Mackenzie Valley Land and Water Board
7th Floor - 4910 50th Avenue • P.O. Box 2130
YELLOWKNIFE, NT X1A 2P6
Phone (867) 669-0506 • FAX (867) 873-6610

July 19, 2010 File: MV2009L8-0008

Distribution List

Dear Sir/Madam:

Request for Comments
TCA Water Treatment Facility Operation and Maintenance Plan
Contaminants and Remediation Directorate, INAC, Phase II Remediation, Tundra Mine

The TCA Water Treatment Facility Operation and Maintenance Plan as per Part D, item 3 of Water Licence MV2009L8-0008 is now available for viewing online. To access this document on our website, please go to www.mvlwb.ca/mv under "Items for Review", Contaminants and Remediation Directorate, INAC.

Submit your comments in writing by August 9, 2010 quoting Water Licence MV2009L8-0008. If you need more time to complete your review, please contact me prior to this date.

If you have any questions or concerns regarding this application, please telephone (867) 669-0506 or email permits@mvlwb.com.

Yours sincerely,

Angela Plautz
Regulatory Officer

Copied to: Northwest Territory Métis Nation – copy of document

Indian and Northern Affairs Canada
Affaires indiennes et du Nord Canada

3rd Floor, Waldron Building
5103-48th St
Yellowknife, NT
X1A 1N5

July 14, 2010

Angela Plautz
Regulatory Officer
Mackenzie Valley Land and Water Board
P. O. Box 2130
YELLOWKNIFE, NT, X1A 2P6 *Sent By Email*

RE: MV2009L8-0008 – Wastewater Treatment Plant Operation and Maintenance Plan of the Tundra Mine

As per Part D, Item 23 of the Water License MV2009L8-0008, INAC-CARD would like to provide this Wastewater Treatment Plant Operation and Maintenance Plan of the Tundra Mine.

If you have any questions or require additional information please do not hesitate to call me.

Regards,

Linh Nguyen
Project Officer
Indian and Northern Affairs Canada
Contaminants and Remediation Directorate
Ph: 867-669-2831
Fax: 867-669-2721

CC: Jane Amphlett INAC-CARD
Melanie Burgess INAC-CARD
Michael Martin INAC-South Mackenzie District

Indian and Northern Affairs Canada
Affaires indiennes et du Nord Canada

Wastewater Treatment Plant Operation and Maintenance Plan of the Tundra Mine

Prepared By
WESA Technologies Inc.

Wednesday July 14th 2010

WESAtech
A Better Environment For Business

WESA Technologies Inc.
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Tundra Mine Site
Tailings
Wastewater Treatment Plant
Operations and Maintenance Manual

WESAtech Project Number WT8603

July 7th , 2010

To

Aboriginal Engineering Limited

Table of Contents

Preface

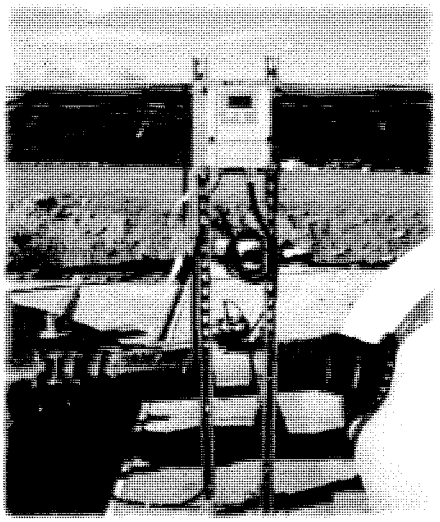
WESAtech is pleased provide water treatment expertise and services to Aboriginal Engineering Limited to design, build and operate a treatment facility to manage the discharge of tailings pond water from the Tailings area of the Tundra Mine Site.

1. The maximum discharge rate will be 300 m^3/hr.
2. The new treatment train is a dual configuration, with a maximum capacity of 300 m^3/hr.
3. Discharge will be to a set of three Geotubes contained within a bermed and lined area.
4. Discharge is to Hambone Lake wetlands area from a discharge pumping resevoir located at the end of the Geotube laydown area where the tube discharge is collected in a lined sump for pumping to Hambone Lake.

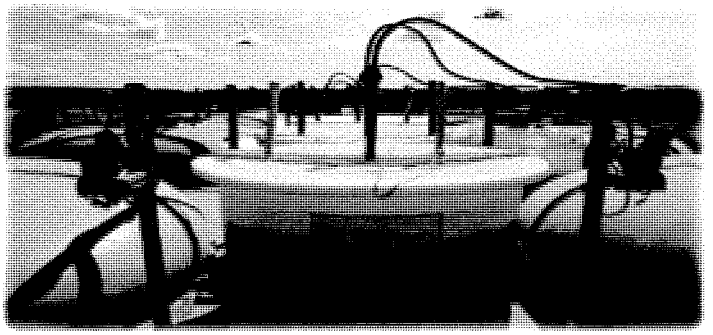
The new 38m^3 onion tanks will be sited in a row and flow between the tanks will be contolled by 200mm wafer valves. Individual tank levels are controled by fine tuning valve openings between tanks.

The influent piping of the plant is SCH 80 PVC and the ability to control flow will be by a 150mm wafer valve. There will be a flow meter mounted on the train to enable the operator to control the flow.

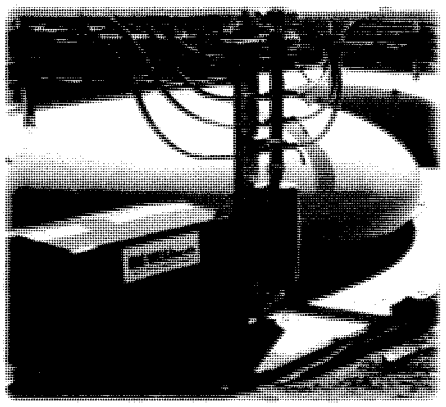
The lime tank discharge will have pH monitor mounted to measure the amount of lime required for maintanance of the discharged pH levels. An automatic control loop is introduced into the ferric addition process, as well as an injectiobn point for sodium metabisulphite. This will enable the operator to fine tune the addition of chemical and hence the pH required for the hydroxide and sulphite precipitation of the additional metal ions.



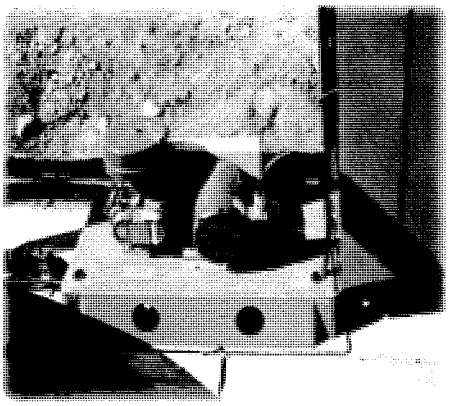
Mixing for the ferric is by air and the polymer and lime will be by VFD controlled mixers.



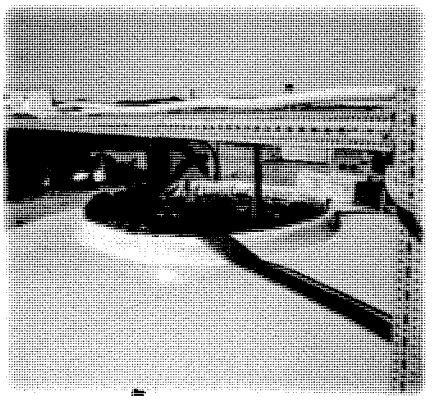
Air supply for mixing is provided by a positive displacement blower. Air is directed into a control manifold that is valved and the operator can direct and control air individually to each diffuser drop.



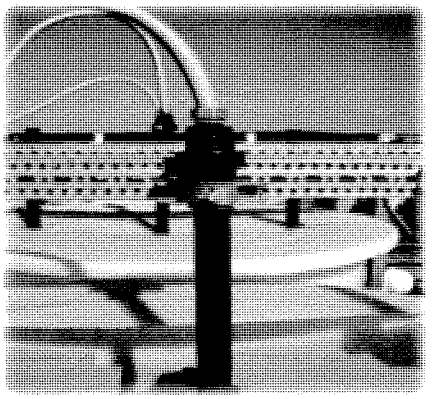
Blower Housing and Manifold



Blower Setup

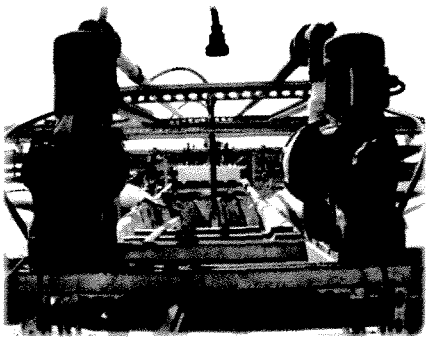


Onion Tank Aeration Mixing

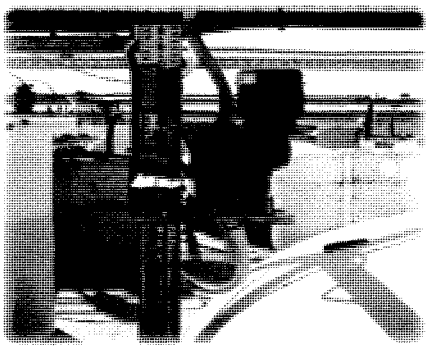


Solution Tank Mixing

Chemical pumps shall be mounted at the head of the treatment train. Each pump has the ability to be operator controled for stroke and frequency in order to fine tune the chemical flow. The ferric and polymer pumps are the same model and size while the lime pump is larger.



Lime Feed Pumps



Ferric and Polmer Pumps

Pre-Startup Lab Work

Prior to commencement of treatment, the starting point for the dosage as required for treatment using the Geotubes will be determined, as will all dosages required for the additional metal contaminants.

We have demonstrated that a formula of 800 grams per cubic meter of ferric sulfate, 330 grams per cubic meter of lime and 0.75 grams per cubic meter of polymer, will create a large and dense enough floc size to be retained within a *new and unlined* model 500 Geotube. This chemical proportion will seem high. This elevated level of chemicals is necessary for a new model 500 geotube, with no liner, but only at the outset of filling. After a brief period of operation at this level, it will be possible to reduce the levels of chemicals, as the large floc created by such a high dose of ferric and lime will act as a liner for the Geotube once it has coated its interior.

Start Up

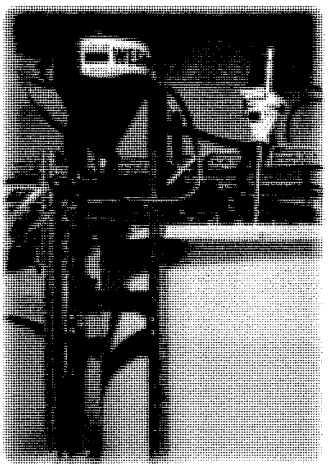
Dry Startup Procedures

The initial startup will be conducted using clean water. All electrical components shall be checked for rotation where necessary, and all others will be checked for function. Tanks shall be filled with clean water to check for leaks, and air shall be introduced to ensure diffusers operate properly. Chemical pumps shall be primed using clean water and mixers energized to ensure proper action

Wet Startup

The operators shall wear/use the correct protective gear, rain suits and rubber aprons, half face respirators, rubber chemical gloves, face shields and rubber boots. They then shall place the appropriate amount of reagent in the ferric tank and the lime tank. Reagents shall be added to tanks of water with all mixing devices operating in a measured manner.

The polymer solution shall then added to the "Hootenany" make up system. This addition shall be done using one 2.5 kg container of dry polymer and be very slowly added to the top of the device. The water dilution system should be on full before adding the chemical and the chemical should be added slowly such that it is received by the inducter and is sucked into the solution tank. In no case should the raw polymer be dumped into this device as this will clog the system. The operators will be trained with regards to this technique.



Hootenany

Lime Mix Tank

The system shall be run on the basic dosage chemical, as previously described and the pH shall be monitored to bring the discharge down between 8.5 and 9. Samples will be taken from the final tank and observed for settleability.

Regarding lead at Tundra II, we need to keep in mind the following and monitor the effluent lead concentrations and treat with sulfide precipitation if required:

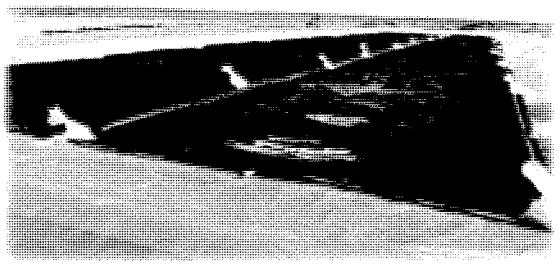
- The lead target for Tundra II is 0.010 mg/l (10 ppb);
- tests indicated the lead concentration in the effluent (2009) was 0.0125 mg/l (12.5 ppb);
- 2009 results indicate lead effluent levels at 2.5 ppb over the new target.

In order to co-precipitate lead and arsenic at the low levels indicated, the system would require the use of the sulfide precipitation process. Using a sulfide compound as a reagent would allow for greater removal of lead, as well as other metals, independent of the pH

Geotubes

The Geotubes (model 500) containment area lined with impervious material on a flat plane with slope from side to side and end to end to allow the water to drain from the tubes and flow to a central collection point shall not have a deviation of no more than 1%.

Discharge lines from the manifold shall be installed in the first two inlet ports with the inlet nozzles arranged such that they faced each other. The plant discharge line, a 200mm lay flat, shall be connected to a distribution header. This shall split the flow into three 150mm feed lines that shall run to the Geotubes



1. Max fill levels on the Geotubes are maked on the side. These should be viewed as absolute maximums and should never be exceeded.
2. Geotubes may occasionally need to be relaxed in order to enhance drainage.

Flow should be reduced or moved to the other tube.

3. It will be necessary to increase chemical dosage for the intial seasoning of the model 500 in order to develop a filter layer of larger floc. Chemical dosage can then be reduced.
4. Polymer dosage should be the minimum required to produce floc to minimize binding of Geotube pores.

The initial year will require 4 model 500 geotubes. This will be complete with a membrane laydown liner and a laydown filter fabric.

Chemicals

There are three chemicals that are potentially required for this treatment process. Based on the results from last year and on a 90 day campaign we would require the following amounts.

Ferric sulphate.....33,000 kgs in 2.7 kg bags

Hydrated Lime.....16,000 kgs in 22.7 kg bags

Should we be required to meet the discharge levels of the lead as shown in the RFQ then we will also require

Sodium Metabisulphite.....kgs in 22.7 kg bags

Appendix A – Lab Equipment

EQUIPMENT	MANUFACTURER	PARAMETER(S)	DETECTION LIMITS
Spectrophotometer DR2700	hach		
reagents	hach	lead	5 - 150ug/l
meter (see below)	thermal Scientific	ph	minus2 to 19
meter	thermal scientific	conductivity	0-3000ms/cm
meter	Orbeco tb 2000	turbidity	.01 - 1100 ntu
reagents	hach	copper	1 - 210 ug/l
reagents	hach	nickel	.006 - 1 mg/l
reagents	hach	zinc	.01 -3 mg/l
reagents	hach	nitrate	.2 - 30 mg/l
reagents	hach	nitrite	.003-.5 mg/l
reagents	hach	ammonia	.4 - 50 mg/l
reagents	hach	arsenic	0 -500 ug/l
top loading balance	hach		

Additional misc. glassware and graduated cylinders, syringes, protective gear, pipettes and mixing devices as required to perform 300 tests of each parameter

Thermo Scientific Orion 4-Star Plus pH/Conductivity Meter.

The 4-Star pH and conductivity meter simultaneously displays pH and conductivity on a back lit LCD screen. The Thermo Scientific Orion Smart Stability and Smart Averaging functions automatically optimize for accuacy, precision and response time. pH Range of -2.000 to 19.999 with a 0.1, 0.01 and 0.001 resolution. Conductivity range of 0.00 to 3000mS/cm with 4 significant digit resolution. The kit comes with the 4-star meter, low maintenance epoxy pH electrode, DuraProbe conductivity cell, pH storage solution, pH buffers (4, 7, 10), conductivity standards (1413uS/cm) and a hard sided field case.

Appendix B – WWTP Component O&M Sheets

Operating & Maintenance Instructions

1) E & H Orbisint CPS11D pH Electrode
2) E & H Liquisys M CPM 223/253 Transmitter for pH/ORP
3) E & H Proline Promag 50W Electromagnetic Flow Measuring System – Technical Information
4) E & H Proline Promag 50 Electromagnetic Flow Measuring System – Operating Instructions
5) ProMinent Sigma/ 1 Pump
6) ProMinent Sigma/ 3 Pump
7) Sharpe G Series Mixer
8) Model URAI – 33 Roots Blower

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FILE NUMBER: MV2009L8-0008

Date: July 19, 2010

To: Distribution List

Organization: Various - Northwest Territories Metis Nation

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Re:
Waste Water Treatment Plant Operation and Maintenance Plan

Should you wish to comment, you can do so by submitting your comments in writing by August 9, 2010 quoting the mentioned water licence.

If you have any questions please contact our office at (867) 669-0506 or email permits@mvlwb.com.

Thanks,

☒ Enclosures

☐ As requested

☐ For your information

☐ For your comment

☐ For your approval

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