

May 24, 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
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Attention: Adrienne Turcotte, Mount Nansen Project Officer

Re: Mount Nansen Surface Water Quality Field Memo: May 21-23, 2013

Trip Dates:	May 21 to 23, 2013
EDI Field Staff:	Joel MacFabe, Caleb Light, and Danny Skookum
Tasks:	Hydrology and Water Quality

Field Summary

EDI completed the surface water quality sampling and hydrometric monitoring at the Mount Nansen site from May 21 through 23, 2013. EDI visited all water quality sites and hydrometric stations. When possible, EDI made hydrometric measurements and collected water quality samples at respective monitoring stations. Weather conditions during the field visit were good, with mostly sun and warm (~12°C) air temperatures and no precipitation.

The purpose of the field visit was to continue to capture freshet conditions at sites wherever possible. Stream flow conditions at higher elevation stations had increased from previous site visit conditions, however lower elevation stations such as those in Victoria, Pony, Minnesota and Back creek had declined.

Channel conditions at all stations remained similar to the previous trip. Significant quantities of overflow ice remain on Dome creek at H-DC-R, DC-U1, DC-U2 and DC-D1b. Where overflow ice remains at Dome Creek stations, complex and highly braided channels of flowing water have developed within and on the ice. Such conditions are not suitable for obtaining representative hydrometric measurements and therefore could not be completed. Some overflow ice remains at Minnesota Creek station H-MN, however a well-defined channel has incised into the overflow ice and was suitable for collecting hydrometric measurements. Residual ice remains frozen to the channel margins within Victoria Creek's floodplain upstream of Nansen Road.



Each section below details additional station and site-specific information for Hydrology (Section 1) and Water Quality (Section 2) programs. Section 3 contains relevant photos of field sites. Section 4 details additional monitoring program comments, noteworthy observations, and any changes to budget or scope moving forward.

1. Hydrology

Stream discharge measure measurements were collected using the cross sectional area – velocity method, alternatively termed the ‘mid-section method’. Point velocities were collected at 60% of the stream depth in discretized ‘panels’ along a stream cross section. Each panel and point velocity measurement is selected such that each panel represents less than 10% of total stream discharge. Where channel conditions did not permit the use of the cross sectional area, salt tracer methods were used. Salt solutions of varying concentrations were slug-injected into the stream with specific conductivity measured at a point downstream. Changes in stream water specific conductivity and conservation of mass is used to estimate stream discharge.

Table 1 summarizes the hydrometric program monitoring stations, measurements completed and any additional relevant station details. All hydrometric stations were visited and site conditions documented. Where installed, data loggers were downloaded and re-deployed following hydrometric monitoring.

The hydrometric station at H-VC-R was repaired following displacement during high flows preceding the May 15th field visit. The stilling well, data logger and staff gauge assembly was reconstructed to sustain higher flows and shifts in channel morphology.

Data loggers were re-deployed at remaining hydrometric stations, with the exception of H-MN and H-DC-U1 & U2, H-DC-D1b. and H-DC-B. Channel conditions were either frozen or unsuitable for installation of hydrometric stations and water level data loggers.

Table 1. Hydrometric program details

Hydrology program dates:	May 21 to 22, 2013	
Weather at time of monitoring:	Weather conditions were sunny, with temperatures between -1 °C to +15 °C.	
Site	Hydrometric Measurement Type	Notes & Comments
ATM-DC2/DC4	None	Both atmospheric barologgers downloaded.
H-DC-DX	Salt Slug	Water flowing in very small, partially ice and snow covered channel. A volumetric measurement was taken from the culvert between stations H-DC-DX and H-DC-DX+105.
H-DC-DX+105	Salt Slug	Channel is snow and ice free. Salt tracer method used in addition to volumetric measurement at culvert upstream.



Site	Hydrometric Measurement Type	Notes & Comments
H-DC-D1b	None	Creek remains frozen to substrate at this location. Flowing channels continue to develop on the surface of the ice, are highly braided and complex networks not suitable for gauging.
H-DC-U1	None	Creek remains frozen to substrate at this location. Complex braided channels are developing on and within the ice. Conditions are not suitable for gauging.
H-DC-U2	None	Creek is frozen to substrate with water flowing on the surface and within the ice via complex networks. Conditions were not suitable for stream gauging.
H-DC-B	Salt Slug	Stream channel was free of ice and at a moderate stage with a high suspended sediment load. Salt tracer method used to calculate discharge.
H-DC-M	Salt Slug	Dome Creek no longer frozen to bed at the stilling well location. Some ice remains on margins and within the floodplain. Salt tracer used to measure discharge.
H-DC-R	None	Water partially flowing across the Mount Nansen Road, and on the surface of the overflow ice. Conditions not suitable for a discharge measurement due to the absence of a well-defined channel. Significant quantities of overflow ice remain covering the channel and hydrometric station downstream of road, up to approximately 1 m thick.
H-VC-REF	ADV	Victoria Creek at the REF station is ice free. Water levels were moderate and lower than the previous visit. Water level loggers were downloaded and surveyed. Discharge measured using the mid-section method.
H-VC-U	ADV	Station location is completely free of ice. Water levels near bankfull conditions. Discharge measurement completed using the mid-section method.
H-BC	Salt Slug	Station location is open with moderate discharge. Bed and suspended sediment load remains high. Salt tracer method used to measure discharge. Water level logger downloaded.
H-VC-DBC	ADV	Stream channel open with high suspended sediment load. Stage elevation significantly less than previous (May 15 th) site visit. Mid-section method used to measure discharge.
H-VC-UMN	ADV	Channel was open and ice free. Water levels less than previous site visit. Mid-section method used to measure discharge. Water level logger downloaded.
H-MN	Salt Slug	Overflow ice remains in creek valley at station, with water incising a channel through the overflow ice. The salt tracer method was used to measure discharge. The stilling well remains frozen in overflow ice.
H-VC-R	ADV	Stream channel open downstream of culvert. All Victoria Creek flowing through road culvert. Stream discharge was measured using the mid-section method. Stilling well was repaired to withstand additional sustained high flows.
H-SEEP	Volumetric	A volumetric measurement was made at the pipe discharge. Flow rate and total volume was recorded from the flow meter. No staff gauge reading was obtained due to ice conditions.
H-TP	None	Tailings pond remains ice covered. No staff gauge reading during ice conditions.



Site	Hydrometric Measurement Type	Notes & Comments
H-PC-U	Salt Slug	Minor quantities of ice and snow remains in the Pony Creek channel at the stilling well. A water level logger was installed in a stilling well. Salt tracer method was used to measure discharge. Total flow for Pony Creek is not being captured by the weir structure due to significant flow diverted around the structure.
H-PC-DSP	Salt Slug	Station location was nearly free of snow and ice. The salt tracer method was used to calculate discharge. The water level logger was downloaded.

2. Water Quality

Water quality stations are generally ice free with water stage elevations declining following freshet conditions encountered the previous sampling event. Water quality samples were collected from all monitoring stations with the exception of WQ-DC-D1b and DC-U1. These stations were not sampled due to very complex, braided channel networks flowing on the remaining overflow ice. Ice cover is still present on the tailings pond. Tailings pond water quality samples were collected from the ice-free margins. The Brown-McDade pit lake was not sampled during this trip due to the ice conditions. Only one sampling event for the Brown-McDade pit is required for May 2013. A single mill seep site (WQ-MS-S-08) was not sampled due to an absence of flowing or standing water at the sampling location.

All water quality samples were delivered to ALS on Thursday, May 23, 2013. Bacteriological samples collected from the pump house well were submitted to Yukon Government (YG) Environmental Health Services on Thursday, May 23, 2013.

This report includes no water quality analysis results as there has not yet been sufficient turn-around time for the lab following the May 13 – 15 2013 sampling; that data will be included in the first trip memo created following reception of the results.



WQ Sampling dates:	May 22-23, 2013
Weather at time of sampling:	Conditions ranged from 2 °C to 15 °C, with periods of sun and overcast skies.

Site	Sampled? (Yes/No)	Notes / Explanations
WQ-PIT1	No	Ice conditions prevented sampling
WQ-PIT2	No	Ice conditions prevented sampling
WQ-PIT3	No	Ice conditions prevented sampling
WQ-SEEP	Yes	Site conditions normal for time of year. LT50 sample collected
WQ-TP	Yes	Ice remains over pond, sample collected from open water on edge of pond (Photo 12)
WQ-DC-DX	Yes	Creek is open and flowing; some ice cover remaining over the channel. Water was very clear (<1 NTU)
WQ-DC-DX+105	Yes	Channel mostly open, high flows and moderate turbidity levels
WQ-D1b	No	Channel remains glaciated, water seeping through multiple layers of ice, not suitable for sampling at this time
WQ-DC-U1	No	Significant overflow ice remains at this location. Some water flowing over top of ice, but highly braided channels and sub-surface flow observed. Not suitable for sampling
WQ-DC-U2	Yes	Creek remains glaciated at this location. Water flowing over top of ice, and nearing breakthrough to substrate
WQ-DC-U	Yes	Channel open to substrate, with ice remaining only on margins. Moderate to low turbidity levels
WQ-DC-R	Yes	Channel remains glaciated upstream and downstream of road crossing. Water flowing on surface of overflow ice. Water sample collected immediately upstream of culvert
WQ-VC-REF	Yes	Channel ice free, with water levels less than previous trip
WQ-VC-U	Yes	Channel is ice free. Water levels significantly lower than previous visit. Moderate turbidity levels
WQ-BC	Yes	Channel open, moderately turbid (198 NTU) and moderate flows
WQ-VC-DBC	Yes	Channel was open with moderate turbidity (37.9 NTU)
WQ-VC-UMN	Yes	Channel was open and ice free. Water levels were much less than previous visit
WQ-MN	Yes	Water was flowing on surface of overflow ice in a well-defined channel
WQ-VC-R	Yes	Samples collect at open-water monitoring location, upstream of road culvert. Up to 1 metre of overflow ice remains over channel
WQ-PW	Yes	Bacteriological and drinking water samples collected from discharge line
WQ-PC-U	Yes	Sampled from regular location where channel enters small pond



Site	Sampled? (Yes/No)	Notes / Explanations
WQ-PC-D	Yes	Channel open and flowing with small amounts of ice along the margins of the channel (Photo 10)
WQ-ADIT-SEEP	Yes	Water seeping through rocks and into Pony Creek upstream of the WQ-PC-D site
WQ-MS-S-08	No	Standing water with no flow apparent. Not suitable for sampling at this time
WQ-MS-S-03	Yes	Some ice still remaining in portions of channel. But sufficient flow for sampling
Quality Assurance/Quality Control Samples		
Field Replicate A	Yes	Collected from WQ-VC-U
Field Replicate B	Yes	Collected from WQ-SEEP
Field Blank	Yes	Samples prepared with laboratory-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 1. Victoria Creek Station H-VC-R looking upstream.



Photo 2. H-MN station on Minnesota Creek looking upstream.



Photo 3. H-DC-R station looking downstream. Note the channel to the left.



Photo 4. H-DC-M station looking downstream.



Photo 5. H-DC-U1 site looking downstream towards tailings pond. Large quantities of overflow ice remains present.



Photo 6. The H-DC-U2 station looking upstream. Channel becoming more well defined and incising channel in overflow ice.



Photo 7. H-DC-D1 station looking downstream. Frozen conditions remain with no flowing water apparent.



Photo 8. H-DC-DCB looking upstream. Small quantities of snow and some ice remain along north-facing channel slopes.



Photo 9. H-DC-DX+105 looking upstream.



Photo 10. H-DC-DX with moderate ice and snow cover on portions of the channel.



Photo 11. H-PC-DSP hydrometric station looking upstream. Note: the white material by the stilling well is foam, not ice.



Photo 12. H-PC-U looking upstream. Flow diverted from the weir (right) re-joins the channel on the left of the image.



Photo 13. WQ-MS-08 monitoring location. Mill seep was dry with no standing or flowing water.



4. Additional Trip Information/Comments

Any changes to project scope (i.e. additional sites sampled):	None
Any alterations to sample scheduling:	No alterations to the sampling schedule.
Any events resulting in changes to budget:	No changes to budget.
Additional Comments:	None
Wildlife Sightings:	Several Ptarmigan, a black bear on Mount Nansen Road.
Site concerns including safety concerns	None
Any additional notes/concerns	None