Mount Nansen Water Quality – Summary of Results

Assessment and Abandoned Mines November 17, 2016

In response to concerns regarding the LC50 result reported for October 2017 (96-hour, 75.3%v/v), water quality conditions at Mount Nansen between October 2015 and October 2016 have been summarized below for WQ-SEEP. These results were compiled from monthly water quality and hydrology reports (EDI).

LC50 samples are typically collected every other month at WQ-SEEP as part of the Mount Nansen Surface Water Quality and Hydrology program. The following table is a list of 96-hour LC50 results reported since October 2015.

Month	LC50 Result
November 2015	90%
January 2016	100%
March 2016	100%
April 2016	100%
June 2016	100%
August 2016	100%
October 2016	75%

Table 1: *LC50 Results, WQ-SEEP*

The main contaminants of concern for Mount Nansen (ammonia, arsenic, iron, manganese, zinc) were considered for the October 2015 through October 2016 period.

Ammonia

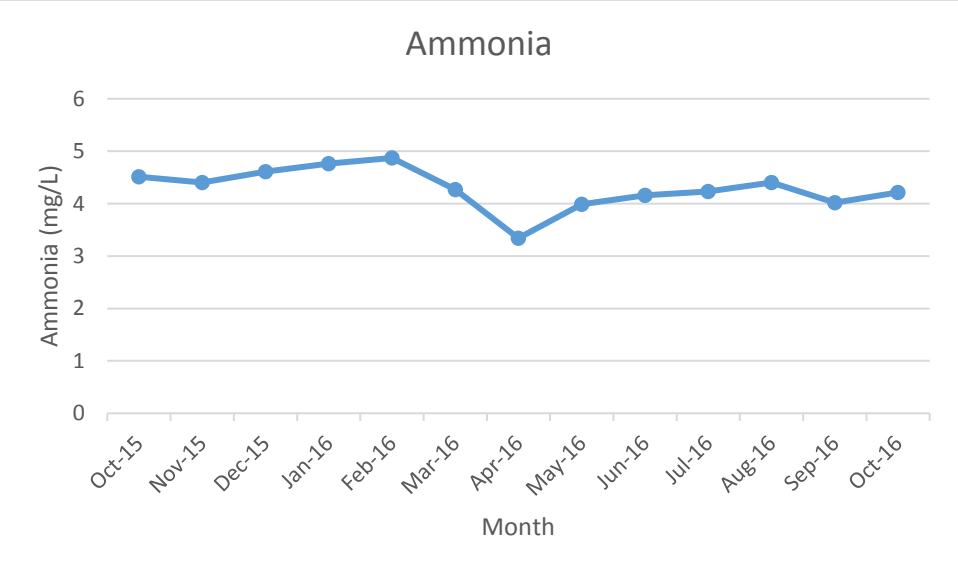

Figure 1: *Ammonia concentrations at WQ-SEEP, October 2015 through October 2016*

Ammonia concentration during October 2016 (4.21 mg/L) was well within the range that is expected at WQ-SEEP. During the 2015 through 2016 period, concentrations ranged from 3.34 mg/L to 4.87 mg/L. Ammonia concentrations are relatively similar between sampling events, with the exception of April 2016, which may be related to freshet conditions at the Mount Nansen site.

Arsenic

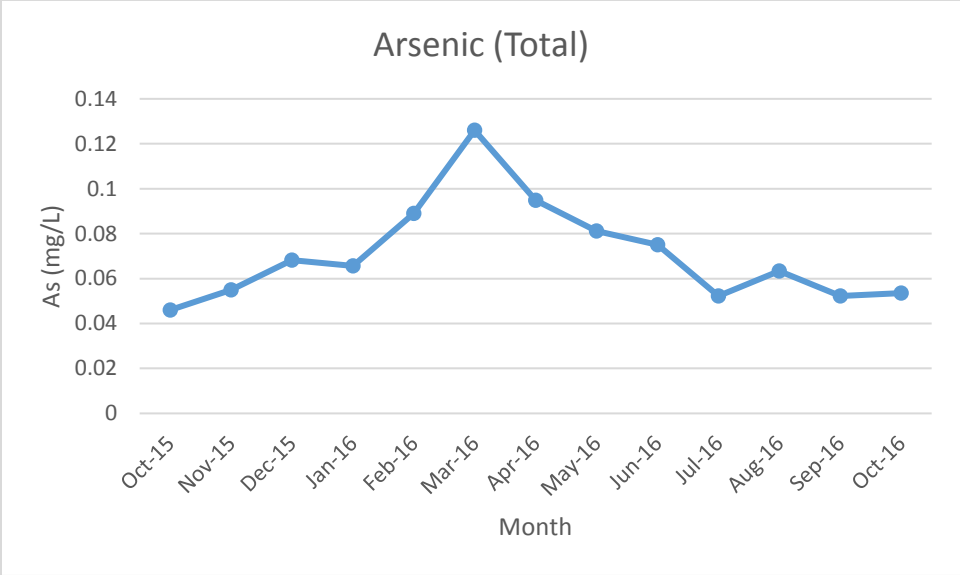

Figure 2: *Total arsenic concentrations at WQ-SEEP, October 2015 through October 2016*

The total arsenic concentration during October 2016 (0.126 mg/L) was also within the range that is expected at WQ-SEEP. During the period depicted in Figure 2, arsenic concentrations ranged from 0.046 mg/L to 0.126 mg/L. Arsenic concentrations appear rise through the winter, and decrease during the summer months.

Iron

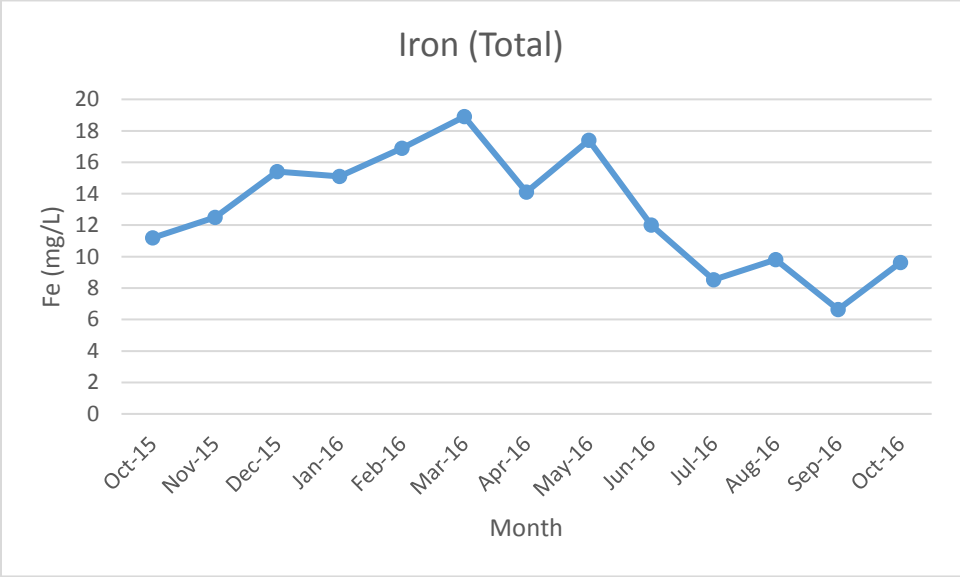

Figure 3: *Total iron concentrations at WQ-SEEP, October 2015 through October 2016*

The total iron concentration reported for October 2016 (9.62 mg/L) was within the expected range at WQ-SEEP. The iron concentration reported for October 2016 (9.62 mg/L) was lower than that reported for October 2015

(11.2 mg/L). The range of iron concentrations during this period was 6.64 mg/L to 18.9 mg/L. Iron concentrations appear to fluctuate throughout the year, but generally rise throughout the winter months, and decrease over the open water period.

Manganese

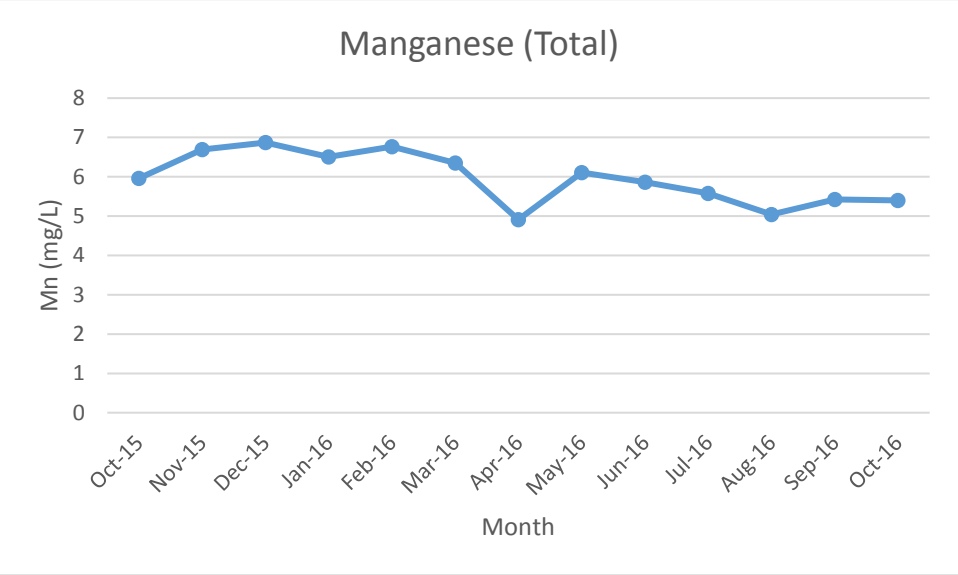

Figure 4: *Total manganese concentrations at WQ-SEEP, October 2015 through October 2016*

The total manganese concentration at WQ-SEEP during October 2016 (5.4 mg/L) was similar to previous results, and well within the expected range at this location. Throughout the 2015 to 2016 period, manganese concentrations ranged from 4.91 mg/L to 6.87 mg/L.

Zinc

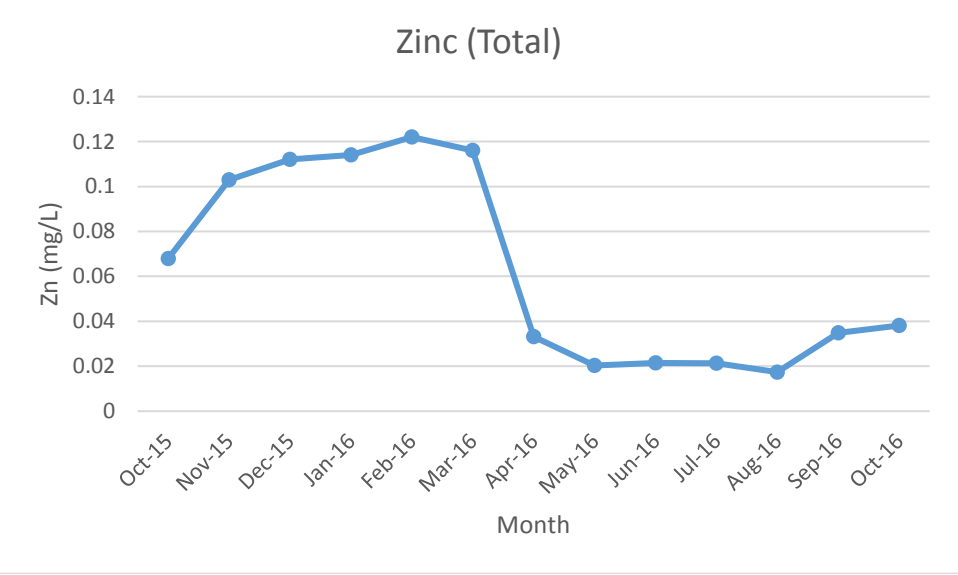

Figure 5: *Total zinc concentrations at WQ-SEEP, October 2015 to October 2016*

While zinc concentrations at WQ-SEEP have increased over the last two months, the October 2016 zinc concentration (0.0381 mg/L) is lower than the concentration reported in October 2015 (0.0679 mg/L). The highest zinc concentration during the October 2015 to October 2016 period was recorded in February 2016 (0.122 mg/L), and the lowest in August 2016 (0.0174 mg/L).

Other Parameters

A high level review of additional water quality parameters was conducted in order to determine if there were any potential concerns related to the October 2016 LC50 result. WQ-SEEP results from July 2016 through October 2016 were considered.

Cyanide (WAD, total), cyanate, thiocyanate. Results from WQ-SEEP typically exhibit trace concentrations of cyanide species, while most water quality stations at Mount Nansen report these parameters below detection limits. Results were similar across sampling events; between July 2016 and October 2016:

- WAD cyanide ranged from <0.0050 mg/L (October) to 0.0151 mg/L (July);
- Total cyanide ranged from 0.0152 mg/L (October) to 0.0367 mg/L (July);
- Cyanate ranged from <0.20 mg/L (July, August, September) to 1.14 mg/L (October); and
- Thiocyanate ranged from 4.64 mg/L (September) to 5.37 mg/L (August).

Parameters exceeding thresholds. In addition to the parameters discussed above (ammonia, arsenic, iron, manganese and zinc), total cadmium was the only other parameter to exceed CCME or EQS thresholds in October 2016 (0.000419 mg/L; hardness-adjusted CCME guideline 0.00037 mg/L). During the July through October 2016 period, total cadmium ranged from 0.000277 mg/L (August) to 0.000496 mg/L (July). No other parameters exceeded CCME or EQS thresholds during this period.

Follow-up

Upon review, surface water quality conditions at WQ-SEEP for October 2016 are not outside of the range that are expected at this location. It is not immediately apparent as to what may have contributed to the LC50 result for the same month. AAM has requested that EDI return to Mount Nansen to collect an LC50 sample from WQ-SEEP. This sample is being collected on November 17, 2016, and laboratory results should be available by November 25, 2016. Results will be communicated immediately to senior management. Should the LC50 report results less than 100%, a more detailed review of water quality conditions is recommended.