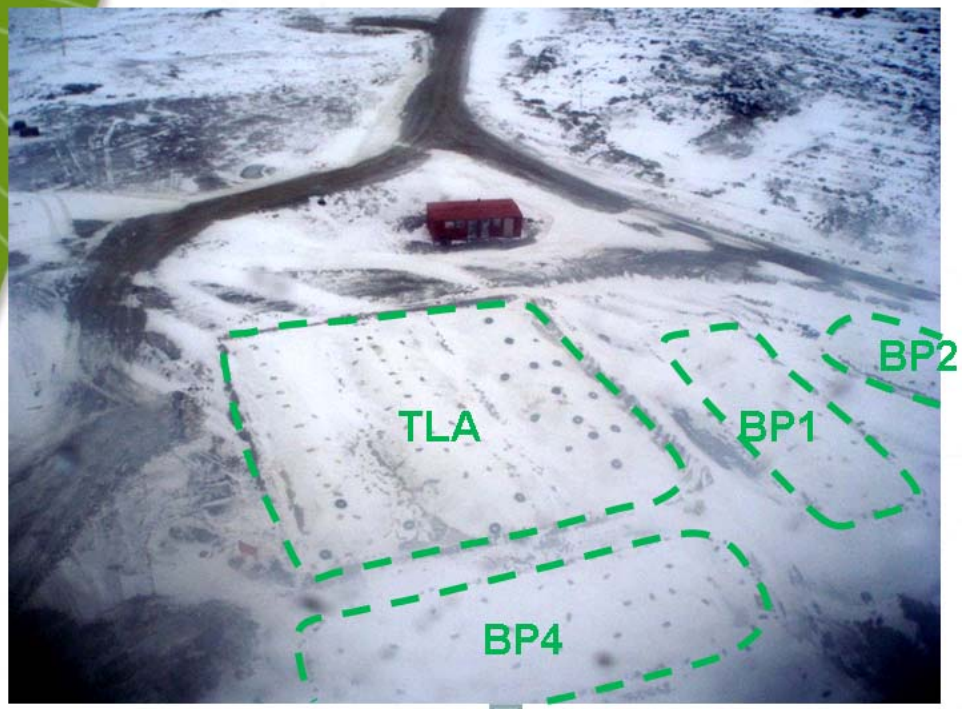
- Transport of TISSA soils (2007 excavation) to biopiles (1260 m^3)
- Excavation of the 'bowl' in APEC 2 (300 m^3)
- Biopile preparation, development and monitoring
  - 2007 TISSA soil concentrations 1-11x DLCC
  - 2008 TISSA soil concentrations 0.5-1x DLCC
  - 2008 biopile concentrations 0.25-1.1x DLCC

2008 Results: Remediation

TISSA

APEC 2

2008 Results: Biopiles



- 3 completed
- 2 started
- Temporary lay down area
- Runoff control

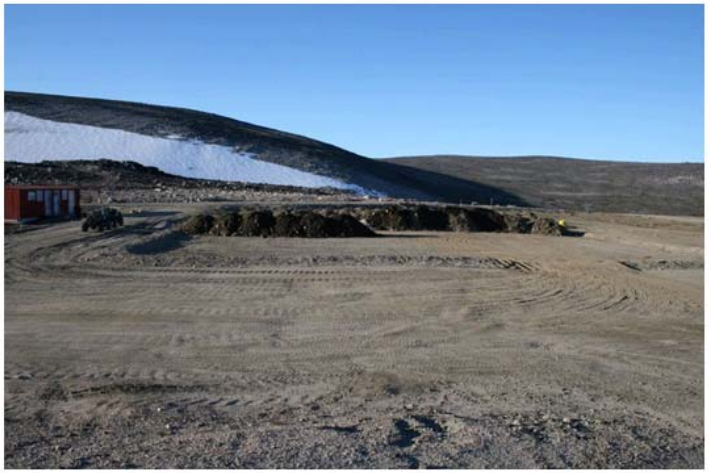
Biopiles

Area Prep

Liners

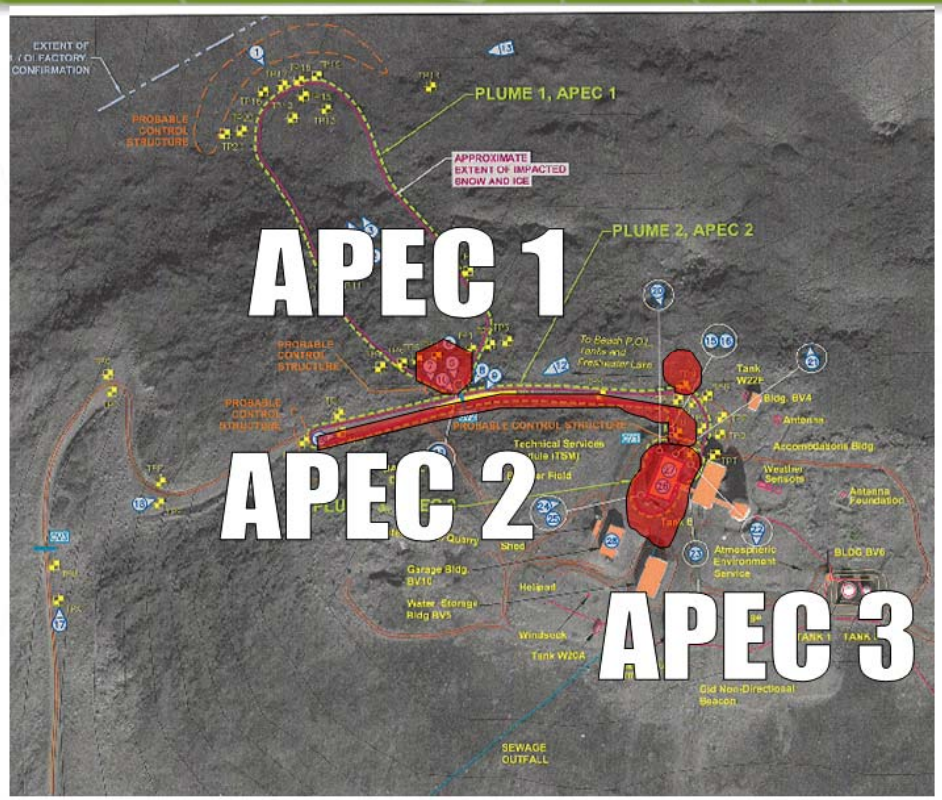
Biopiles

TLA

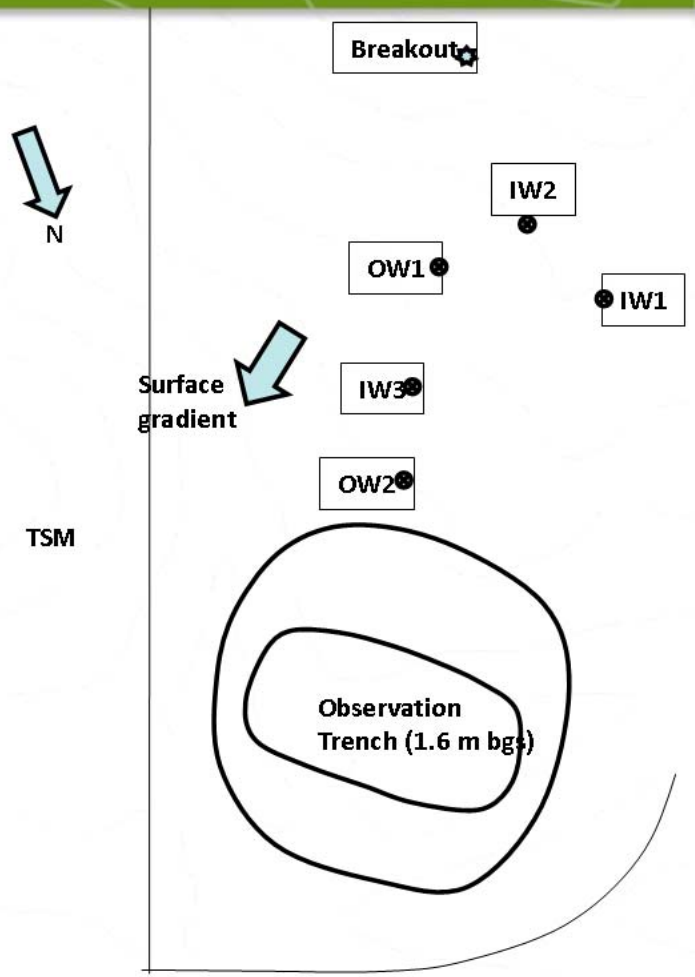


Runoff CS

Target Soils: Variable



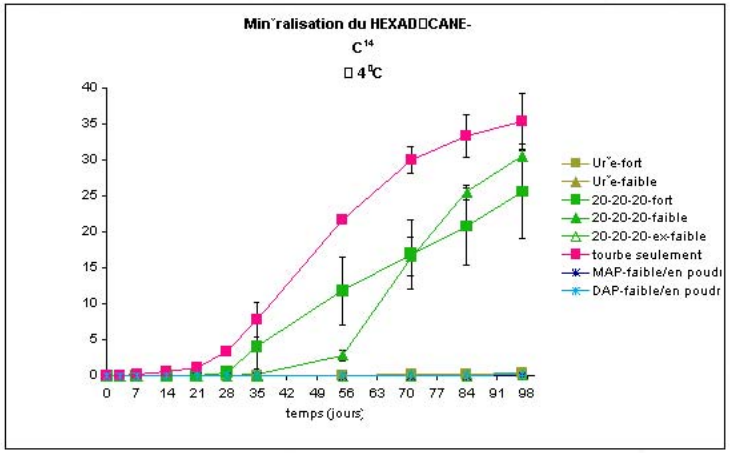
2008 Results: Soil Flushing Pilot



- Observation trench
- 2 observation wells
- 3 injection wells (1 successful)
- GW seepage at 100x un-forced

2008 Results: Technical and Scientific Support

- NRC-BRI:
  - Initial results from mesocosm very positive
- Utility Locates:
  - USL on-site, plan produced by NJW



2008 Workplan: Winterization and Site-Shutdown

WTS

APEC 2

Proposed Way-Ahead

- Plan for 2009 as last full activity year:
  - Lessons Learned/Challenges
  - Control and Mitigation
  - Water Treatment
  - APEC 1 – minimal excavation
  - APEC 2 – complete roadside ditch and N section
  - APEC 3 – remove source, in-situ soil flushing
  - Engineered Biopiles
  - Product Recovery/Disposal
- 2010+ reinstatement and monitoring