

October 21, 2013

EDI Job Number: 13-Y-0167

Assessment and Abandoned Mines Branch (AAM) K-149
Department of Energy, Mines and Resources, Yukon Government
Room 2C Royal Center, 4114-4th Avenue
PO 2703, Whitehorse, YT, Y1A 2C6

Attention: Adrienne Turcotte, Mount Nansen Project Officer

Re: Mount Nansen Surface Water Quality Field Memo: October 15-17, 2013

Trip Dates:	October 15-17, 2013
EDI Field Staff:	Dawn Hansen, Danny Skookum, Joel MacFabe
Tasks:	Hydrology and Water Quality

Field Summary

EDI completed the surface water quality sampling and hydrometric monitoring at the Mount Nansen Site from October 15 to October 17, 2013. Air temperatures during the trip ranged from -7°C to $+7^{\circ}\text{C}$. Weather conditions were clear and calm. Ice had formed over the tailings pond and Brown McDade pit lake, with ice along the margins of most streams. There were a few centimeters of snow on the ground during the site visit. Water levels across most of the sites/stations were low to moderate and typical for the late-fall period.

EDI visited all water quality sites and hydrometric stations. The Brown-McDade pit lake was not sampled due to thin ice conditions, making sampling unsafe. An additional water quality site was sampled at the request of AAM along the east slope of the Dome Creek Valley, see comments in Section 4.

Each section below details additional site- and station-specific information for the Hydrology (Section 1) and Water Quality (Section 2) programs. Included in the Water Quality section are appendices of water quality parameters that exceeded guidelines and/or the Mount Nansen Effluent Quality Standards, ALS Lab Analysis Reports, and YG Environmental Health Services bacteriological analysis results for the previous trip (September 23-25, 2013). Section 3 contains relevant photos of field conditions. Section 4 details additional monitoring program comments, noteworthy observations, and any changes to budget or scope moving forward.



1. Hydrology

All hydrometric stations were visited and station conditions documented. Stream discharge measurements were collected at each hydrometric station using the cross-sectional velocity-area method (*i.e.* mid-section method), the volumetric method, and/or the salt tracer method using a salt slug injection.

Water levels at all stations were typical of the late-fall period, with discharges in Dome Creek showing moderate water levels (H-DC-DX+105, H-DC-M, and H-DC-R). Due to air temperatures below zero degrees overnight and during parts of the day, ice has been forming along the shore at the majority of stations, and ranged from shore and anchor ice to full ice and snow covered channel sections. Due to the onset of winter conditions, most continuous hydrometric stations were removed for the winter, leaving only loggers at H-VC-R, H-VC-DBC, H-VC-U, and H-DC-M for the winter. These four loggers were winterized. Note during the removal of some loggers for the winter, the entire well casings had to be removed, as loggers were already frozen inside some wells. These well casings will be reinstalled in the spring 2014 along with the loggers.

Table 1 summarizes the hydrometric monitoring program measurements completed at each station and any additional relevant station details.

Table 1. Hydrometric program details.

Hydrology program dates:	October 15-16, 2013
Weather at time of monitoring:	Weather conditions were clear and calm, with temperatures between -7°C to +7°C.

Station	Hydrometric Measurement Type	Notes & Comments
ATM-DC2/DC4	None	Both atmospheric barologgers downloaded.
H-DC-DX	Volumetric	Water levels low, hydrometric measurement taken at culvert immediately downstream. Channel snow and ice covered.
H-DC-DX+105	Salt Slug	Water levels moderate. Salt tracer method used to measure stream discharge. Shore ice beginning to form along channel
H-DC-D1b	Salt Slug	Flow levels were low. Salt tracer discharge measurement taken. Sections of channel are snow and ice covered.
H-DC-U1	Salt Slug	Water levels seasonally low. Salt tracer method used to estimate discharge. Channel snow and ice covered.
H-DC-U2	Salt Slug	Water levels were low with moderate turbidity. Salt tracer method used to estimate discharge through existing channel. Shore ice along channel with some sections completely covered.
H-DC-B	Salt Slug	Salt tracer method used to estimate stream discharge. Logger and well casing removed for winter season. Majority of channel covered in ice.
H-DC-M	Salt Slug	Salt tracer used to estimate stream discharge. Logger downloaded, winterized and redeployed. Shore ice starting to form along channel.



Station	Hydrometric Measurement Type	Notes & Comments
H-DC-R	Salt Slug	Water level moderate. Salt tracer used to estimate stream discharge. Logger and well casing removed for the winter season. Shore ice along some creek margins (Photo 6).
H-VC-REF	ADV	Flow levels moderate and water clear. Area-velocity method used to estimate discharge. Logger removed for winter season. Shore and anchor ice along length of channel.
H-VC-U	ADV	Water levels are moderate. Discharge measurement completed using the mid-section method. Logger winterized and redeployed. Minimal ice observed in channel section.
H-BC	Salt Slug	Water levels moderate and water very clear. Channel is ice covered with overflow taking place. Salt tracer used to measure discharge. Logger removed for winter season.
H-VC-DBC	ADV	Water level moderate. Stream water is clear with some silt accumulation. Mid-section method used to measure discharge. Logger downloaded, winterized, and redeployed. Minimal ice observed in channel section.
H-VC-UMN	ADV	Mid-section method used to measure discharge. Logger removed for winter season. Shore ice present along channel.
H-MN	Salt Slug	Mid-section method used to measure discharge. Logger and well casing removed for winter season. Channel partially ice and snow covered.
H-VC-R	ADV	Stream flows moderate and relatively clear. Mid-section method used to estimate discharge. Logger downloaded, winterized, and redeployed. Shore ice along entire channel section (Photo 5) and anchor ice beginning to form upstream of the culvert.
H-SEEP	Volumetric	A volumetric measurement was made at the pipe discharge. Flow rate and total volume was recorded from the flow meter. Staff gauge measurement recorded from the seepage pond pump house.
H-TP	None	Staff gauge reading recorded. Note full ice coverage at time of sampling.
H-PC-U	Salt Slug	Moderate flow at station with water continuing to be diverted around weir structure. Salt tracer was used to measure discharge. Logger and well casing were removed for the winter season. Channel snow and ice covered. Benchmark 2 was found pulled up and moved 85cm higher in elevation (photo 1, 1b).
H-PC-DSP	Volumetric	Flow level is very low. A volumetric measurement was collected from the culvert upstream of the station. Logger removed for the winter season. Ice and snow covered sections of channel.

2. Water Quality

Water quality samples were collected from all monitoring sites with the exception of WQ-ADIT-SEEP due to zero flow and WQ-PIT due to thin ice conditions (Photo 2). Ice was present over most still water areas, including the tailings pond (Photo 4) and the pond at WQ-PC-U. Water levels were moderate to low at all other sites, with creek sites having some ice coverage on the margins. Table 2 summarizes the water quality sampling conditions at each site.



All water quality samples were delivered to ALS on Thursday, October 17, 2013. Bacteriological samples collected from the pump house well were submitted to YG Environmental Health Services (EHS) on Thursday, October 17, 2013.

This memo includes analytical results from samples collected during the September 23-25, 2013 trip (Appendix A, C) as well as copies of the ALS Certificate of Analysis (Appendix B).

Table 2. Water quality sampling program details.

WQ Sampling dates:	October 16-17, 2013
Weather at time of sampling:	Weather conditions were clear and calm, with temperatures between -7°C to +7°C during sampling.

Site	Sampled? (Yes/No)	Notes / Explanations
WQ-PIT1	No	Thin ice covered conditions. Not safe for sampling (Photo 2).
WQ-PIT2	No	Thin ice covered conditions. Not safe for sampling (Photo 2).
WQ-PIT3	No	Thin ice covered conditions. Not safe for sampling (Photo 2).
WQ-SEEP	Yes	Conditions normal for this time of year.
WQ-TP	Yes	Conditions normal for this time of year. Ice covering 8 cm (Photo 4).
WQ-DC-DX	Yes	Water levels were moderate.
WQ-DC-DX+105	Yes	Water levels were moderate.
WQ-DC-D1b	Yes	Water levels were moderate.
WQ-DC-U1	Yes	Water levels were moderate.
WQ-DC-U2	Yes	Water levels were moderate.
WQ-DC-U	Yes	Water levels were moderate.
WQ-DC-R	Yes	Water levels were moderate.
WQ-VC-REF	Yes	Site conditions normal for time of year.
WQ-VC-U	Yes	Site conditions normal for time of year.
WQ-BC	Yes	Site conditions normal for time of year.
WQ-VC-DBC	Yes	Site conditions normal for time of year.
WQ-VC-UMN	Yes	Site conditions normal for time of year.
WQ-MN	Yes	Site conditions normal for time of year.
WQ-VC-R	Yes	Site conditions normal for time of year.
WQ-PW	Yes	Bacteriological sample and drinking water samples collected from discharge pipe.
WQ-PC-U	Yes	Moderate to low flow observed entering pond at sampling location. Water samples collected.
WQ-PC-D	Yes	Low flows present in creek. Sample collected.



Site	Sampled? (Yes/No)	Notes / Explanations
WQ-ADIT-SEEP	No	Seep was dry. No samples collected.
WQ-MS-S-03	Yes	Ditch had been excavated and shaped. Flowing water present within ditch. Sample collected.
WQ-DRY	No	No scheduled sampling.
WQ-DESS-01	Yes	One-time sampling event, see Section 4 for more info (Photo 3).
Quality Assurance/Quality Control Samples		
Field Replicate A	Yes	Collected from WQ-VC-UMN.
Field Replicate B	Yes	Collected from WQ-VC-U.
Field Blank	Yes	Samples prepared with lab-supplied de-ionized water at the site.
Trip Blank	Yes	Samples provided by lab and were transported to and from site.



3. Trip Photographs



Photo 1a. H-PC-U BM2 Location 27 May, 2013.



Photo 1b H-PC-U BM2 Location 15 Oct, 2013.



Photo 2. WQ-PIT thin ice conditions.



Photo 3. Dome East Slope Seep 01 (WQ-DESS-01), site requested by AAM for one time sample event.



Photo 4. WQ-TP showing ice coverage over entire pond.



Photo 5. H-VC-R (looking upstream) station showing ice on margins.



Photo 6. H-DC-R (looking upstream) station showing ice on margins and light snow on banks.

4. Additional Trip Information/Comments

<p>Any changes to project scope (i.e. additional sites sampled):</p>	<p>One water quality site (WQ-DESS-01) outside of the Scope of Work was sampled upon request from AAM. Erik Pit directed crew to the site which lies along the power line road along the east slope of the Dome Creek Valley (Field GPS Coordinates 08V 0388628, 6881160). Location, photos and the regular suite of samples were taken (Photo 3). See comments below for budget implications and addition comments.</p>
<p>Any alterations to sample scheduling:</p>	<p>No alterations to monitoring trip schedule.</p>
<p>Any events resulting in changes to budget:</p>	<p>The addition of the one-time water sample at the site noted above, required some additional time and expense, including 2.25 hrs of additional person hours plus the analysis of the extra sample set. This will be noted on the October invoice for budget tracking purposes.</p>
<p>Additional Comments:</p>	<p>Crews noticed that Benchmark 2 at H-PC-U had been moved by someone else prior to October field visit.</p> <p>The WQ-DESS-01 site sampled this trip at the request of AAM, is a site that has been sampled in previous years (2009-2011) and was originally established by Altura Environmental Consulting.</p>
<p>Wildlife Sightings:</p>	<p>No wildlife observed.</p>
<p>Site concerns including safety concerns:</p>	<p>None</p>



Appendix A:
Water Quality Parameter Guideline Exceedances
September 23-25, 2013



Appendix B:
ALS Analytical Reports
September 23-25, 2013



Appendix C:
YG Bacteriological Results
September 23-25, 2013