



March 6, 2019

Sahtu Land and Board File Numbers: S17L8-003 & S17X-004

Ms. Bonnie Bergsma  
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**Memorandum RE: Norman Wells Land Treatment Unit Sump Water Discharge Criteria**

Dear Ms. Bergsma:

The following information is being provided in response to the memorandum received from the Sahtu Land and Water Board (SLWB) on February 15, 2019. Transport Canada (TC), Public Services and Procurement Canada (PSPC) and BluMetric Environmental Inc. (BluMetric) have reviewed your response and has new information related to manganese to further support our request that the SLWB provide an exception of the discharge criteria for water formerly contained in the sump of the Norman Wells Airside Land Treatment Unit (LTU). This memo has been prepared by BluMetric Environmental Inc. (BluMetric) on behalf of TC and addresses the outstanding SLWB concerns related to manganese. The following supports our opinion that the discharge of the sump water poses a low risk to human health or the environment and discharge to the site is requested.

**1. Sump water concentrations are consistent with the receiving environment**

The SLWB memorandum acknowledges that the aluminum and iron concentrations found in this sump water do not exceed the background surface water quality values in the Mackenzie River which is the downgradient surface water receptor. The SLWB acknowledges that the source of these exceedances may be the result of anthropogenic activities beyond the scope of the project. Therefore, TC considers this acknowledgement to support the rationale that discharge of this water to the ground surface at the LTU site would not pose a significant risk to freshwater aquatic life in the downgradient surface water receptor – the Mackenzie River.

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The SLWB identified manganese concentrations as an outstanding impediment to permitting surface discharge to the site. BluMetric notes that the LTU was commissioned for treatment of hydrocarbon impacted soils and typical contaminants of concern with these soils are petroleum hydrocarbons (PHCs); benzene, toluene, ethylbenzene and xylenes (BTEX); and polycyclic aromatic hydrocarbons (PAHs). No hydrocarbons were found in the sump water samples. Manganese was not a contaminant of concern for the soil remediation, which support the likelihood that the elevated levels are associated with baseline site conditions.

Background soil samples were collected up-gradient of the LTU during the summer of 2018 to evaluate the chemical composition of the native soils in the area. These soil samples were analyzed for metals including manganese. Soil samples within the stockpiles of the LTU were also analyzed for metals in order to evaluate whether they met the Treated Soil Criteria as specified in Water Licence S17X-004. The concentrations of manganese in both the background soil samples and stockpile samples have been compared and the results are presented in Table A-1 (attached). It is noted that elevated concentrations of manganese are present in both the background test pits and stockpiled soil from within the LTU. This suggests that manganese is naturally occurring within the soils of the region.

As discussed in the previous memo dated December 20, 2018, the up-gradient groundwater monitoring well MW1 had exhibited higher concentrations of manganese than the downgradient wells (MW2 and MW3) during the June 2018 sampling round. In January 2019, a replacement well for MW1-D was installed to a depth of approximately 8 mbgs to ensure it intersected the water table as MW1 was found to be dry during the September 2018 sampling round. The results of the groundwater sampling of MW1-D are presented in Table 1 below:

**Table 1 – Concentrations of Managenese in Groundwater – Norman Wells Airside LTU**

Sample ID	Water Licence Criteria	MW1	MW1-D	MW2	MW2	MW3	DUP (MW3)	MW3	DUP (MW3)
Location Relative to the LTU:		Upgradient		Downgradient		Downgradient			
Date Sampled		Jun.28 2018	Jan.31 2019	Jun.28 2018	Sep.23 2018	Jun.28 2018	Jun.28 2018	Sep.23 2018	Sep.23 2018
Manganese (Total)	0.05	0.865	4.86	0.112	0.202	0.123	0.125	0.206	0.296

Red indicates an exceedance of the water licence discharge criterion

The concentration of Manganese in MW1-D is significantly higher than previously found in both the up-gradient and downgradient wells at the site. It is noted that the sampling methodology used in January 2019 required the use of Waterra tubing due to the cold weather conditions. This sampling method agitates the water column along with suspended solids which can result in elevated concentrations of total metals, which would be similar to conditions present in the turbid surface water that was removed from the LTU sump. The previous sampling methodology used low-flow methods which are not suitable for winter conditions. The concentration of manganese in this up-gradient well is greater than that found in the sump water that is being considered for discharge.

## **2. Human Health Impacts Resulting from Manganese in Drinking Water**

The SLWB has expressed concern that the discharge of this manganese from the sump water could prove to be toxic if released into the environment. The Water Licence discharge criterion for manganese is based on an aesthetic drinking water objective and is not based on human health/ecological risk. The maximum acceptable concentration (MAC) of 0.1 mg/L referenced in the SLWB response dated February 15, 2019 is proposed for total manganese in drinking water (Health Canada – Manganese in Drinking Water Document for Public Consultation, 2016) and is not an environmental quality guideline. There are no drinking water wells in the vicinity of the proposed discharge site and the groundwater exposure pathway for human health risk is not an applicable consideration.

The Mackenzie River is the source of drinking water for Norman Wells and as demonstrated by the adjustment factors applied to the Federal Interim Groundwater Quality Guidelines (FIGWQGs), attenuation of metals in groundwater is expected to occur between the discharge point and the downgradient Mackenzie River. It is noted that there is no FIGWQG for manganese so no adjustment of criterion can be applied. This is because manganese is considered an aesthetic concern and not a risk to human or ecological health under the FIGWQGs. The December 20, 2018 BluMetric memo to the SLWB highlighted that the discharge of aluminum, arsenic and iron concentrations in the sump water at a distance greater than 300 m from the Mackenzie River would protect freshwater aquatic life. It is expected that the attenuating conditions represented within this separation distance would also apply to other inorganics in groundwater such as manganese. As a result, we do not expect that the release of this water to ground surface would be toxic to downgradient ecological receptors.

Based on the information provide above, it is our opinion that treatment of this sump water or disposal of this water by a licenced facility is not considered to be required to ensure protection of human health and the environment. The analytical results in the sump water are consistent with the local environment and any potential impacts to downgradient human health or

ecological receptors would be attenuated due to the distance between the discharge point and the Mackenzie River.

Transport Canada has adhered to the SLWB requirements for the Norman Wells LTU decommissioning project and will continue to do so however we would request that the SLWB and Environment and Natural Resources Water Inspector consider the information presented above and approve the request for permission to discharge the sump water to the ground surface at the site. This summary demonstrates multiple lines of evidence supporting that discharge of this sump water is unlikely to impact human health or ecological receptors as levels are consistent with background conditions.

## **CLOSURE**

The information presented within this memo has been prepared for Public Services and Procurement Canada and Transport Canada. Any use a third party makes of this report, any reliance on the report, or decisions based upon the report, are the responsibility of those third parties unless authorization is received from BluMetric Environmental Inc. in writing. BluMetric Environmental Inc. accepts no responsibility for any loss or damages suffered by any unauthorized third party as a result of decisions made or actions taken based on this report.

If you have any questions please do not hesitate to contact the undersigned.

Respectfully submitted,

**BluMetric Environmental Inc.**



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Senior Engineer

cc: Mr. Michael Brownlee, Project Manager, Public Services and Procurement Canada  
Melissa Fraser, Environmental Officer, Transport Canada  
Laurel MacDonald – Department of Environment and Natural Resources, GNWT;  
Erin Goose – Department of Environment and Natural Resources, GNWT

## **List of Attachments**

*Attachment A – Table A-1: Manganese Concentrations in Soil at the Norman Wells Airside LTU*

**Attachment A:**

Table A-1: Manganese Concentrations in Soil at the Norman Wells Airside LTU

Table A-1: Manganese Concentrations in Soil at the Norman Wells Airside LTU

<b>Background Test Pitting Program Results</b>												
Sample ID	LDL	Units	TP1SS1	TP1SS2	TP2SS1	TP2SS2	TP3SS1	TP3SS2	TP3SS3	TP4SS1	TP4SS2	
Date Sampled			2018-06-26	2018-06-26	2018-06-26	2018-06-26	2018-06-26	2018-06-26	2018-06-26	2018-06-26	2018-06-26	2018-06-26
ALS Sample ID			L2120846-1	L2120846-2	L2120846-3	L2120846-4	L2120846-5	L2120846-6	L2120846-7	L2120846-8	L2120846-9	
Manganese (Mn)	1	mg/kg	451	389	335	278	258	386	1620	376	309	

  

Sample ID	LDL	Units	TP5SS1	TP5SS2	TP6SS1	TP6SS2	TP7SS1	TP7SS2	TP8SS1	TP8SS2	TP8SS3
Date Sampled			2018-06-26	2018-06-26	2018-06-26	2018-06-26	2018-06-26	2018-06-26	2018-06-26	2018-06-26	2018-06-26
ALS Sample ID			L2120846-10	L2120846-11	L2120846-12	L2120846-13	L2120846-14	L2120846-15	L2120846-16	L2120846-17	L2120846-18
Manganese (Mn)	1	mg/kg	421	495	316	383	347	472	390	338	454

  

Sample ID	LDL	Units	TP9SS1	TP9SS2	TP10SS1	TP10SS2	TP11SS1	TP11SS2	TP11SS3	TP12SS1	TP12SS2
Date Sampled			2018-06-27	2018-06-27	2018-06-27	2018-06-27	2018-06-27	2018-06-27	2018-06-27	2018-06-27	2018-06-27
ALS Sample ID			L2120846-19	L2120846-20	L2120846-21	L2120846-22	L2120846-23	L2120846-24	L2120846-25	L2120846-26	L2120846-27
Manganese (Mn)	1	mg/kg	334	429	362	329	410	390	397	485	489

  

Sample ID	LDL	Units	TP13SS1	TP13SS2	TP14SS1	TP14SS2	TP15SS1	TP15SS2	TP16SS1	TP16SS2
Date Sampled			2018-06-27	2018-06-27	2018-06-27	2018-06-27	2018-06-27	2018-06-27	2018-06-27	2018-06-27
ALS Sample ID			L2120846-28	L2120846-29	L2120846-30	L2120846-31	L2120846-32	L2120846-33	L2120846-34	L2120846-35
Manganese (Mn)	1	mg/kg	342	342	417	423	402	282	444	404

  

<b>Stockpile Characterization Sampling Results</b>												
Sample ID	LDL	Units	SP1-1	SP1-2	SP1-3	SP2-1	SP3-1	SP3-2	SP4-1	SP4-2	SP2-2	
Date Sampled			2018-09-26	2018-09-26	2018-09-26	2018-09-26	2018-09-26	2018-09-26	2018-09-26	2018-09-26	2018-09-26	2018-09-26
ALS Sample ID			L2171652-15	L2171652-21	L2171652-27	L2171652-33	L2171652-39	L2171652-45	L2171652-51	L2171652-57	L2171652-64	
Manganese (Mn)	1	mg/kg	450	474	393	516	430	431	418	464	437	

  

Sample ID	LDL	Units	COMPOSITE SAMPLE	SP5-1	SP5-2	SP6-1	SP6-2	SP7-1	SP7-2	SP8-1	SP8-2
Date Sampled			2018-09-26	2018-09-27	2018-09-27	2018-09-27	2018-09-27	2018-10-07	2018-10-07	2018-10-13	2018-10-13
ALS Sample ID			L2171652-70	L2172749-1	L2172749-7	L2172749-13	L2172749-19	L2179148-6	L2179148-12	L2180757-1	L2180757-7
Manganese (Mn)	1	mg/kg	485	500	448	496	433	608	365	409	376