



# Lupin Discharge Sampling Procedure

Canada

## TABLE OF CONTENTS

<b>1</b>	<b>PURPOSE</b>	<b>3</b>
<b>2</b>	<b>POND 2 DISCHARGE (SNP LUP-10)</b>	<b>3</b>
<b>3</b>	<b>LOWER SEWAGE POND (LUP-14)</b>	<b>4</b>
<b>4</b>	<b>SUN BAY SAMPLING</b>	<b>4</b>
4.1	SNP LUP-20	4
4.2	SNP LUP-21	5
4.3	SNP LUP-22	5
4.4	SNP LUP-24	5
4.5	SNP LUP-25	6
<b>5</b>	<b>ATTACHMENTS</b>	<b>6</b>
<b>6</b>	<b>AMENDMENTS</b>	<b>6</b>

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## Lupin Discharge Sampling Procedure

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# Lupin Discharge Sampling Procedure

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## Canada

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### 1 PURPOSE

The following is an overview of the water sampling requirements for the tailings area and sewage pond for the Lupin Mine Site. The attached Table 1 from Schedule J of the current water licence shows what parameters must be sampled for in the various locations and during what timeframe. Note that different parameters require specific sample bottle sizes and preservatives. Most of the sample requirements will be for water licence compliance but the Metal Mining Effluent Regulations (MMER) also requires monthly water samples be taken at reference, discharge, and exposure areas. These stations will coincide with three of the SNP stations, as indicated below. A map of the Surveillance Network Program (SNP) sample locations and Schedule 1 (Part 2) of the water licence are attached.

All samples are to be packed in coolers, with all the appropriate paperwork, and sent to ALS Labs on a weekly basis (or more frequently if planes permit).

Notes:

- a report for a metals sample includes a whole suite of metals, not just the ones required for the NWB or MMER.
- Field parameters (pH, Conductivity, Temperature) will be recorded at each sample location for each sample collected during the discharge process.

### 2 POND 2 DISCHARGE (SNP LUP-10)

Location is the west side of Dam 1A, where the siphons discharge into the environment. Flow rate must be read and recorded daily, and adjusted if necessary (large gate valve) to keep it around 65,000 cubic metres per day (45 cu.m per minute) flow rate. We are limited by our licence to a MAXIMUM of 70,000 cu.m per day of discharge.

Daily sampling at SNP LUP-10 is required, beginning the first day of discharge (July 15).

- 1 routine sample for pH and Total Suspended Solids (TSS);
- 1 sample for CN;
- 1 metals sample for As, Cu, Zn.

Weekly sampling at SNP LUP-10 is required – first sample taken on 19 July, then every Tuesday (to minimise waiting time between planes) during discharge, and on the final day of discharge.

- 1 routine sample for alkalinity (include this parameter with the daily routine sample);
- 1 nutrient sample for NH<sub>4</sub>;
- 1 metals sample for Pb, Ni, Cd (included in daily metals sample).

Effluent characterisation is required by MMER Environmental Effects Monitoring (EEM) studies. Monthly sampling at SNP LUP-10 is required, beginning at start of decant. Sampling must be done at no less than



# Lupin Discharge Sampling Procedure

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## Canada

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1 month intervals, so take a sample 19 July (to minimise waiting time between planes) and another 23 August. If discharge is still occurring on 20 September (doubtful), then a sample can be taken then as well.

- 1 routine sample for pH, TSS, alkalinity, hardness, NO<sub>2</sub>, NO<sub>3</sub>;
- 1 nutrient sample for NH<sub>4</sub> (same as first weekly NWB sample);
- 1 sample for Hg (lab detection limit MUST BE less than 0.1ug/l (that's micrograms, i.e. 1/1000 milligram);
- 1 sample for CN (same as daily NWB sample);
- 1 metals sample for As, Zn, Ni, Pb, Cu, Cd, Mo, Al, Fe (included in daily NWB sample);
- 1 sample for Ra 226.

### 3 LOWER SEWAGE POND (LUP-14)

Location is at siphon outlet off dyke on east side of lower sewage pond. Flow rate must be read and recorded daily. There is no limit on sewage discharge flow rate. pH must be measured daily and closely watched to ensure that limits are not exceeded (6.0 to 9.5). If pH is not within the proper range for 2 consecutive days, shut down siphon and do not restart until pH in lower pond is back within range.

Sampling is required the first day of discharge and monthly thereafter. Take sample the morning of plane day.

- 1 routine sample for pH, TSS, alkalinity, hardness, NO<sub>2</sub>, NO<sub>3</sub>;
- 1 nutrient sample for NH<sub>4</sub>, Total Kjeldahl Nitrogen (TKN), Total Phosphorus (TP), and orthophosphate (OPO<sub>4</sub>);
- 1 metals sample for As, Zn, Ni, Pb, Cu, Cd;
- 1 sample for Biochemical Oxygen Demand (BOD<sub>5</sub>);
- 1 microbiological sample for fecal coliform.

### 4 SUN BAY SAMPLING

There are five separate SNP stations downstream between SNP LUP-10 and outer Sun Bay. All must be read on a weekly basis after Pond 2 discharge commences, starting on Tuesday 19 July. Access to these locations is either by boat from camp or by argo from the powder magazine.

#### 4.1 SNP LUP-20

West end of Seep Creek before discharge into Unnamed Lake (southern extension of Inner Sun Bay). Sampling is required weekly during discharge.

- 1 routine sample for pH, TSS, alkalinity, hardness;
- 1 metals sample for As, Zn, Ni, Pb, Cu, Cd;



# Lupin Discharge Sampling Procedure

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## Canada

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- 1 nutrient sample for NH<sub>4</sub>;
- 1 sample for CN.

### 4.2 SNP LUP-21

North end of Concession Creek, before discharge into Unnamed Lake. This is a reference area, as the water flows from Concession Lake and has not been affected by mine effluent. Sampling is required weekly during discharge.

- 1 routine sample for pH, TSS, alkalinity, hardness;
- 1 metals sample for As, Zn, Ni, Pb, Cu, Cd;
- 1 nutrient sample for NH<sub>4</sub>;
- 1 sample for CN.

This station is the reference area for EEM sampling. A monthly sample (July 19, and when biological monitoring study is done in late August) at mid-depth is required for:

- 1 routine sample for pH, alkalinity, hardness, TSS, NO<sub>3</sub> (same sample as NWB, just include NO<sub>3</sub>);
- 1 nutrient sample for NH<sub>4</sub> (same as weekly NWB sample);
- 1 sample for Hg (lab detection limit MUST BE less than 0.1ug/l (that's micrograms, i.e. 1/1000 milligram));
- 1 sample for CN (same as weekly NWB sample);
- 1 metals sample for As, Zn, Ni, Pb, Cu, Cd, Mo, Al, Fe (same as weekly NWB sample);
- 1 sample for Ra 226;
- measure and record temperature and dissolved oxygen content with portable meter.

### 4.3 SNP LUP-22

Inner Sun Bay, midway between end of peninsula and west shore. Sampling is required at mid-depth commencing 1 week prior to discharge (July 8), weekly during discharge, and concluding 2 weeks after discharge ends.

- 1 routine sample for pH, TSS, alkalinity, hardness;
- 1 metals sample for As, Zn, Ni, Pb, Cu, Cd;
- 1 nutrient sample for NH<sub>4</sub>;
- 1 sample for CN.

### 4.4 SNP LUP-24

In narrows between Inner and Outer Sun Bay. Sampling is required at mid-depth commencing one week prior to discharge (July 8), weekly during discharge, and concluding two weeks after discharge ends.



# Lupin Discharge Sampling Procedure

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## Canada

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- 1 routine sample for pH, TSS, alkalinity, hardness;
- 1 metals sample for As, Zn, Ni, Pb, Cu, Cd;
- 1 nutrient sample for NH<sub>4</sub>;
- 1 sample for CN.

This is also the recommended EEM exposure area station. A monthly sample (19 July and when biological monitoring study is done in late August) at mid-depth is required for:

- 1 routine sample for pH, alkalinity, hardness, TSS, NO<sub>3</sub> (same sample as NWB, just include NO<sub>3</sub>);
- 1 nutrient sample for NH<sub>4</sub> (same as weekly NWB sample);
- 1 sample for Hg (lab detection limit MUST BE less than 0.1ug/l (that's micrograms, i.e 1/1000 milligram)
- 1 sample for CN (same as weekly NWB sample);
- 1 metals sample for As, Zn, Ni, Pb, Cu, Cd, Mo, Al, Fe (same as weekly NWB sample);
- 1 sample for Ra 226
- measure and record temperature and dissolved oxygen content with portable meter.

## 4.5 SNP LUP-25

Outer Sun Bay. Sampling is required at mid-depth commencing 1 week prior to discharge (July 8), weekly during discharge, and concluding 2 weeks after discharge ends.

- 1 routine sample for pH, TSS, alkalinity, hardness;
- 1 metals sample for As, Zn, Ni, Pb, Cu, Cd;
- 1 nutrient sample for NH<sub>4</sub>;
- 1 sample for CN.

## 5 ATTACHMENTS

FIGURE 1 - LUPIN SNP WATER QUALITY SAMPLE SITES

SCHEDULE I – LUPIN WATER LICENSE

TABLE 1 – LUPIN WATER LICENSE (schedule J)

## 6 AMENDMENTS

Version	Version Date	Revised By	Approved By	Reason for Change