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Memo

To:	File	**Date:**	December 6, 2012
		From:	Ashley Landriault
		Project #:	1CH008.057
Subject:	Boston Ephemeral Stream Monitoring 2012		

Five ephemeral streams have been identified down-gradient of the ore stockpile areas (Figure 1). As recommended in the waste rock and ore management plan for Boston (SRK 2009), these streams are now monitored during spring freshet to provide an indication of whether contaminants from the ore and waste rock piles are reaching the shoreline of Aimaokatalok Lake. It should be noted that there are old drill sites upstream of all sampling locations that may also influence results in this area Results of field parameters for the three streams that were sampled are summarized in Table 1. Full results and field observations are presented in Attachment 1. Photos of the streams are presented in Attachment 2. In 2012, Seeps A2, C2, D2 and E2 were flowing, and were therefore sampled. Seep B2 was dry during the 2012 seep survey, but there was evidence that it was flowing earlier in the spring.

A summary of water quality results is provided in Table 2. The 2012 results are generally consistent with the 2009-2011 results.

Seepage chemistry predictions were made as part of the Water and Ore/Waste Rock Management Plan (SRK 2009). Measured concentrations from the ephemeral streams were generally below predicted maximum concentrations reported in SRK 2009. The predicted concentrations of parameters that behave conservatively (Cl, Se, SO_4) were generally below the predicted average values, with the exception of stream C2 and D2 which exceeded the predicted maximum concentrations of sulphate and A2, D2 and E2 which exceeded the predicted average concentrations of Cl, but were still below the predicted maximum concentrations. Parameters that are not expected to behave conservatively (As, Fe, Cu, Ni, NO_3) were consistently below the predicted values.

Reference:

SRK Consulting, 2009. Water and Ore/Waste Rock Management Plan for the Boston Site Hope Bay Project, Nunavut. Report 1CH008.022 prepared by SRK Consulting (Canada) Ltd. for Hope Bay Mining Ltd. July 2009.

Table 1: Field Parameters

Sample ID	Field pH	Field Conductivity	ORP	Temperature	Flow	Comments
Units		**µS/cm**	**mV**	**^{0}C**	**L/s**	
A2	7.59	80.9	75.7	4.5	50ml/s	Approximate location as 2010-2011
B2	--	--	--	--	--	Not flowing
C2	7.06	93.6	163	3.6	very slight	Approximate location as 2010-2011
D2	6.56	157.4	16.9	2.9	very slight	Approximate location as 2010-2011
E2	7.09	41.3	161	4.2	very slight	Approximate location as 2010-2011

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Table 2: Summary of 2009-2012 Water Quality Results

	Sample ID	Anions and Nutrients						Dissolved Metals								
		Alkalinity, Total (as $CaCO_3$)	**Ammonia**	**Chloride**	**Nitrate**	**Ortho Phosphate**	**Sulphate**	**Aluminum**	**Arsenic**	**Cadmium**	**Copper**	**Iron**	**Lead**	**Nickel**	**Selenium**	**Zinc**
		mg/L as $CaCO_3$	mg/L as N	mg/L	mg/L as N	mg/L as P	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
2009	C2	42	<0.02	166	<0.005	<0.001	48	0.014	<0.0015	<0.000017	0.0017	<0.03	<0.00005	0.003	<0.001	0.0014
	D2	25	0.024	455	4	0.001	196	0.012	<0.002	<0.000085	0.0016	<0.03	<0.00025	0.005	<0.006	<0.005
	E2	43	0.022	210	2.2	<0.001	137	0.016	<0.002	0.000063	0.003	<0.03	0.000068	0.006	<0.001	0.0055
2010	C2	44	0.083	197	3.00	<0.001	223	0.011	0.0021	<0.00005	0.002	0.071	0.0002	0.0084	0.0018	0.0071
	D2	30	0.030	547	2.10	0.0011	217	0.0057	<0.003	<0.00025	0.001	<0.03	<0.00025	0.0083	<0.005	<0.005
	E2	59	<0.005	137	<0.005	<0.001	50	0.0076	0.0016	<0.00005	0.001	<0.03	<0.00005	0.0029	<0.001	<0.001
2011	B2	9.6	3.4	40	12	--	17	0.13	0.003	<0.000050	0.007	0.14	0.00020	0.0031	<0.0010	0.017
	C2	29	0.050	42	1.2	--	85	0.02	0.006	<0.000050	0.001	<0.030	<0.000050	0.0049	<0.0010	<0.0030
	D2	29	0.12	187	1.0	--	63	0.01	0.002	<0.000050	0.001	<0.030	<0.000050	0.0058	0.0015	<0.0030
	E2	36	0.023	48	0.02	--	34	0.01	0.002	<0.000050	0.001	<0.030	<0.000050	0.0018	<0.0010	<0.0030
2012	A2	44	0.0077	179	0.31	--	43	0.0045	0.018	<0.000010	0.0009	<0.010	0.00010	0.004	<0.00010	0.0029
	C2	44	0.01	105	1.4	--	220	0.012	0.0017	0.000012	0.0016	0.033	<0.000050	0.006	0.00038	0.0021
	D2	31	0.0065	374	0.30	--	156	0.0067	0.00093	0.000016	0.001	<0.010	<0.000050	0.006	0.00077	0.0025
	E2	43	<0.0050	59	<0.0050	--	50	0.013	0.00099	<0.000010	0.0018	0.014	<0.000050	0.003	<0.00010	0.0015

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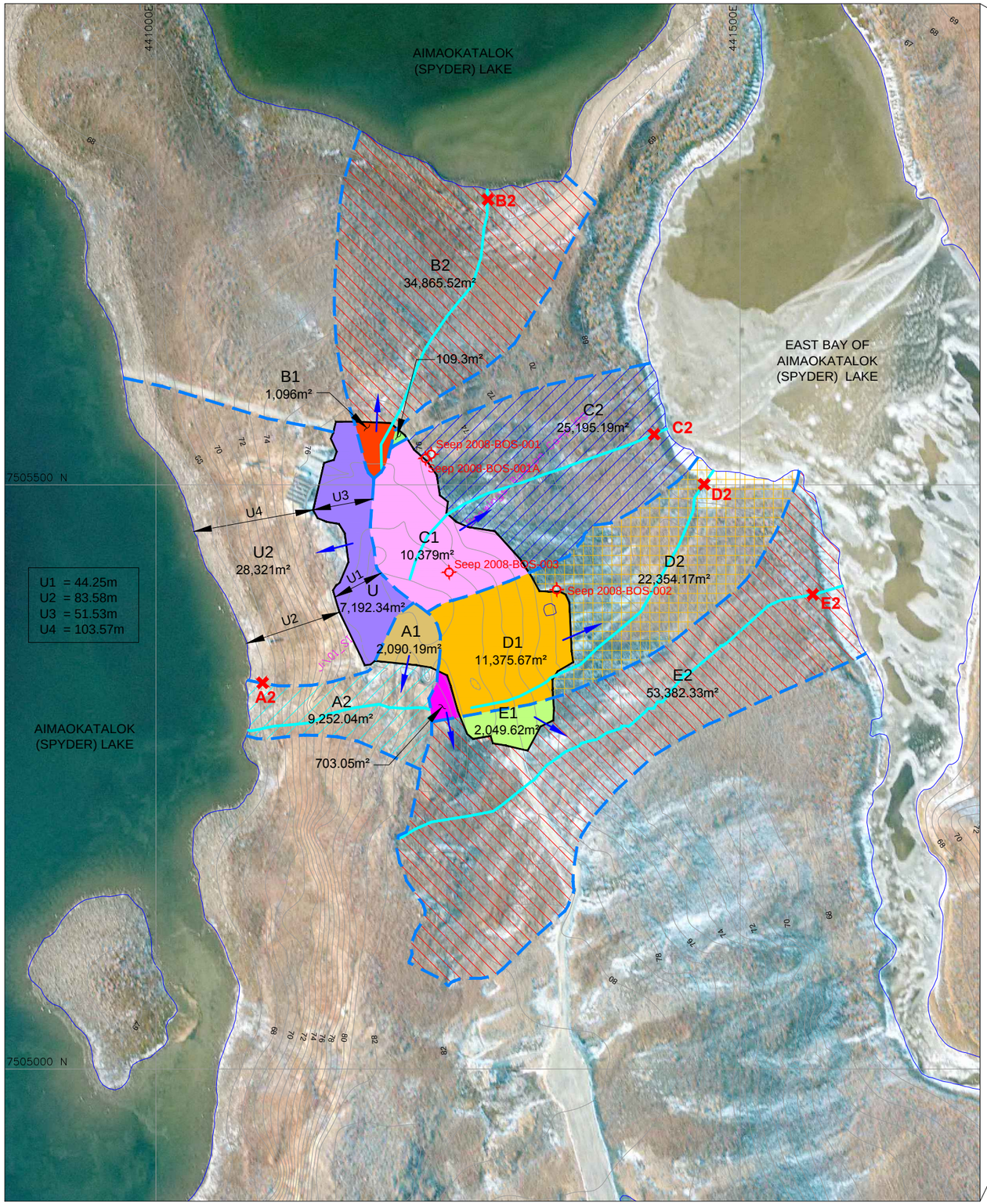
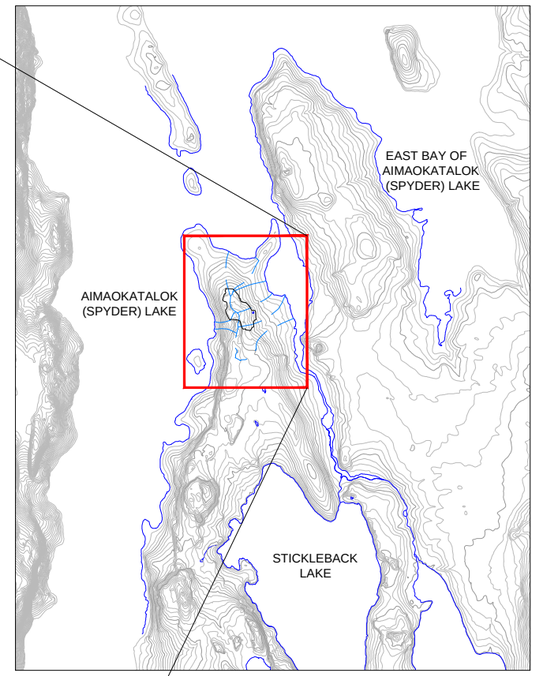
Figure





SITE LOCATION

Legend

	Contours (1m)		Catchment Boundary
	Ephemeral streams		Flow direction
	Camp pad perimeter		Seepage Sampling Station
A2, B2, C2, D2, E2, U2	Dilution Zone (Hatch)	25,195.19m²	Catchment Areas

1:4000

0 50 100 150 200 Metres

SRK Consulting
Engineers and Scientists
Vancouver B.C.

SRK JOB NO.: 1CH008.022
FILE NAME: Boston Catchments.dwg

HOPE BAY MINING LTD.

Hope Bay Project

Boston Waste Rock Management Plan

Boston Camp Drainage Areas

DATE: March 2011
APPROVED:
FIGURE: 1

J:\01_SITES\Hope Bay\MCAD\2010 Drawings\Boston Catchments.dwg

Attachment 1: Data and Field Observations

Sample ID	WP	Easting	Northing	Date	Time	Sampled (y/n)	Description	Temperature 'C	Field Conductivity	Field pH	ORP (mV)	Flow (L/s)	ALS File No.	Date Received	Date	Date Sampled
EPH A2	61	441116	7505315	6/14/2012	13:30	y	very broken flow, flowing across tundra and down hill, very diffuse, wet area ~7ft wide, flow <1cm-4cm deep, flow rate estimated 50mL/sec at one point, clear water, lots of OM, bird feces, mud. Multiple exits into lake.	4.5	80.9	7.59	75.7	50ml/s	L1163287	15-Jun-12	29-Jun-12	14-JUN-12
EPH B2	57	441272	7505703	6/14/2012	11:00	n	no stream or water, evidence of former flow, mud, algae is dead or damp, stream path is evident. Photos 556-558	--	--	--	--	--	--	--	--	--
EPH C2	58	441385	7505530	6/14/2012	11:30	y	stream is shallow, breaks up a bit before reaching lake, flowing from camp. Clear water, brown sediment/ tundra base, bird feces, not much snow left anywhere.	3.6	93.6	7.06	163	not measurable	L1163287	15-Jun-12	29-Jun-12	14-JUN-12
EPH D2	59	441457	7505457	6/14/2012	12:00	y	very minimal flow, some pooling, grass/tundra bottom, origin in ore stockpile, broken up flow, can see evidence of stronger flow earlier this season due to direction of grass, water is clear, bird feces.	2.9	157.4	6.56	16.9	not measurable	L1163287	15-Jun-12	29-Jun-12	14-JUN-12
EPH E2	62	441497	7505405	6/14/2012	14:00	y	clear water, grass bottom, no measurable flow, very slow. ~1ft deep, ponded in some areas, some floating OM, bird feces, took duplicate sample	4.2	41.3	7.09	161	not measurable	L1163287	15-Jun-12	29-Jun-12	14-JUN-12
EPH DUP	Duplicate of E2			6/14/2012			Duplicate of E2						L1163287	15-Jun-12	29-Jun-12	14-JUN-12

Sample ID	Time Sampled	ALS Sample ID	Matrix	Conductivity	Hardness (as CaCO3)	pH	Total Suspended Solids	Total Dissolved Solids	Acidity (as CaCO3)	Alkalinity, Total (as CaCO3)	Ammonia	Bromide (Br)	Chloride	Fluoride (F)	Nitrate	Nitrite (as N)	Phosphorus (P)-Total	Sulphate	Aluminum (Al)-Dissolved	Antimony (Sb)-Dissolved
EPH A2	13:00	L1163287-5	Water	742	241	7.9	#N/A	659	4.5	44.2	0.0077	#N/A	179	<0.10	0.309	<0.0050	0.0122	43.3	0.0045	0.00063
EPH B2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EPH C2	11:30	L1163287-3	Water	825	336	7.88	#N/A	556	4.6	44.2	0.0112	#N/A	105	<0.20	1.41	<0.010	0.012	220	0.0117	0.00109
EPH D2	12:15	L1163287-2	Water	1490	609	7.59	#N/A	1540	6.3	30.7	0.0065	#N/A	374	<0.20	0.297	<0.010	0.011	156	0.0067	0.0015
EPH E2	14:30	L1163287-1	Water	379	160	7.84	#N/A	288	4.6	43.2	<0.0050	#N/A	59.2	0.053	<0.0050	<0.0010	0.0163	49.5	0.0126	0.00073
EPH DUP	15:00	L1163287-4	Water	374	156	7.86	#N/A	258	4.4	42.9	<0.0050	#N/A	58.7	0.052	<0.0050	<0.0010	0.0109	49.5	0.0114	0.00074

Sample ID	Arsenic (As) - Dissolved	Barium (Ba)- Dissolved	Beryllium (Be)- Dissolved	Bismuth (Bi)- Dissolved	Boron (B)- Dissolved	Cadmium (Cd) - Dissolved	Calcium (Ca)- Dissolved	Chromium (Cr)- Dissolved	Cobalt (Co)- Dissolved	Copper (Cu)- Dissolved	Iron (Fe)- Dissolved	Lead (Pb)- Dissolved	Lithium (Li)- Dissolved	Magnesium (Mg)- Dissolved	Manganese (Mn)- Dissolved	Mercury (Hg)- Dissolved	Molybdenum (Mo)- Dissolved	Nickel (Ni) - Dissolved	Potassium (K)- Dissolved	Selenium (Se)- Dissolved
EPH A2	0.0181	0.0208	<0.00010	<0.00050	0.03	<0.000010	73.6	<0.00010	0.00019	0.0009	<0.010	0.000101	0.017	13.8	0.00138	<0.000010	0.000155	0.00358	3.45	<0.00010
EPH B2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EPH C2	0.00174	0.0344	<0.00010	<0.00050	0.041	0.000012	73.1	0.00035	0.00052	0.00159	0.033	<0.000050	0.00201	37.4	0.0153	<0.000010	0.000428	0.00609	6.69	0.00038
EPH D2	0.00093	0.0533	<0.00010	<0.00050	0.091	0.000016	175	0.00016	0.00112	0.00102	<0.010	<0.000050	0.0221	41.9	0.014	<0.000010	0.000554	0.00599	9.18	0.00077
EPH E2	0.00099	0.0195	<0.00010	<0.00050	0.029	<0.000010	44.7	0.00021	0.00019	0.0018	0.014	<0.000050	0.0069	11.6	0.000761	<0.000010	0.000595	0.00273	2.12	<0.00010
EPH DUP	0.00102	0.0191	<0.00010	<0.00050	0.029	<0.000010	43.7	0.00022	0.00018	0.00133	0.014	<0.000050	0.00699	11.3	0.000628	<0.000010	0.000602	0.00268	2.03	<0.00010

Sample ID	Silicon (Si)-Dissolved	Silver (Ag)-Dissolved	Sodium (Na)-Dissolved	Strontium (Sr)-Dissolved	Thallium (Tl)-Dissolved	Tin (Sn)-Dissolved	Titanium (Ti)-Dissolved	Uranium (U)-Dissolved	Vanadium (V)-Dissolved	Zinc (Zn) -Dissolved
EPH A2	0.513	<0.000010	39.2	0.556	<0.000010	<0.00010	<0.010	0.000015	<0.0010	0.0029
EPH B2	--	--	--	--	--	--	--	--	--	--
EPH C2	0.79	<0.000010	40.9	0.257	<0.000010	<0.00010	<0.010	0.000019	<0.0010	0.0021
EPH D2	1.81	<0.000010	50.3	1.42	<0.000010	<0.00010	<0.010	0.00001	<0.0010	0.0025
EPH E2	0.594	<0.000010	11.5	0.314	<0.000010	<0.00010	<0.010	0.000015	<0.0010	0.0015
EPH DUP	0.586	<0.000010	11.6	0.312	<0.000010	<0.00010	<0.010	0.000016	<0.0010	0.0018

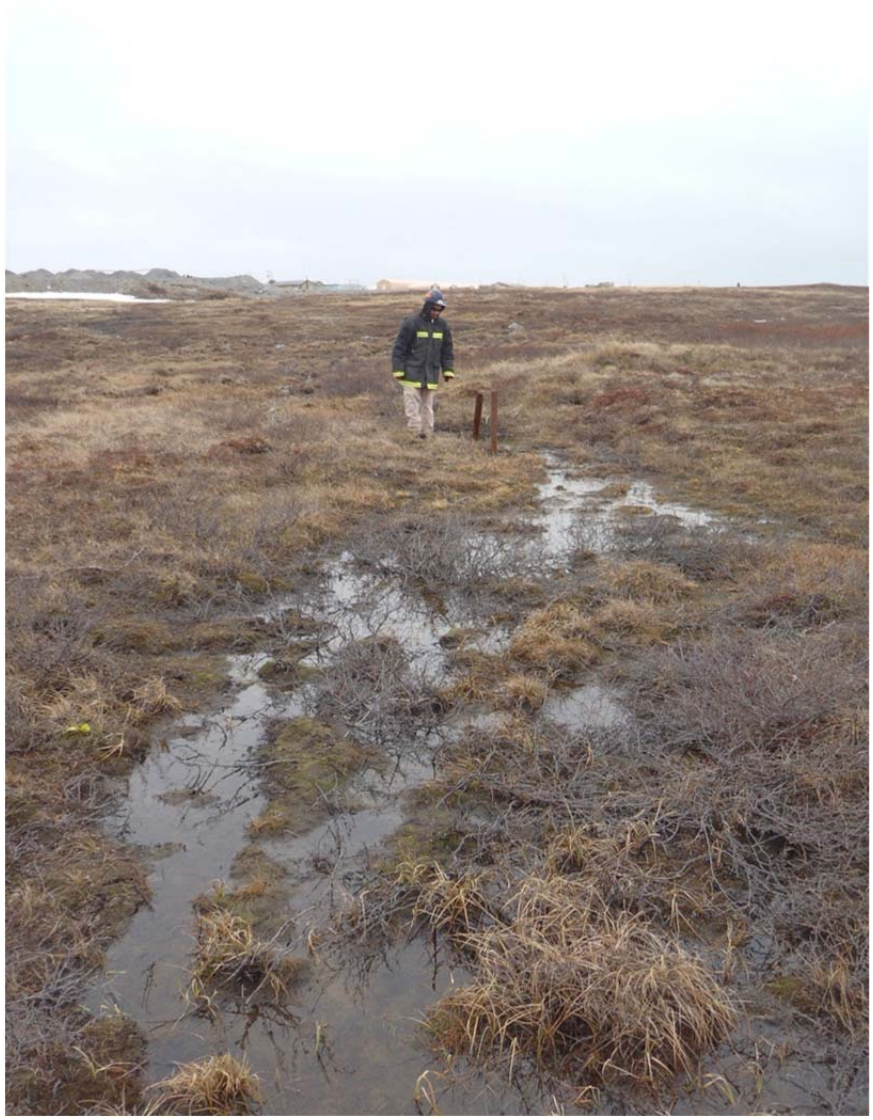
Attachment 2: Photos

A2 Upstream June 2012

A2 Downstream June 2012

B2 Upstream June 2012

B2 Downstream June 2012

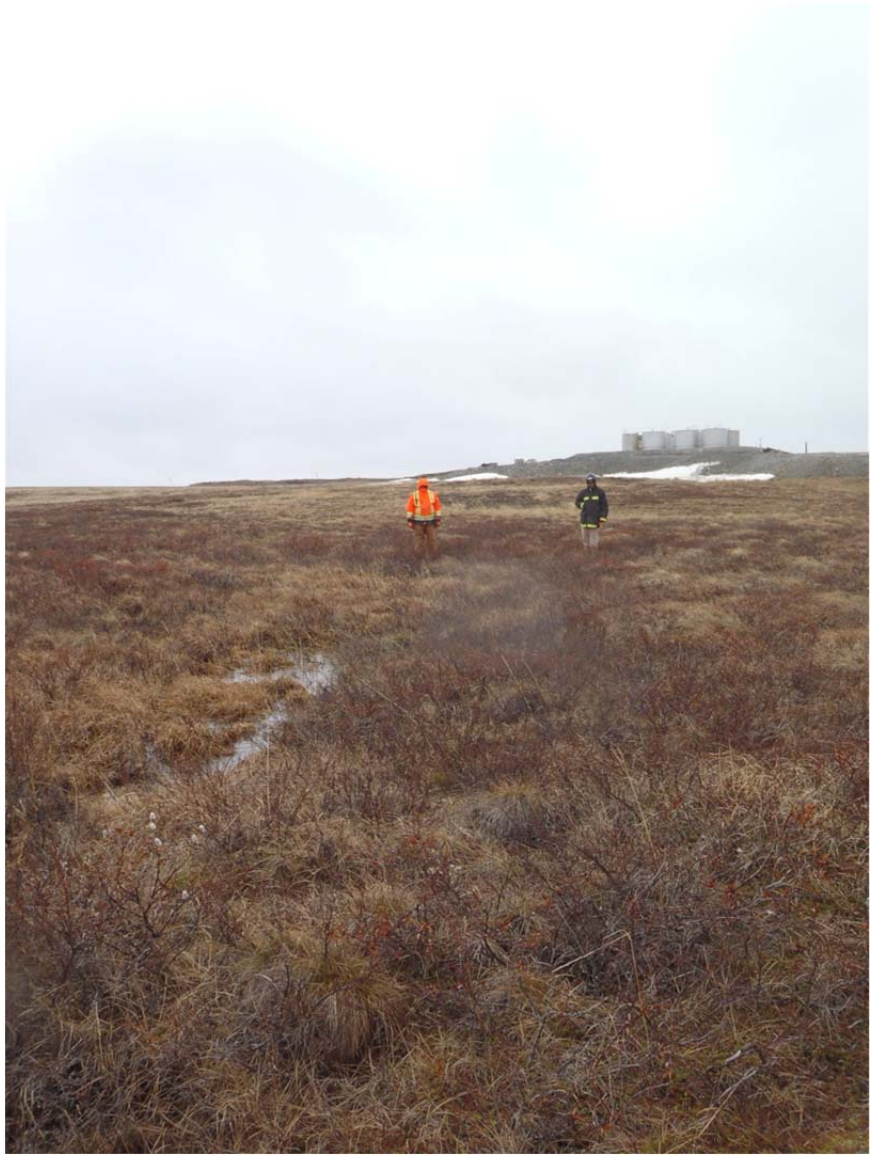


C2 Upstream June 2012

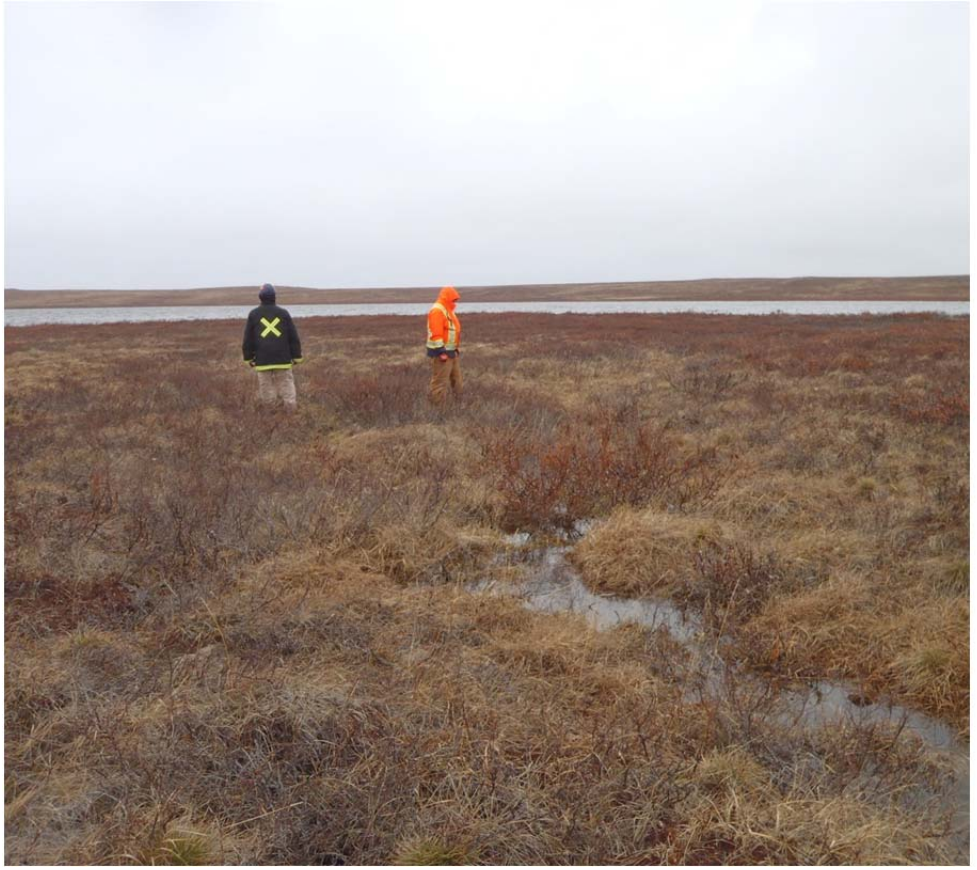
C2 Downstream June 2012

D2 Upstream June 2012

D2 Field Measurement June 2012



E2 Upstream June 2012



E2 Downstream June 2012