

Sent by mail and email

September 5, 2017

Mackenzie Valley Land and Water Board
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Attention: Mr. Julian Morse

Dear Sir

Re: NATCL Water License MV2015L2-0003 SNP Amendment Request

North American Tungsten Corporation Ltd. (NATCL) is writing to request an amendment to the Surveillance Network Program (SNP) described in Annex A of Water License MV2015L2-0003. NATCL has identified SNP amendments that we feel appropriately reflect the water management, reduced operational activities and discharges on site, as well as personnel safety concerns, during care and maintenance.

The proposed amendments outlined in this letter are designed to meet the requirements of the September 8, 2016 and June 7, 2017 letter from the Mackenzie Valley Land and Water Board (MVLWB or 'the Board') which require NATCL to "...submit a formal request, supported by rationale, for any proposed changes to the SNP associated with the two locations from which mine water is discharging to the receiving environment (at SNP stations not currently active or established)."

Background Information

As identified in the Care and Maintenance Plan (C&M Plan), the most recent version of which was submitted concurrently with this SNP amendment request on 5 September 2017, water from the mine site during the Care and Maintenance period flows from either the mine portal (S4-13) into Sardine Creek (S4-32) prior to discharging to the Flat River, or it flows from the mine's conveyor gallery (S4-42) to the old lagoon (S5-2) prior to discharging to the Flat River. To date, each of these flows has been monitored through either the Water License SNP or requirements under the Metal Mining and Effluent Regulations (MMER) as outlined in Figure 1, and results have been shared through the monthly SNP reports.

Figure 1. Care and Maintenance Water Discharge and Monitoring Locations



The following changes proposed by NATCL for the SNP would result in SNP monitoring stations at each of the above locations. NATCL is also requesting some further SNP reductions that reflect the current status of the mine and are based on results observed to date.

1. Re-activate SNP Station S4-13

Mine water from the 3950 level main portal/“E” Zone discharge point (S4-13) was actively pumped from this area during mine operations and the status of SNP station S4-13 was therefore ‘inactive’. This station began regularly discharging seepage water after all the dewatering pumps were shut down in October 2015. Since the mine has flooded (estimated as April 2017), water discharging from this portal location is now a mix of the mine/ground water and seepage water. Water from this portal discharge point reports to a collection sump that provides access for sample collection and flow characterization. The water is then released through a series of culverts that connect to an old ditch line which ultimately flows into the Flat River via Sardine Creek (SNP S4-32).

NATCL recommends that SNP sampling at this station be revised to ‘active’ for operational monitoring on a monthly basis until commercial operations resume and the mine is dewatered.

Sampling at this location also occurs as part of NATCL’s requirements under the Metal Mining Effluent Regulations (MMER) and results since January 2016 have remained below MMER criteria.

It should be noted that operational monitoring at SNP S4-32 (Sardine Creek) also occurs monthly, during open water, and NATCL does not propose any changes for the monitoring requirements at this station.

2. Addition of SNP Station at S5-2

Water flowing from the mine conveyor gallery is captured under the operational monitoring at SNP S4-42. This occurs on a monthly basis and NATCL does not propose any changes for the monitoring requirements at this station.

Water from the conveyor gallery flows to the old lagoon, the outflow of which is MMER Final Discharge Point S5-2, which is currently sampled as part of NATCL’s requirements under the MMER, and results to date have remained below MMER criteria.

NATCL proposes to incorporate this sample point into the SNP operational monitoring for Care and Maintenance and **recommends the addition of a SNP station at the same location as S5-2**. NATCL proposes a monthly sampling frequency that aligns with the sampling schedule for S4-42, as well as that of S4-13 and S4-32.

In reference to the Board's directive, NATCL would like to clarify that S4-13 and S4-42 are the two locations from which mine water discharges to the environment. The Board's September 8, 2016 directive noted that water quality data from S4-13 and S4-42 at the time of the review had not exceeded Effluent Quality Criteria (EQC) derived for the WWTF effluent (S4-43). The Board also recognized that EQC for the Wastewater Treatment Facility (WWTF) may not necessarily be transferrable to the mine water discharge locations and NATCL agrees with this statement.

Under Care and Maintenance, the average flows from the two mine water discharge sites since April 2017 are 200 m³/day (S4-13) and 534 m³/day (S4-42); this is significantly less water, and therefore less loading, than the volumes released from the WWTF. While sample results of the mine water discharge since January 2016 have remained below MMER criteria, elevated levels have been noted for some parameters in comparison to the Effluent Quality Criteria developed for the Waste Water Treatment Facility effluent at the Cantung mine.

The list below identifies where concentrations above EQC have been observed for the following reported parameters at Station S4-13:

- Maximum Average Concentration (MAC) for TSS exceeded on 9 & 16 May 2016;
- MAC for sulphate on 17 & 24 April and 1, 8, 15 & 22 May 2017;
- MAC for iron exceeded on 25 April and 2, 9 & 16 May 2016; and
- Maximum Grab Concentration (MGC) for iron, copper and zinc exceeded on 25 April 2016.

Parameters with elevated levels in relation to EQC at S4-42 are:

- MAC for sulphate from April to July 2017;
- MGC for sulphate on 3 April and 8 May 2017; and
- MAC and MGC for iron from April to July 2017.

These values have been provided in the monthly SNP reports. Flooding of the mine and instances of elevated water flows (e.g. freshet, heavy rainfall events) appear to be influencing the water quality in these locations. Site-specific Water Quality Objectives (SSWQO) were also determined for most parameters of concern within the Flat River, though a SSWQO for sulphate was not calculated. Where exceedances of SSWQO have occurred in the Flat River sampling areas associated with the mine site, corresponding elevated values have generally been observed both upstream and downstream of the site as well. NATCL feels that it is important to recognize that while the select parameters noted above have sometimes been elevated in comparison to EQC over the past twenty months, SSWQO within the Flat River have largely remained within those values derived for the Cantung mine, which should provide assurance that there is no immediate risk to the receiving environment.

3. Suspension of SNP Station S4-44

SNP Station S4-44 is a water sampling station located on the Flat River and is approximately 180 m downstream of the final discharge point (FDP) from Cantung's Wastewater Treatment Facility (WWTF). SNP Sampling Station S4-44 was implemented January 14th, 2013 in anticipation of the initial effluent discharge from the WWTF which was commissioned in August 2013.

In April 2014, NATCL was granted an amendment to their former Type A Water License (MV2002L2-0019) which permitted increased effluent discharge (up to 8,000 m³/day) during periods of 'high flow' (50,000+ m³/day) in the Flat River. As a condition of this amendment, NATCL was required under Section F, Item 22 of MV2002L2-0019 to complete an assessment report designed to evaluate NATCL's ability to meet specific water quality objectives at S4-44 (Annex B of MV2002L2-0019). In 2015, NATCL submitted the S4-44 Water Quality Assessment Report as required by the 2014 amendment and determined that the water quality objectives outlined for Fluoride, Nitrite and Selenium in Annex B of MV2002L2-0019 required some revisions.

A new Water License (MV2015L2-0003) was then issued to NATCL by the Board in January, 2016, and included an updated table of Water Quality Objectives for S4-44 (Table 1 below and Annex A Part B in the Water License).

Table 1. Water quality objectives to be met at SNP S4-44 (mixing zone boundary in the Flat River)

Parameter	Water Quality Objective (mg/L)
Total Suspended Sediments	6
Ammonia as N	1.27
Nitrite-nitrogen	0.06
Nitrate-nitrogen	3.0
Sulphate	-
Chloride	120
Fluoride	1.03
Total Aluminum	0.3
Total Arsenic	0.005
Total Boron	1.5
Total Cadmium	0.00021
Total Chromium	0.001
Total Copper	0.0032
Total Iron	1.3
Total Lead	0.005
Total Mercury	0.000026
Total Molybdenum	0.073
Total Nickel	0.125
Total Selenium	0.001
Total Silver	0.0001
Total Thallium	0.0008
Total Uranium	0.015
Total Zinc	0.03
pH	6.5 – 9.0

Given that there is no discharge of treated effluent from the WWTF during Care and Maintenance, and that sampling of the WWTF discharge (S4-43) only occurs when the WWTF is operational, it stands to reason that sampling of the mixing zone associated with this discharge should also be suspended during Care and Maintenance. Additional SNP sample locations are located at various points along the Flat River (including S4-40, which is approximately 300 meters from the S5-2 discharge), and these will continue to be monitored during Care and Maintenance.

The river at the sample site for S4-44 also poses some safety risks for Environment personnel. This area of the river is relatively deep in comparison with other Flat River monitoring stations and there is a small but steep bank directly adjacent to the sampling point. During ice-on conditions, it is either very difficult, or impossible to safely access the ice and create a hole from which to sample the water. At times, presumably due to a sharp bend in the river that creates a localized area of high flow, there is a small opening at this location that allows staff to use a long sampling pole for collection. However, in other instances during ice-on conditions, it is not possible to safely collect water at this location.

There have been very few exceedances of the Water Quality Objectives for any parameter outlined in Table 1, and the two exceedances that have occurred at S4-44 since the WWTF at Cantung ceased operating in late 2015 were similarly identified at other sampling stations along the Flat River. Figures 2 to 4 of Attachment 1 shows the Water Quality trends for fluoride, nitrite and selenium from January 2013 to December 2016. A summary of the trends for all the water quality objectives and data collected at SNP S4-44 have been reported to the Board in the monthly SNP reports since its implementation.

Sampling at S4-44 is considered redundant based on the WWTF not being operational and the existence of sample sites in close proximity that allow for safer access. **NATCL is therefore proposing that SNP Station S4-44 be temporarily suspended from the SNP until no later than three months prior to the discharge of effluent from the WWTF.**

4. Removal of SNP S4-27-16

As described in Section 5.4 of the 2016 Annual Water License Report, SNP station S4-27-16, a groundwater monitoring well sampled tri-annually, had TSS exceedances observed on August 23rd and October 4th, 2016, with samples reporting values of 59 mg/L and 58 mg/L, respectively. Part G, Item 40 of the Water License defines 30 mg/L as the maximum acceptable concentration for a grab sample at this location.

Similar occurrences were reported in previous years, including in 2015 with TSS exceedances observed on both August 25th and October 13th (39 mg/L and 72 mg/L, respectively). These results are consistent with historical TSS results dating back to 2009 when the well was installed in the floodplain of the Flat River within the historical tailings that were deposited in the 1960s.

The elevated TSS was originally believed to be a result of the production of gypsum within the well. Upon closer examination of the water chemistry, the water was not high in any deleterious metals or *in situ* TSS. Instead, elevated levels of iron in the water sample combined with exposure to oxygen are believed to have created a precipitate, subsequently contributing to

elevated TSS levels post-collection. The sample appears transparent when first collected from the well.

On August 4th, 2013, NATCL issued a memo to the Board outlining the issue which concluded that the water sampled at this location is not high in any deleterious metals or *in situ* TSS and that since the elevated TSS has been documented to occur several hours after being collected from the well, it is not sufficient grounds to necessitate the activation of the Groundwater Pumping Contingency Plan.

Following the exceedances observed in 2016, the INAC inspector further corroborated this interpretation and agreed that the Groundwater Pumping Contingency Plan, as described in Part G, Item 41 of MV2015-0003 would not require implementation. Please refer to the appended memo from August 4th, 2013 which further addresses the issue (Attachment 2).

NATCL is proposing that SNP Station 4-27-16 be permanently removed from the Surveillance Network Program based primarily on the following grounds:

- The water at this location has not been demonstrated to contain any deleterious substances or characteristics, particularly *in situ*, that are affecting animals or the environment;
- Each time an exceedance occurs, it requires permission from the Inspector to forego the initiation of the Groundwater Pumping Contingency Plan, which is an extensive undertaking with the reduced capacity of the current Care and Maintenance crew; and
- It creates an incorrect perception that NATCL regularly exceeds groundwater Effluent Quality Criteria at this location.

5. Groundwater SNP Station Sampling Frequency Reduction

As part of the SNP outlined in Annex A of MV2015L2-0003, there are a total of 18 groundwater stations (including S4-27-16) that require sampling three times per year (approximately late June, August and October). On August 25th, 2016 the Board approved NATCL's request to suspend the sampling of six Groundwater Wells and two Surface Stations associated with TSF 6 and 7 until 3 months prior to the construction of TSF 6, leaving a total of 13 groundwater wells for sampling.

Besides SNP station 4-27-16, which has a unique set of properties described above, there have been no exceedances from any groundwater well since sampling began in 2009. Many of these wells are quite deep and involve extensive time and equipment requirements such as pumps, hoses and portable power sources to sample. Sampling the remaining 13 wells within a period of one or two weeks is a challenging undertaking with the limited number of Environment personnel on site during care and maintenance. More frequent sampling of these wells three times within a few months is even more challenging.

Water quality results from these groundwater wells have demonstrated zero exceedances of the values outlined in Part G Item 40 of MV2015L2-0003 since sampling began in 2009. Moreover, this sampling program is difficult to achieve with current staffing capacities. **For these reasons, NATCL is proposing that the frequency required for SNP Stations 4-27-4,**

4-27-7 to 4-27-15, and 4-27-17 be reduced to once per year (between late June and October) until the first ice-off season following the re-commencement of commercial operations.

To support this SNP amendment request, NATCL has improved the descriptions of water management and monitoring within the updated C&M Plan that was concurrently submitted with this SNP amendment request on 5 September 2017, and we also plan to update the Water Management Plan to reflect the current Care and Maintenance activities once NATCL obtains additional data on expected water quantities and quality from the flooded mine scenario.

NATCL appreciates the Board's consideration of these important changes to the Surveillance Network Program. If you have any questions or require further information, please contact Callum Beveridge (by telephone on 604-638-7447) or the Environmental Department at the Cantung Mine Site (by telephone 604-759-0913 ext. 275 or by email at enviro@natcl.ca),

Yours truly,
North American Tungsten Corporation
by its Monitor, Alvarez & Marsal Canada Inc.
acting in its capacity as Monitor of NATC and not
in its personal capacity



Todd M. Martin
Senior Vice President

cc: NATCL - Brian Delaney, Steve Sherwood, Shawn Laidlaw Cantung Enviro (NATCL), Colleen English,
A&M - Callum Beveridge
MVLWB Permits
INAC – Sam Kennedy, Alison Heslep

Attachments:

Attachment 1 – Water quality results for Fluoride, Nitrite and Selenium

Attachment 2 – Memo on TSS Results for S4-27-16

Attachment 1 – Figures 2-4; Fluoride, Nitrite and Selenium Concentrations at S4-44

Figure 2. Water quality results for Fluoride at S4-44 between January 2013 and January 2016. The black line represents the value of the Water Quality Objective outlined in Annex A, Part B of the License MV2015-0003.

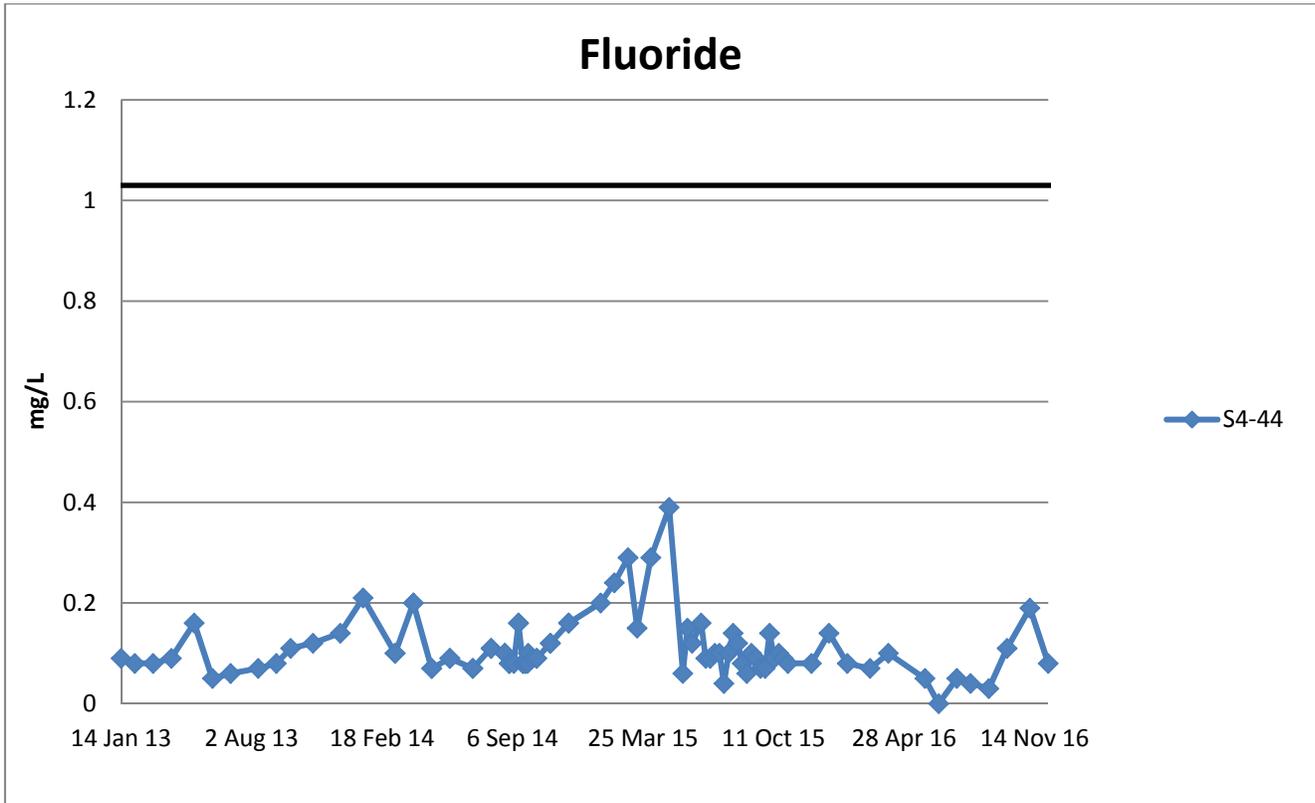


Figure 3. Water quality results for Nitrite at S4-44 between January 2013 and January 2016. The black line represents the value of the Water Quality Objective outlined in Annex A, Part B of the License MV2015-0003.

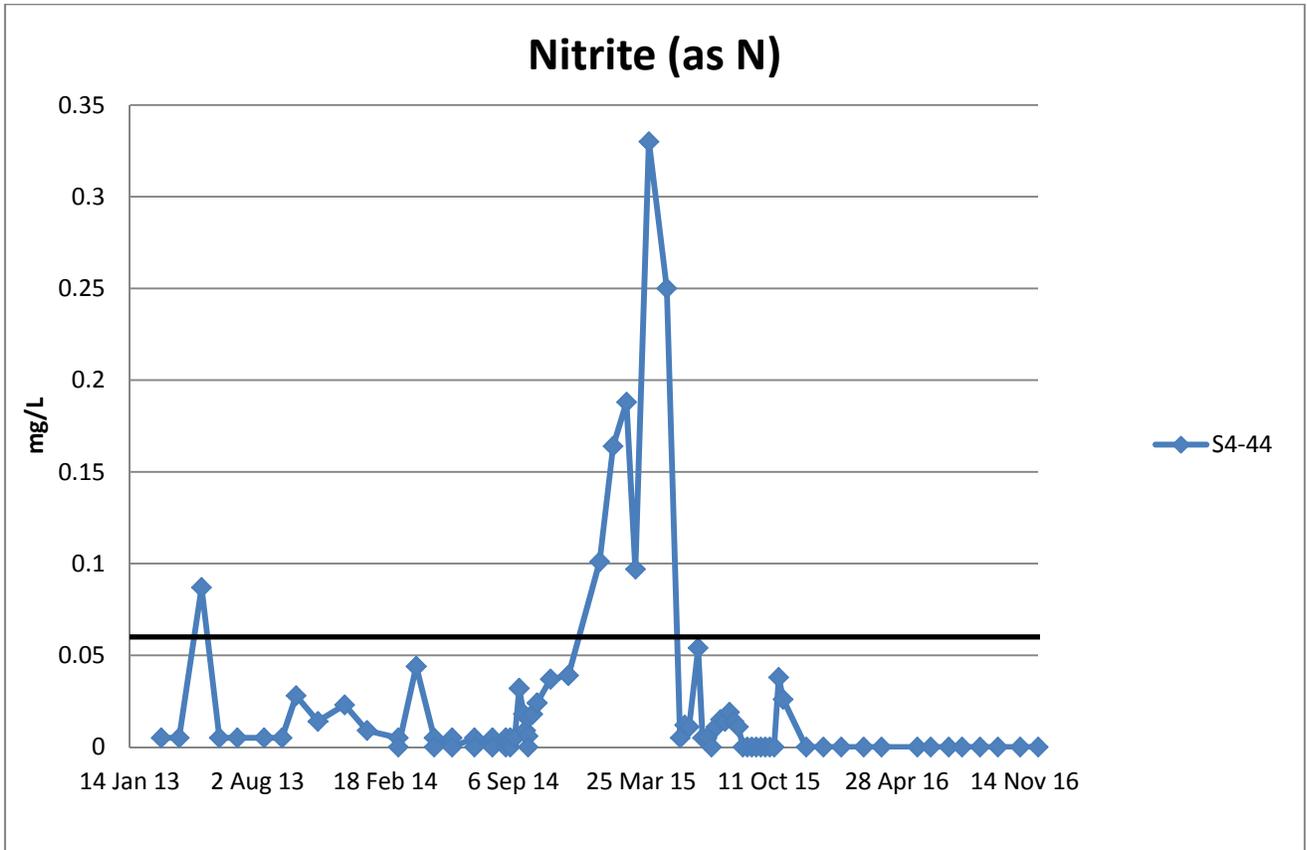


Figure 4. Water quality results for Total Selenium at S4-44 between January 2013 and January 2016. The black line represents the value of the Water Quality Objective outlined in Annex A, Part B of the License MV2015-0003.

