2014 Annual Geotechnical Inspection – Lupin Mine Tailings Containment Area, Nunavut

Prepared for

Lupin Mines Incorporated

Prepared by

srk consulting

SRK Consulting (Canada) Inc.
1CL008.001
October 2014

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1 Introduction

The Lupin Mine site is currently under care and maintenance status and operating under Nunavut Water Licence 2AM-LUP0914 (NWB 2009) by Lupin Mines Incorporated, a wholly-owned indirect subsidiary of Elgin Mining Inc. Elgin acquired LMI from MMG Resources Inc. in July 2011. The mine is located on the west shore of Contwoyto Lake, approximately 285 km southeast of Kugluktuk, Nunavut and 400 km northeast of Yellowknife (Figure 1.1). As a part of the Water Licence requirement, an annual geotechnical inspection is required for the tailings containment area (TCA) perimeter dams, TCA Covers, including an assessment of any seepage from the TCA (NWB 2009). In fulfillment of the regulatory requirements, Mr. George Friesen, Manager of Technical Services of LMI has retained SRK Consulting (Canada) Inc. to conduct the 2014 geotechnical site inspection. Part E Item 6 of Water Licence (NWB 2009) applies to the inspection and stipulates the following:

> "*Clause E.6. The TCA shall be constructed, operated and maintained to engineering standards such that:*
>
> a. *A freeboard limit of 1.0 m shall be maintain at all times or as recommended by a Geotechnical Engineer and as approved by the Nunavut Water Board (the Board) in writing;*
> b. *Seepage from the TCA is minimized;*
> c. *Any seepage that occurs is collected and returned immediately to the TCA;*
> d. *Erosion of constructed facilities is addressed immediately;*
> e. *The solids fraction of the mill Tailings shall be permanently contained within the TCA or underground as Backfill;*
> f. *Weekly inspections of the dam(s), Tailings line(s), and catchment basin(s) shall be carried out and records of these inspections shall be kept for review upon the request of an Inspector, or as otherwise approved by the Board. More frequent inspections shall be performed at the request of an Inspector; and*
> g. *An inspection of the TCA shall be carried out annually during ice free, open water conditions by a Geotechnical Engineer. The Engineer's report shall be submitted to the Board within sixty (60) days following the inspection and shall include a covering letter from the Licensee outlining an implementation plan to respond to the Engineer's recommendations*."

This report summarizes SRK's observations of the mine's condition and our recommendations. Review of previous design, as-built and annual inspections reports made prior to 2000 were outside SRK's scope for this inspection. These included:

- Inspections from 2009 to 2011 by TBT Engineering Consulting Group,
- Inspections from 2000 to 2008 by BGC Engineering and Golder Associates,
- Earlier design, as-built and annual inspections reports by Geocon Inc., and
- The 2004 Dam Safety Review of the perimeter tailings dams performed by Golder Associates.

Generally, the 2014 inspection revealed the dams are in good condition with the exception of two interior dams. Minor erosion issues around all the dams were observed but none of major concern.

srk consulting

Lupin Mine Inc.

Lupin Mine Incorporated

2014 Geotechnical Inspection

Location Plan

SRK JOB NO.: 1CL008.001

FILE NAME: Lupin-SiteFacil-utm-12_ATedits_RevA-20131018.dwg

DATE: October 2014

APPROVED:

FIGURE: 1.1

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2 Site Conditions

2.1 History of the Lupin TCA

A brief summary of the development history of the TCA is listed in Table 2.1. A closure plan for the Tailings Containment Area (TCA) prepared by Holubec Consulting Inc. in 2005 and it provides a more detailed history of the TCA (Holubec 2005).

Table 2.1 – Lupin Mine TCA Development Historical Summary

Year	Comment
1960	Ore deposit discovered by Canadian Nickel Company Ltd.
1980	Property purchased by Echo Bay Mines Ltd.
1981	TCA developed by the construction of Dam 1A and Dam 2.
1982	Mining operations commenced in October and tailings slurry discharged from the northern edge of the TCA into future Cell 5. Dam 3 constructed.
1985	Tailings management strategy revised and tailings deposited within cells. Excess water from the cells is directed into two ponds in series within the TCA prior to discharge. Internal Dam 3C and Dam J constructed.
1990	Internal Dam K constructed and Cell 4 provides an additional clarification pond.
1992	Perimeter Dam 4, Dam 5 and Dam 6 and internal Dam L and Dam M constructed.
1997	Internal Dam N constructed.
1998	Production stopped and site placed on care and maintenance in January.
2000	Production resumed in April. Dam M raised.
2002	Echo Bay Mines Ltd., TVX Gold and Kinross Gold Corp. merged and Kinross assumed control of operations.
2003	Site placed on care and maintenance in August.
2004	Production resumed between March and December.
2005	Closure of operation announced in February and site placed on care and maintenance.
2006	Ownership is purchased by Lupin Mines Inorporated, a subsidiary of Wolfden Resources.
2007	Wolfden Resources acquired by Zinifex Ltd.
2008	Zinifex Ltd. merged with Oxiana Ltd. to form OZ Minerals Ltd.
2009	Canadian assets of OZ Minerals sold to China Minmetals Ltd. MMG Resources Inc., a wholly owned subsidiary of Minerals and Metals Group Ltd., was the Canadian operating company set up after that transaction to hold the Lupin Mine.
2011	Ownership of LMI purchased by Elgin Mining Inc. in July.

Covering the tailings with a gravelly sand esker commenced in 1998 with the covering of Cell 1A. In 1995, Cell 1 and part of Cell 2 were covered. In 2003, Cells 3A and 3B, two mini-cells in the westerly section of Cell 3, were covered. In 2004, the remainder of Cell 2 and part of Cell 3 were covered. In 2005, Cell 3, Cell 5 and the cell formed by Dam N were partially covered. About 75% of the tailings areas are covered with at least 1 m of sand/gravel (Holubec 2006). The winter supply road was closed prematurely to fuel deliveries in 2006; no cover program was undertaken that year. In 2007, ownership of the LMI was transferred. The property has remained in care and maintenance since 2005 and no tailings has been produce since then.

2.2 Site Infrastructures

Because of its isolated location, the mine site was constructed to be totally self-sufficient, with all (then) operation and (now) maintenance personnel living on site. The only year-round access to the site is via aircraft. Historically, the mine was annually resupplied in bulk via a 570 km ice-road from Tibbitt Lake during February and March.

The Lupin Mine site (Figure 2.1) consists of two major areas: an industrial complex and the TCA. The industrial complex consists of the administration buildings, mill, maintenance shops, fuel tank farms, camp buildings, and the airstrip (Figure 2.2).

The 2014 geotechnical inspection focused on the TCA as stipulated by the water licence (NWB 2009). The TCA is located approximately 6 km south of the industrial complex, and is divided into two main components: five solid retention cells and two settling ponds in series (Figure 2.3). The TCA is characterized by six main perimeter dams and nine internal dams for cell separation. The perimeter dams consist of Dam 1A, 1B, 1C, and Dams 2–6, and ranged from 1 to 8 m in height. The nine internal dams consist of 3C, 3D and 3E, J–N, and an unnamed dam between Cell 2 and Cell 5. Internal dams range from 5.7 to 11.2 m in height. All the dams are constructed from esker sands and gravels, with the perimeter dam including a liner for seepage control. All perimeter dams are frozen core structures founded on permafrost.

The care and maintenance procedures for water management at the TCA have runoff flowing from Cell 3 to Cell 4, where solids settle out prior to the water flowing to Pond 1. It is assumed water flows from Cell 4 to Pond 1, via a gated culvert and trench. Water in Pond 1 is then transferred by siphon to Pond 2 for clarification and settling and, if needed, treatment, prior to discharge into the environment. Prior to discharge by siphon from Pond 2 into the environment the quality of water is tested for pH, metals and toxicity to rainbow trout and *Daphnia* species. No tailings have been deposited since the cease of milling operations in 2006.

2.3 Dam Classifications

According to the CDA guideline (Table 2.2), the perimeter Dam 1A, 1B, 1C, and Dams 2–6 are classified as Significant where no population is at risk, minor loss or deterioration of fish or wildlife habitat in the immediate impact areas and there are no losses to recreational facilities, workplace or transportation routes. The nine internal Dams 3C, 3D and 3E, J–N, and an unnamed dam between Cell 2 and Cell 5 are classified as Low where no loss of life and external environmental loss are expected (Golder 2004).

Table 2.2 – Dam Classifications as per CDA (2007, Revised 2013)

Dam Class	Population at Risk[1]	Incremental losses		
		Loss of Life[2]	**Environmental and Cultural Values**	**Infrastructure and Economics**
Low	None	0	Minimal short-term loss No long-term loss	Low economic losses; area contains limited infrastructure or services
Significant	Temporary only	Unspecified	No significant loss or deterioration of fish or wildlife habitat Loss of marginal habitat only Restoration or compensation in kind highly possible	Losses to recreational facilities, seasonal workplaces, and infrequently used transportation routes
High	Permanent	10 or fewer	Significant loss or deterioration of *important* fish or wildlife habitat Restoration or compensation in kind highly possible	High economic losses affection infrastructure, public transportation, and commercial facilities
Very high	Permanent	100 or fewer	Significant loss or deterioration of *critical* fish or wildlife habitat Restoration or compensation in kind possible but impractical	Very high economic losses affecting important infrastructure or services (e.g., highway, industrial facility, storage facilities for dangerous substances)
Extreme	Permanent	More than 100	Major loss of *critical* fish or wildlife habitat Restoration or compensation in kind impossible	Extreme losses affecting critical infrastructure or services (e.g., hospital, major industrial complex, major storage facilities for dangerous substances)

[1] Definitions for population at risk:

None—There is no identifiable population at risk, so there is no possibility of loss of life other than through unforeseeable misadventure.

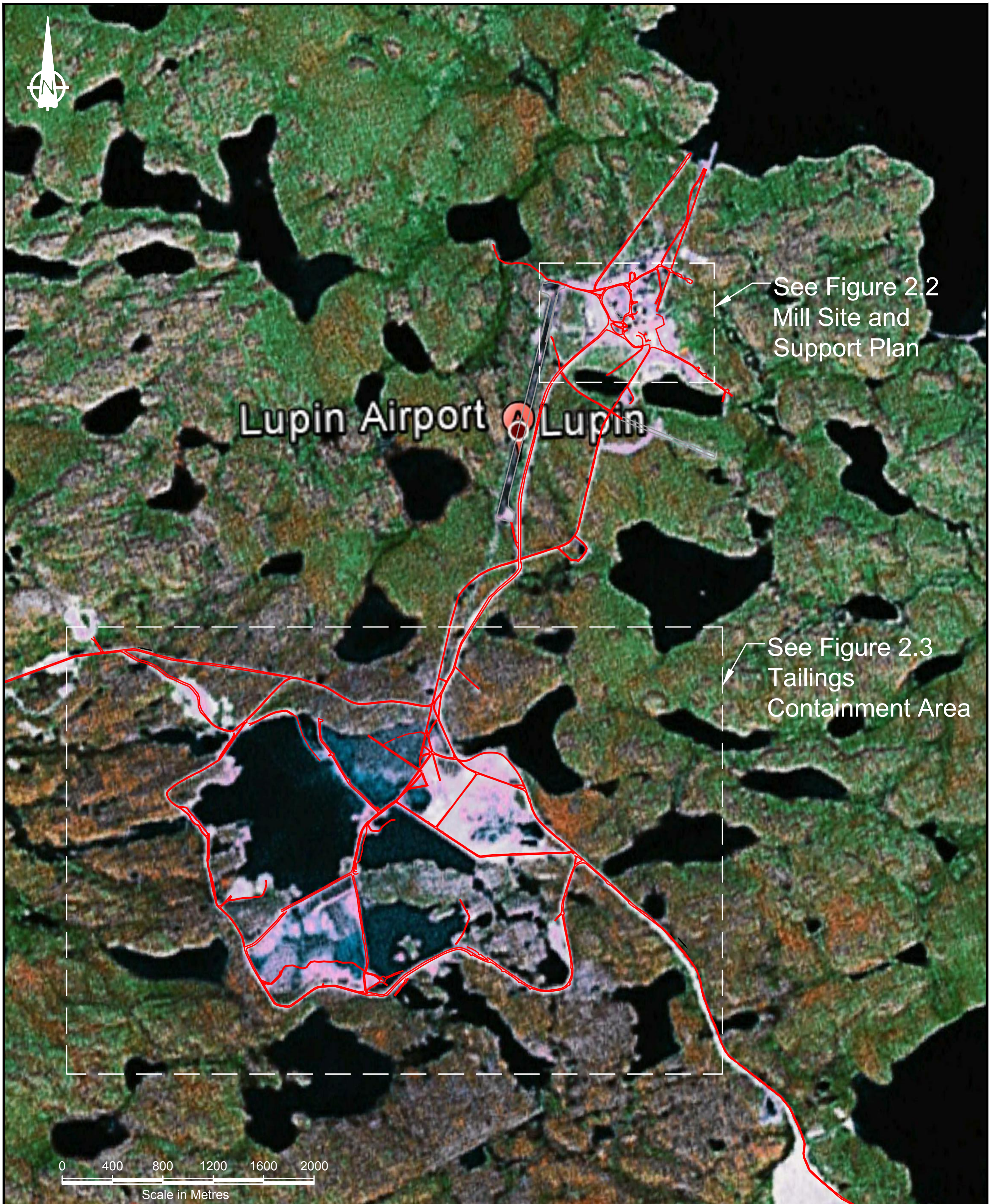
Temporary—People are only temporarily in the dam-breach inundation zone (e.g., seasonal cottage use, passing through on transportation routes, participating in recreational activities).

Permanent—The population at risk is ordinarily located in the dam-breach inundation zone (e.g., as permanent residents); three consequence classes (high, very high, extreme) are proposed to allow for more detailed estimates of potential loss of life (to assist in decision-making if the appropriate analysis is carried out).

[2] Implications for loss of life:

Unspecified – The appropriate level of safety required at a dam where people are temporarily at risk depends on the number of people, the exposure time, the nature of their activity, and other conditions. A higher class could be appropriate, depending on the requirements. However, the design flood requirement, for example, might not be higher if the temporary population is not likely to be present during the flood season.

The classifications of these dams do not require an Emergency Preparedness Plan (EPP) or a dam break inundation study. A Liquid Waste Management Plan for care and maintenance prepared by Lupin (LMI 2013) is included in Appendix B.



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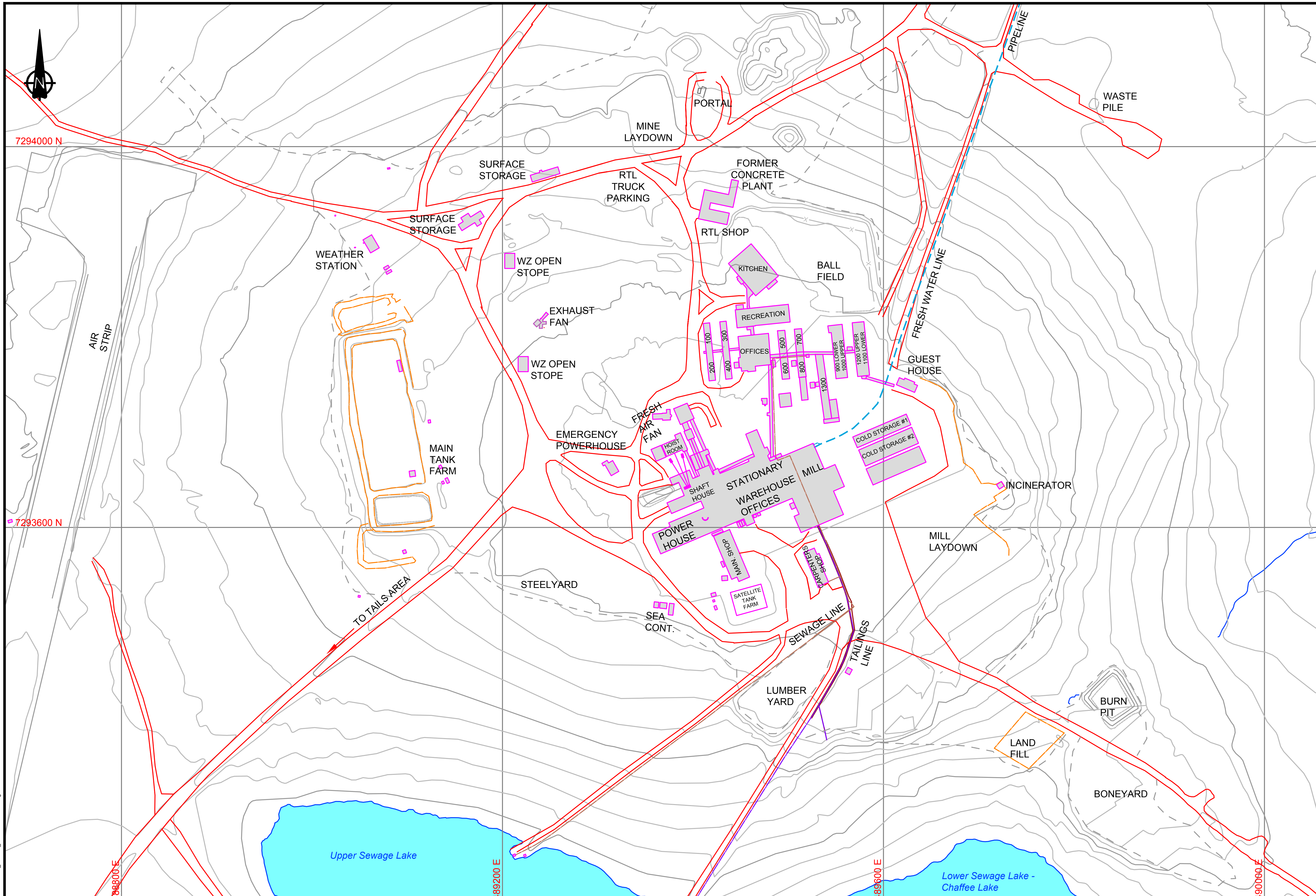
srk consulting	**Lupin Mine Inc.**	2014 Geotechnical Inspection
		General Site Plan
SRK JOB NO.: 1CL008.001	Lupin Mine Incorporated	DATE: October 2014
FILE NAME: Lupin-SiteFacil-utm-12_ATedits_RevA-20131018.dwg		APPROVED:
		FIGURE: 2.1



LEGEND

- Lake Pond
- Tank Farm Berm Outline
- Building
- Water Pipeline (8 in Diam) (Not in Use)
- Tailings Line Route (Not in Use)
- Sewage Pipeline (6 in Diam) (Not in Use)
- Lake Shore, Drainage
- Contour 1 m
- Contour 5 m
- Roads
- Site Features Miscellaneous
- Cleared Area
- Berm Area
- Slope Toe
- Slope Top
- Culvert
- Fence

NOTES

1. Topographic information and facilities outline provided by Lupin Mine Inc. on August 13, 2012.

0 40 80 120 160 200
Scale in Metres

Coordinate System: Nad_1983_UTM_Zone_12N
NTS Map Sheets 076E11 and 076E14

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SRK JOB NO.: 1CL008.001

FILE NAME: Lupin-SiteFacil-utm-12-ATedits_RevA-20131018.dwg

Lupin Mine Inc.

Lupin Mine Incorporated

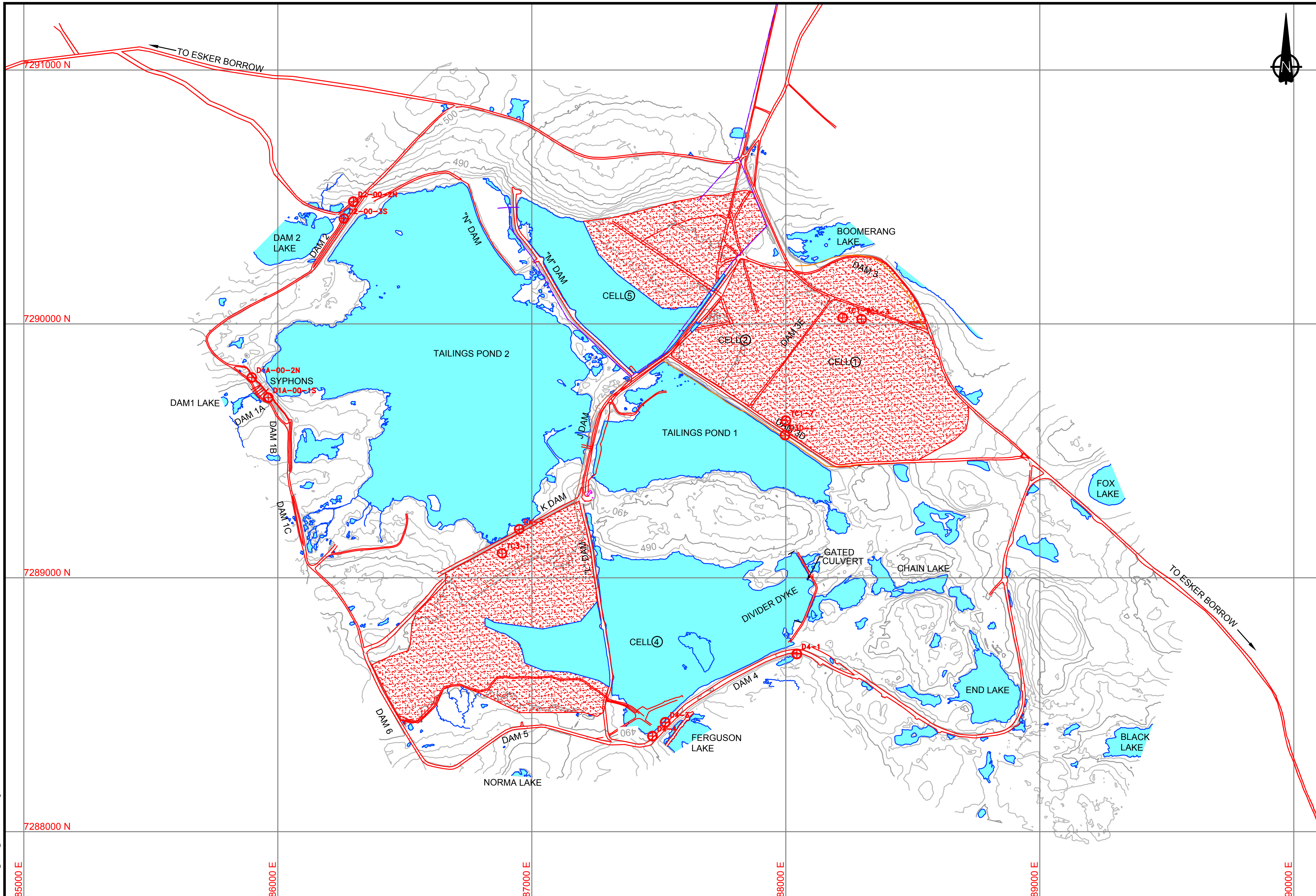
2014 Geotechnical Inspection

Mill Site and
Support Facility Plan

DATE: October 2014

APPROVED:

FIGURE: 2.2



Coordinate System: Nad_1983_UTM_Zone_12N
NTS Map Sheets 076E11 and 076E14

LEGEND

- Water Body
- Granular Tailings Cover
- Lake Shore, Drainage
- Tailings Line Route (Not in Use)
- Contour 1 m
- Contour 5 m
- Roads
- Berm Area
- Thermistor

NOTES

1. Topographic information and facilities outline provided by Lupin Mine Inc. on August 13, 2012.

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SRK JOB NO.: 1CL008.001

FILE NAME: Lupin-SiteFacil-utm-12_ATedits_RevA-20131018.dwg

Lupin Mine Inc.

Lupin Mine Incorporated

2014 Geotechnical Inspection

Tailings Containment Area

DATE:	APPROVED:	FIGURE:
October 2014		2.3

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2.4 Climate

Climate conditions were recorded at the Lupin manned weather station until October 2006. An automated weather station known as Lupin (MAPS) (CWIJ) has recorded data intermittently at the site. Reviewing the data from the end of October 2006 to the present, the station has reported an arctic climate with a mean annual temperature of -9.8°C. Winter is considered to last from October to May and summer is considered to last from June to September. The summer daily temperature averaged at 6.8°C and winter daily temperature averaged at -18.5°C. There are persistent winds at an annual mean of 18.0 km/h and gusts up to 95 km/h. Measured site precipitation is reported at an annual mean of around 388 mm. The data does not breakdown the precipitation into rain and snow (WU 2012).

2.5 Site Geology

The Lupin gold deposit is situated in an Archean metaturbidite sequence of the Contwoyto Formation, part of the Yellowknife Supergroup of supracrustal metasedimentary and metavolcanic rocks of the Slave Geologic Province. The rocks have been subjected to both regional and contact metamorphism and to several phases of deformation and intrusion.

The Contwoyto Lake area lies within the Upland unit of the Kazan physiographic region of the Canadian Shield. The area was glaciated during the Pleistocene Epoch. Isostatic rebound after ice melt resulted in emergent landforms, and during this process all parts of the land were washed by runoff and lakes. The easily erodible glaciolacustrine sediment, till and glacio-fluvial sand and gravels were subsequently reworked by melts and runoff. This has resulted in the present day outcrops with thin soil veneers, abandoned beaches and esker formations (Kinross 2005).

Tailings are primarily composed of the gangue minerals amphibole and quartz, which account for over 80% of the volume. Pyrrhotite and arsenopyrite make up an additional 17% (Klohn-Crippen 1995). The tailings have been shown through various studies to be capable of generating acid upon oxidation (Kinross 2005).

2.6 Permafrost and Dam Geotechnical Conditions

The area is completely within Canada’s cold continuous permafrost region. The active layer is somewhat variable between 1.3 m to 3.1m. There has been long-term discontinuous monitoring of the permafrost conditions in dams at the Lupin TCA since 1982 and since 1985 in the cover. The recordings are made by thermistors installed in various dam and cover locations. While a number of thermistors are defunct and others have suffered physical damages, some are read regularly during inspections. They still show the presence of permafrost through the dams and foundations. While there are some fluctuations in recorded ground temperature readings, no obvious thaw trend has been found.

3 TCA Inspection

3.1 General

Mr. Alvin Tong, P.Eng., a Senior Consultant with SRK, conducted the geotechnical inspection on August 19, 2014. After a general overview of the site in the air, the detailed site inspection was carried out using ground transportation with frequent stops for thorough visual inspections. Mr. George Friesen of LMI accompanied SRK partially on the inspection and was available for comment and discussion immediately after the inspection.

Weather conditions during the inspection were cool and sunny with periods of high winds. A detailed photographic log of the inspection is included in Appendix A.

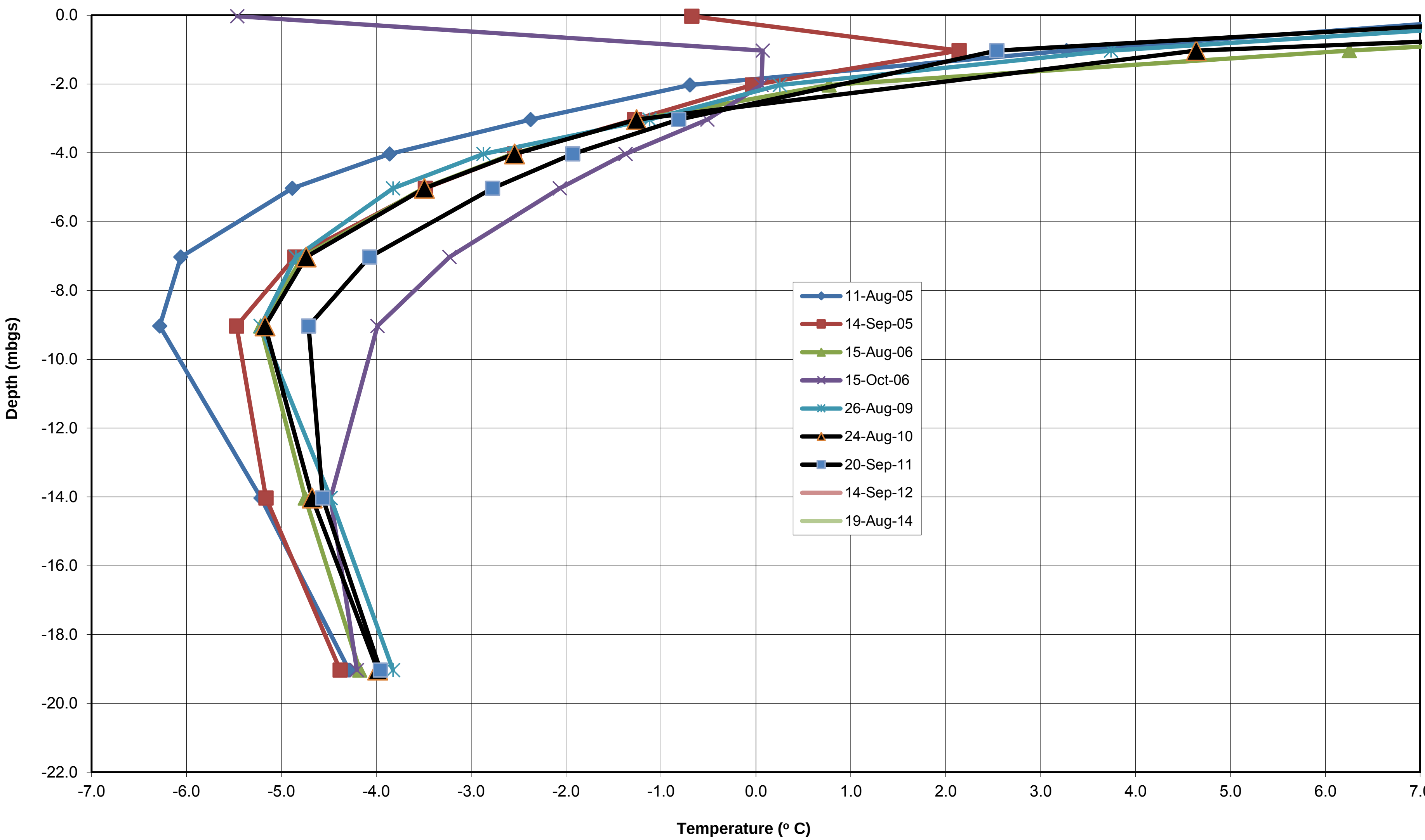
Generally, the inspection revealed the dams are typically in good condition with the erosion damage on Dam 3 and tension cracks in Dam M. There are minor erosion issues around all the dams but no major concerns were identified.

3.2 Thermistors

Figure 2.3 presents the locations of five functioning TCA thermistors that were installed between 1985 and 2004. In addition to the thermistor strings shown, there are a number of historical thermistor installations that are no longer functional. Furthermore, only thermistor data recorded after cease of production in 2005 are presented in this document, as this data best reflects the current care and maintenance status.

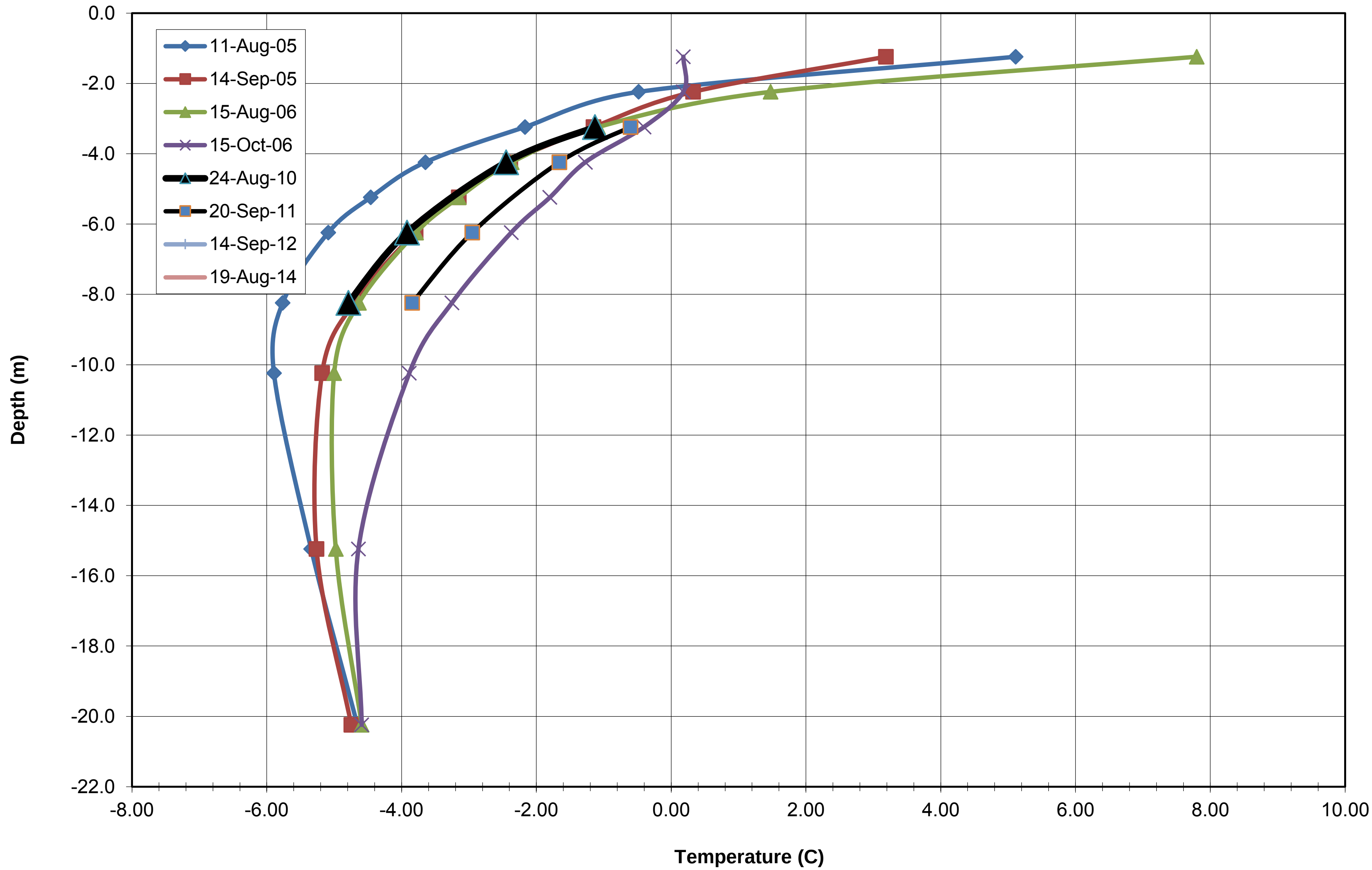
In the TCA, all five of the thermistors are less than 20 m deep. Based on the data between 2005 and 2014, taking into account annual climatic variations, there is no trend showing permafrost degradation. The largest variation occurs in Dam 3D, of 4°C in the given data set, at approximately 4 m below dam crest. This variation occurs below -1°C; and the 0°C gradient occurs at approximately 3 m below the surface. This concurs with the regional active zone. These records indicate the frozen cores in the dams are performing satisfactorily, and the general trends and visual physical inspection support that permafrost is not degrading. Figure 3.1 to Figure 3.5 show the thermistor data read during summer periods from 2005 to 2014 (SRK 2012a).

Thermistor D1A-00-01 - Installed November 9, 2000
(Vertical Thermistor installed on the crest of Dam 1A, south of Syphons)

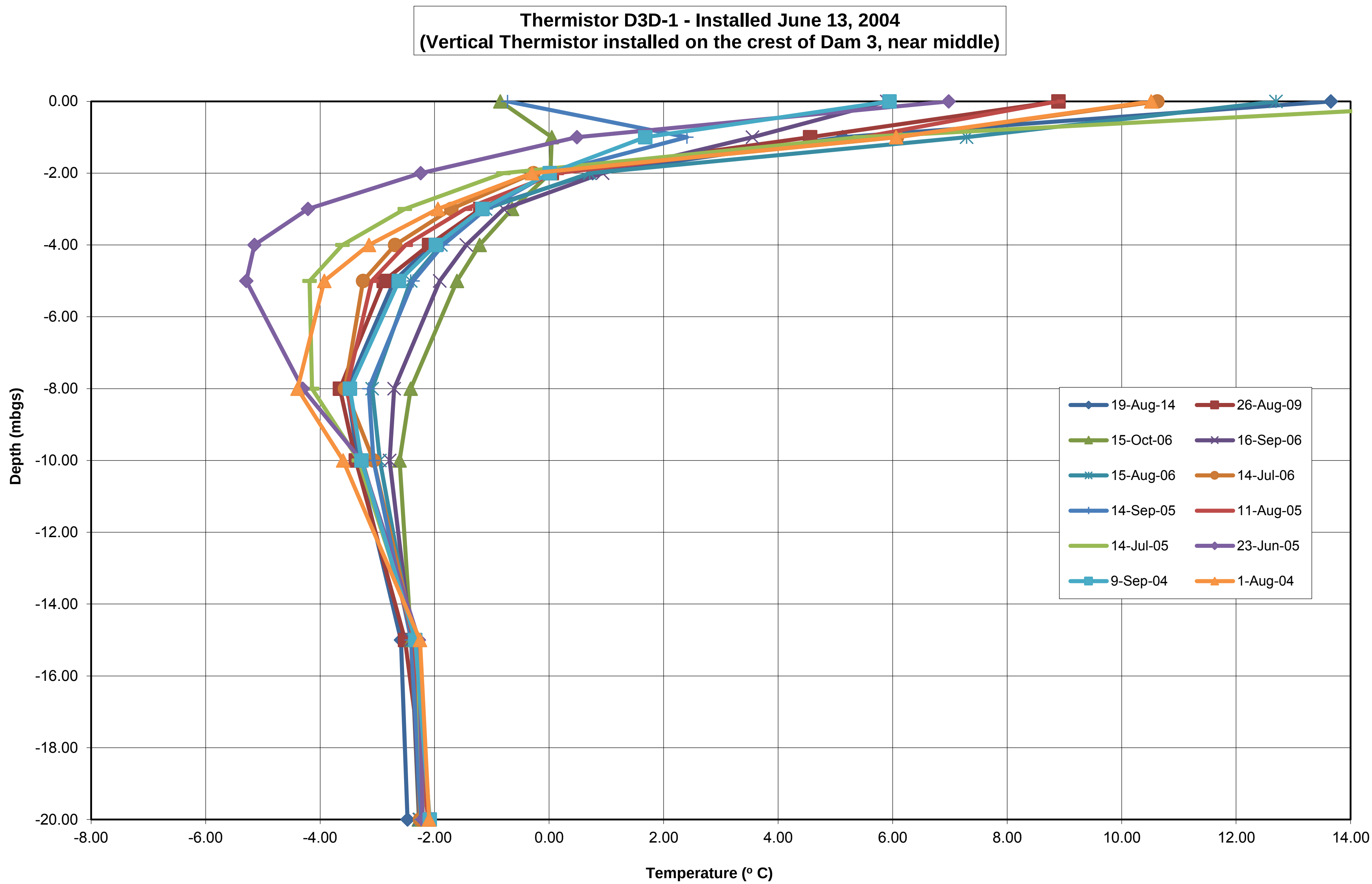


srk consulting	**Lupin Mines Incorporated**	2014 Annual Geotechnical Inspection on Perimeter Dams **Thermistor Reading D1A-00-01**		
Job No: 1CL008.001 Filename: Lupin Annual Inspection_Figure 3.1_3.5.pptx	Lupin Mine	Date: October 2014	Approved: AT	Figure: **3-1**

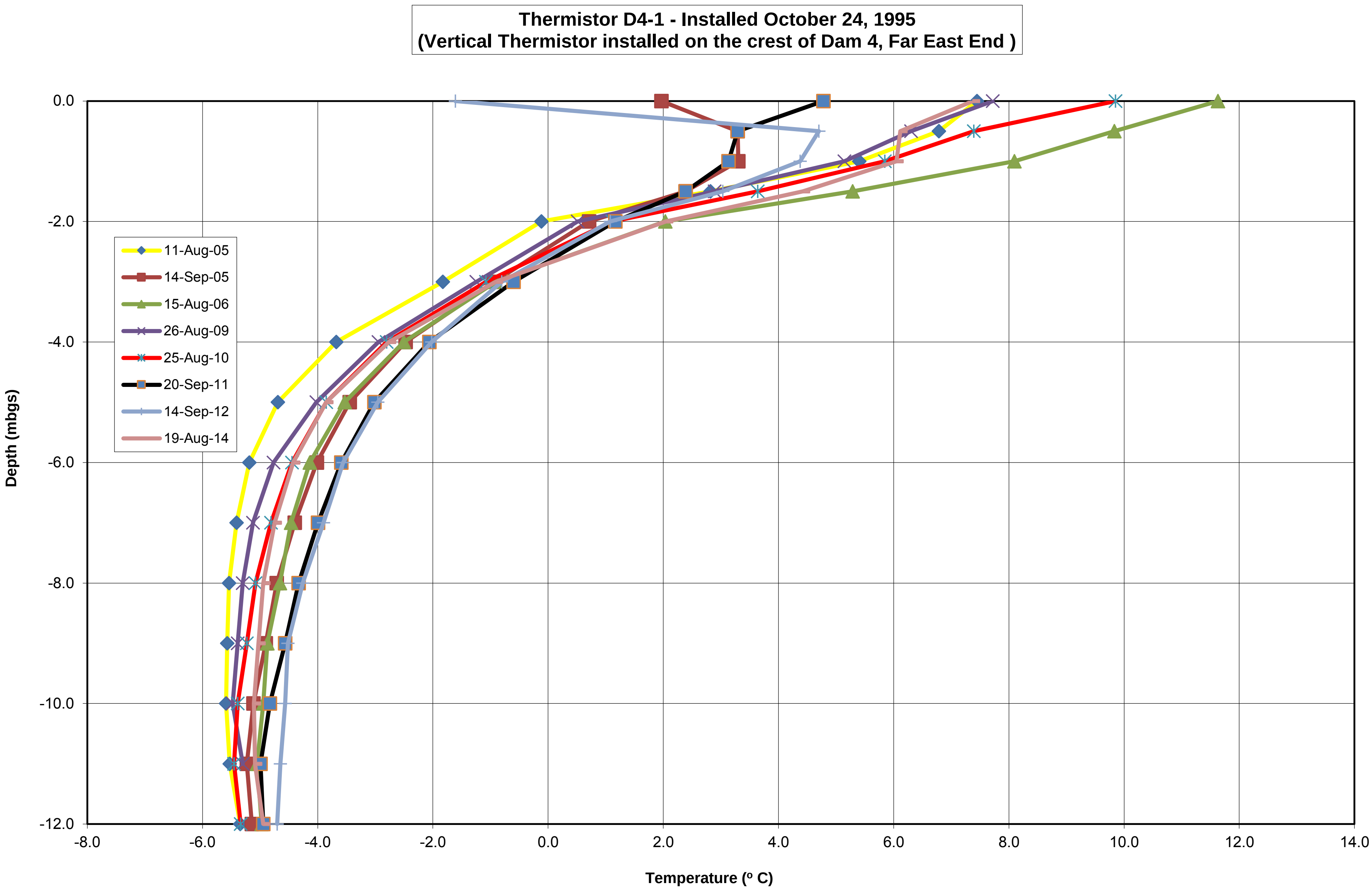
Thermistor D2-00-2 n- Installed November 8, 2000
(Vertical Termistor Installed on the crest of Dam 2, at the north end)



srk consulting	Lupin Mines Incorporated	2014 Annual Geotechnical Inspection on Perimeter Dams **Thermistor Reading D2-00-02**
Job No: 1CL008.001 Filename: Lupin Annual Inspection_Figure 3.1_3.5.pptx	Lupin Mine	Date: October 2014 / Approved: AT / Figure: **3-2**

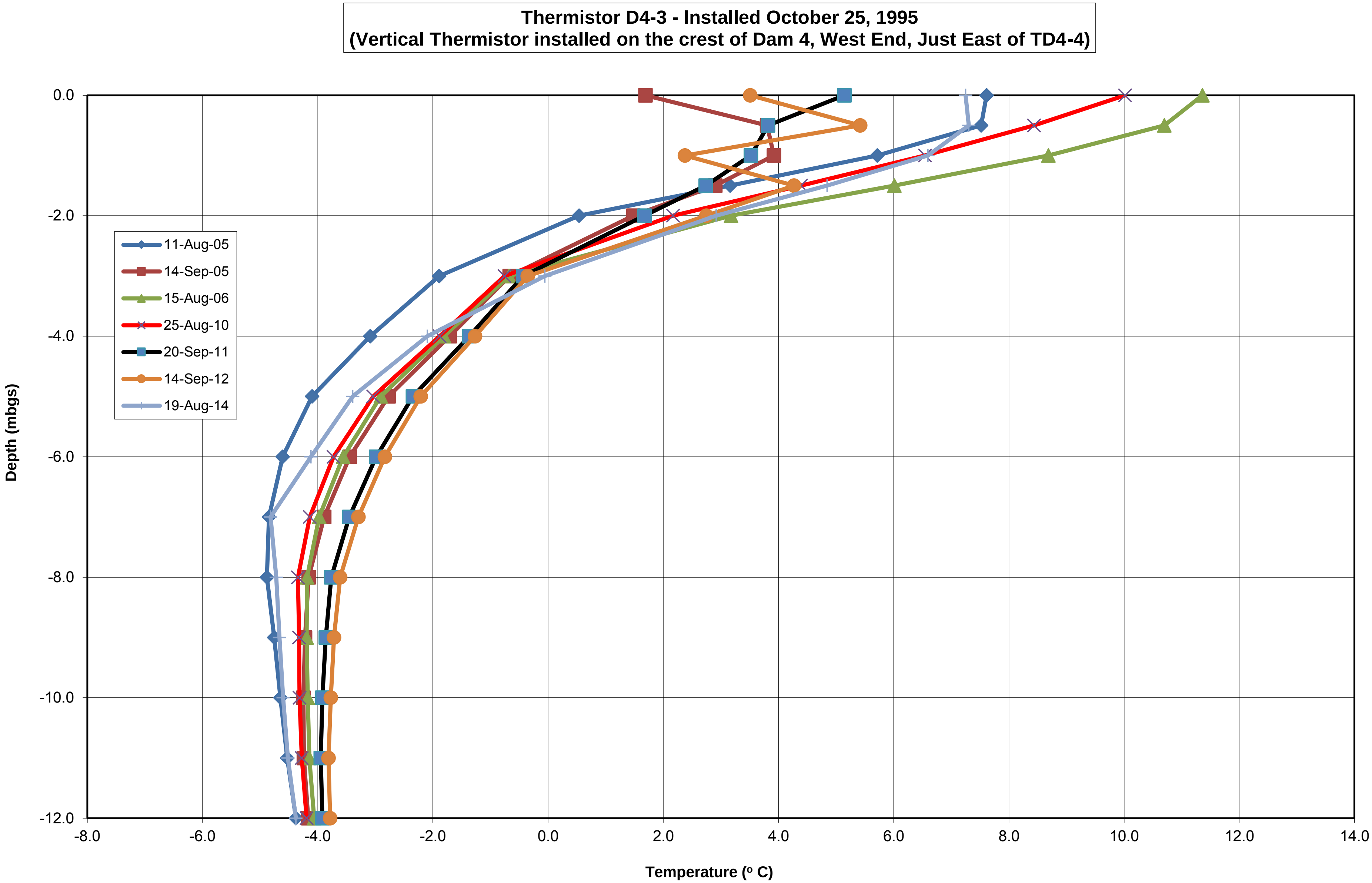


srk consulting	**Lupin Mines Incorporated**	2014 Annual Geotechnical Inspection on Perimeter Dams **Thermistor Reading D3D-1**
Job No: 1CL008.001 Filename: Lupin Annual Inspection_Figure 3.1_3.5.pptx	Lupin Mine	Date: October 2014 · Approved: AT · Figure: **3-3**



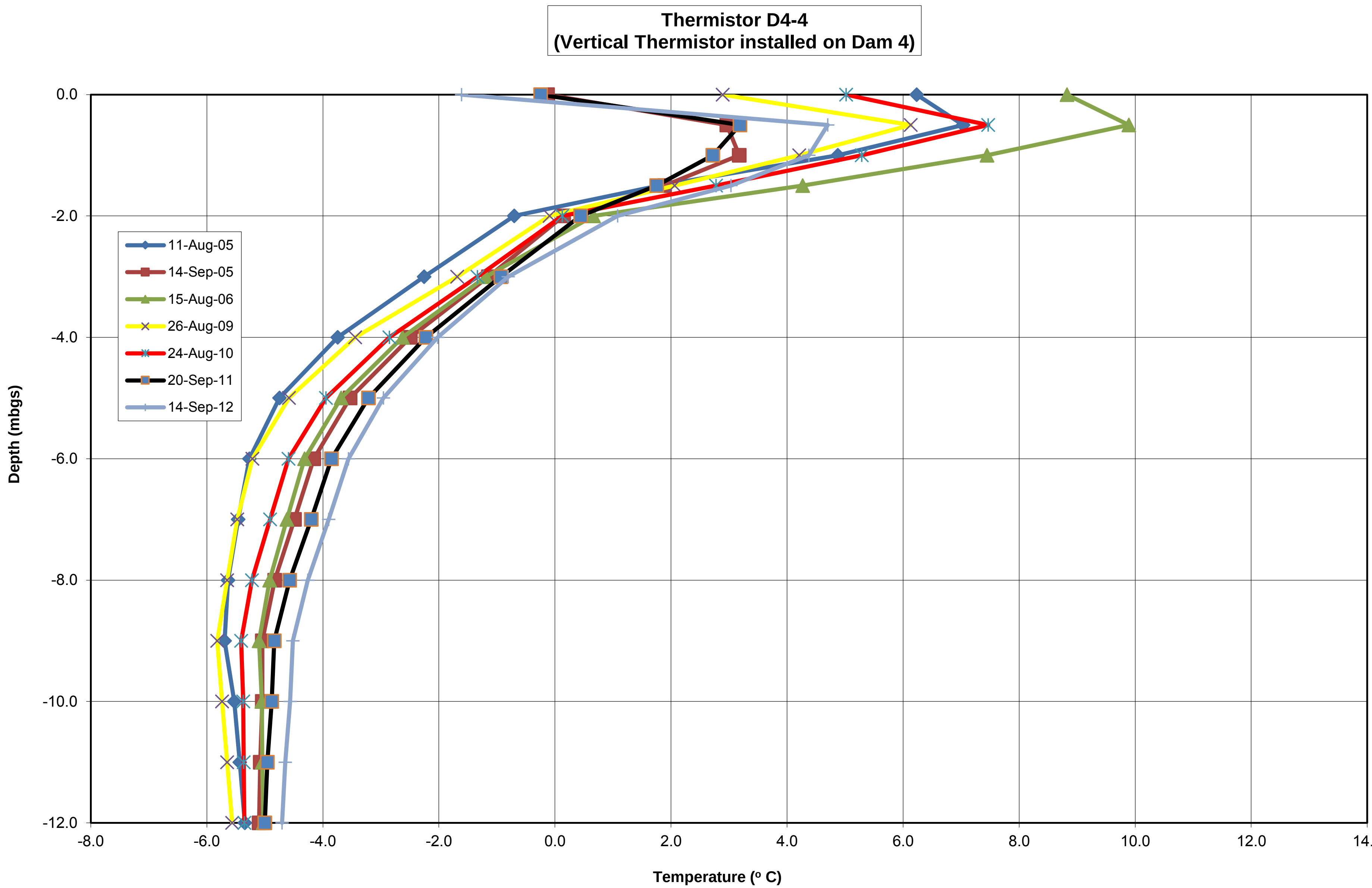
Note: Reading was not done in 2013.

srk consulting	**Lupin Mines Incorporated**	2014 Annual Geotechnical Inspection on Perimeter Dams
		Thermistor Reading D4-1
Job No: 1CL008.001 Filename: Lupin Annual Inspection_Figure 3.1_3.5.pptx	Lupin Mine	Date: October 2014 · Approved: AT · Figure: **3-4**



Note: Reading was not done in 2013.

srk consulting	Lupin Mines Incorporated	2013 Annual Geotechnical Inspection on Perimeter Dams		
		Thermistor Reading D4-3		
Job No: 1CL008.001 Filename: Lupin Annual Inspection_Figure 3.1_3.5.pptx	Lupin Mine	Date: October 2014	Approved: AT	Figure: 3-5



srk consulting	**Lupin Mines Incorporated**	2014 Annual Geotechnical Inspection on Perimeter Dams
		Thermistor Reading D4-4
Job No: 1CL008.001 Filename: Lupin Annual Inspection_Figure 3.1_3.5.pptx	Lupin Mine	Date: October 2014 / Approved: AT / Figure: **3-6**

3.3 TCA Perimeter Dams

The perimeter dams are generally in good condition in terms of stability and performance. There are minor erosion issues which are typically associated with sand and gravel construction material. These should be monitored and repaired as required to prevent continuous erosion that could worsen and impair the dam. While most of the erosion is minor, some along Dam 1A is more serious and should be addressed in 2015.

The 2011 annual inspection found seepage in the western buttress toe of Dam 4 into Ferguson Lake and the northern buttress toe of Dam 2 into Dam 2 Lake. It was not observed in subsequence and 2014 inspections. A cofferdam was placed at the toe of Dam 2 to collect seepage to be pumped back into Pond 2 when it pooled. This pool is observed to be quite full and should be pump back to Pond 2 during maintenance in 2015.

The storm ditch built within the top 2 m of Dam 3 has suffered some erosion damages from the 2014 freshet. It is believed that ponding in sections of the ditch is the main cause of the erosion damage. Because of the poor grading, the water pooled, froze, and created an ice dam; which in turn forced the freshet water to overtop the ditch and a small portion of Dam 3. LMI informed SRK that the recommended repairs on Dam 3 eroded section was completed immediately after the geotechnical inspection and that these repairs will be inspected early in the 2015 season.

The observed freeboard on the perimeter dams ranges from 1.5 m to 4 m depending on the individual perimeter dam elevations. The site treated and discharged water in 2012 hence the freeboard on the perimeter dams has slight increased since last observed in 2013.

3.4 Internal Dams

The internal dams are generally in good condition with the exception of Dam L and Dam M. The majority of the internal dams have typical erosion issues associated with dam constructed from esker sand material. Continued repairs and maintenance can help mitigate further damage in terms of widening and deepening of erosion gullies.

During the 2012 inspection, an erosion breach was observed at the south end of Dam L. It appears that the erosion was caused by the 2012 freshet where the water from the uncovered portion of Cell 3 breached into Cell 4. Cell 3 water level was reduced in 2012 from the treatment process and while it is unlikely that Cell 3 water could breach this location again in 2015 freshet, monitoring should be done to ensure no further erosion should occur. It is recommended that this erosion damage to be repaired. Section 4 of this report provides recommendations to deal with the breached section in Dam L. The slope facing Cell 3 is observed to have considerable erosion near the toe. Monitoring should be carried out to prioritize the repair on the erosion to minimize propagation to the crest of the dam.

Eight significant tension cracks observed on Dam M are a cause for concern in term of geotechnical stability. Potentially, the failed portions of the dam could breach and allow the supernatant water and tailings from Cell 5 into Pond 2. Visual comparison between 2012 and 2014 photographs showed the existing cracks are widening and new major cracks are developed. Because of the severity of the cracks and potential breach, Mr. George Friesen was advised that all vehicle traffic should avoid this section for safety reasons. A risk assessment was completed to outline the potential water quality and environmental impact in the event of a breach would be minimal (SRK 2013b); hence this situation is more of a concern for worker safety, site infrastructure access, and care and maintenance operation. Section 4.1 provides recommendations to address the potential risks in the event of a full breach.

The observed freeboard during inspection on the internal dams ranged from 0.2 m to 5 m depending on individual internal dam elevations.

4 Recommendations

Table 4.1 summarizes observations and recommendations from the inspections performed in 2014 and 2013.

Table 4.1 – Inspection Observations and Recommendations

Inspection Item	2014 Inspection		2013 Inspection	
	Observations	Recommendations	Observations	Recommendations
Perimeter Dams				
Dam 1A	Minor erosion on series and some deep erosion gullies.	Repair deep erosion gullies.	Minor erosion on series and some deep erosion gullies.	Repair deep erosion gullies.
Dam 1B	Minor surface erosions.	Consider surface maintenance.	Minor surface erosions.	Consider surface maintenance with grading and placement of fill erosions.
Dam 1C	Minor surface erosions. No cracks observed.	Consider surface maintenance.	Minor surface erosions. No cracks observed.	Consider surface maintenance with grading and placement of fill erosions.
Dam 2	Minor surface erosion. Estimated seepage at the northern buttress is less than 0.1 L/min. Collection pond is nearly full.	Consider surface maintenance. Monitor the water level in collection pond to pump the collected seepage back into Pond 2.	Minor surface erosion. Estimated seepage at the northern buttress is less than 0.1 L/min. Seepage collection pond is nearly full.	Consider surface maintenance. Pump the collected seepage back into Pond 2.
Dam 3	Minor surface erosion. Despite repairs to the storm ditch, it does not yet have a free-draining grade.	Repairs were completed on the eroded section after the inspection by LMI. Consider to re-grade ditch to minimize ponding and monitor during freshet to prevent ice blockages.	Despite repairs to the storm ditch, there are still some ponding.	Consider re-grading ditch to minimize ponding and monitor during freshet to prevent ice blockages.

Inspection Item	2014 Inspection		2013 Inspection	
	Observations	Recommendations	Observations	Recommendations
Dam 4	Surface erosion with a number of deep erosion gullies. Exposed geogrid or similar synthetic reinforcements observed near the eastern downstream toe of the dam.	Repair the deep erosion gullies and maintain the surface. Monitor the exposed geogrid for further erosion and potential water seepage.	Surface erosion with a number of deep erosion gullies. Exposed geogrid or similar synthetic reinforcements observed near the eastern downstream toe of the dam.	The geogrid exposure does not seem to be degrading, hence immediate remedial action is not required. Repair the deep erosion gullies and maintain the surface. Monitor for erosion and water seepage.
Dam 5	Minor surface erosions.	Consider surface maintenance.	Minor surface erosions.	Consider surface maintenance with grading and placement of fill erosions.
Dam 6	Surface erosion with some gullies. No seepage or ponding.	Repair the deep erosion gullies and maintain surface.	Surface erosion with some gullies. No seepage or ponding.	Repair the deep erosion gullies and maintain surface. Monitor for potential seepage.
Internal Dams(1)				
Dam J	Reduced crest width due to erosion and placement of siphon pipes. Toe erosion likely due to wave action from Pond 1 and 2. Free board is around 0.3m.	Repair eroded section and siphon pipes base. Rebuild crest width where possible. Place riprap along the dam face on both site to protect against further erosion.	Reduced crest width due to erosion and placement of siphon pipes. Toe erosion likely due to wave action from Pond 1 and 2.	Repair eroded section and siphon pipes base. Rebuild crest width where possible. Place riprap above and below the Pond 2 water line to protect against erosion.
Dam K	Minor downstream slope surface erosion and some undercutting at toe; appears to be fine grained material, from Pond 2 wave action.	Consider surface maintenance. Consider placing riprap near the toe for erosion protection.	Minor downstream slope surface erosion and some undercutting at toe; appears to be tailings material, from Pond 2 wave action.	Consider surface maintenance. Monitor regularly to ensure dam toe is not undercut. If so, place riprap there for protection.
Dam L	Minor slope surface erosions and some undercutting at toe. Breach at southern section of dam near buttress. No seepage observed	Consider surface maintenance. Consider placing riprap at the eroded areas for protection. Repair the breach with compacted well-graded esker material. Monitor and manage water in Cell 3 to prevent freshet overflow.	Minor slope surface erosions and some minor undercutting at toe. Breach at southern section of dam near buttress. Seepage observed at 0.5 L/min below breach.	Consider surface maintenance. Monitor regularly to ensure dam toe is not undercut. If so, place riprap at the problematic area for protection. Repair with compacted well-graded esker material. Monitor and manage water in Cell 3 to prevent freshet overflow.

Inspection Item	2014 Inspection		2013 Inspection	
	Observations	Recommendations	Observations	Recommendations
Dam M	Slope surface erosion. New major tension cracks observed over 150m section along the southwest facing slopes. Cracks are up to 10 m long and deeper than 30 cm.	Set up barricades on dam to prevent non-authorized personnel traffic. Consider construction of a buttress for stabilization. Reference section 4.1 for detailed mitigation measures.	Slope surface erosion. Major tension crack observed over 15m along the southwest facing slopes. Cracks are up to 6 m long and deeper than 30 cm.	Consider surface maintenance. Reference section 4.1 for detailed mitigation measures.

Note [1]: Dam 3C, 3D and 3E are considered closed as they have been intergraded with the tailings granular cover.

4.1 Mitigation for Tension Cracks on Dam M

Based on a visual inspection of the tension cracks in Dam M, possible causes could include pore water pressure from Cell 5, and/or foundation "creep" (movement between the active layer and permafrost). If LMI wants to better understand the mechanism behind the tension cracks to better determine the cause and rate of failure, then a detailed investigation would be required.

In the short term, all non-authorized personnel shall avoid this dam for safety reasons. SRK further recommends that a monitoring program be established to determine the rate of failure and development of new cracks. The program should include pairs of monitoring monuments placed perpendicular to the cracks: one at each end and one in the middle of the failing sections, each with a matching monitor on the stable section of the crest. Authorized personnel should measure and record the distances between each set of monuments on a seasonal basis. Results should be compiled and reviewed each year.

The risk assessment and water quality review (SRK 2012b) provided a summary of potential impact in the event of these cracks resulted in a full breach of Dam M. In the event of a full breach, resulting water quality impact would not prevent discharge from Pond 2 to the receiving environment. Thus, the risks associated to a dam breach are mainly related geotechnical stability where personnel health and safety, and accessibility for traffic around site are of concerns rather than environmental concerns. To mitigate some of the stability risks, SRK recommends that one of these measures should involve the construction of a toe buttress with a minimum crest width of 3 m. The buttress should be constructed of compacted, well-graded esker material, and placed with a downstream slope of 2H:1V (horizontal to vertical) and extend up to half the height to the existing dam crest. The buttress should extend a minimum of 5 m beyond the failing sections at each end. LMI should make preparations for the placement of this buttress in 2015 if stability failure of the dam is deemed unacceptable.

4.2 General Recommendations

With the exception of Dam M, the majority of the dams were generally found to be performing well and stable. SRK recommends that the observed erosion on Dams 1A, 3, 4, 6, L and J be monitored and repaired as required to reduce the risk of instability.

Clause E.6.f of the Water Licence (NWB 2009) states that:

> *"Weekly inspections of the dam(s), tailings line(s), and catchment basin(s) shall be carried out and records of these inspections shall be kept for review upon the request of an Inspector, or as otherwise approved by the Board."*

SRK understands that compliance with this clause is difficult while the site is under care and maintenance. SRK suggests that LMI submit a request to the Nunavut Water Board for an amendment to the schedule. Given the lack of mining activities and loading, we suggest that a schedule consisting of bi-weekly inspections during May and June (during freshet), and monthly inspections for the remaining open water period July to October would be adequate. However, if water levels in the ponds are allowed to rise, then inspections should be carried out bi-weekly. The inspections would specifically cover:

- Collection of and return of seepage in Dam 2,
- The water levels in Ponds 1 & 2 and Cells 3 & 5,
- General surface erosion and anomalies on dams, and
- The tension cracks in Dam M.

Observations and findings from site inspections should be included in the annual inspection records.

LMI should also consider conducting a dam safety review of the perimeter dams. The last review was completed by Golder in 2004. The Canadian Dam Association suggests the frequency of dam safety reviews for Significant class of dams should be once every 10 years (CDA 2007).

This report "*2014 Annual Geotechnical Inspection of Lupin Mine Tailings Containment Area, Nunavut*" has been prepared by SRK Consulting (Canada) Inc.

Prepared by

Alvin Tong, P.Eng.

Senior Consultant

Reviewed by

Peter Healey, P.Eng.

Project Reviewer

SRK Consulting (Canada) Inc. has prepared this document for Lupin Mine Incorporated Any use or decisions by which a third party makes of this document are the responsibility of such third parties. In no circumstance does SRK accept any consequential liability arising from commercial decisions or actions resulting from the use of this report by a third party.

The opinions expressed in this report have been based on the information available to SRK at the time of preparation. SRK has exercised all due care in reviewing information supplied by others for use on this project. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information, except to the extent that SRK was hired to verify the data.

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Appendix A: Photo Log

Photo 1: Seepage in the north abutment of Dam 2 and surface erosion

Photo 2: Looking south at the seepage collection ponds at toe of Dam 2.

Photo 3: Looking southwest on Dam 2 near the northern abutment.

Photo 4: Looking south at Dam 1 A

Photo 5: Downstream surface erosion of Dam 1A

Photo 6: Looking north from the southern abutment of Dam 1A

srk consulting	Lupin Mines Incorporated	2014 Annual Geotechnical Inspection Lupin Tailings Mine **Appendix A: Photo Log**
Job No: 1CL008.002 Filename:Appendix_A_Photo_Log_1CL008_002_JN_20141006	Lupin Mine	Date: Oct 2014 / Approved: AT / Figure: 1

Photo 7: Looking south at the upstream face of Dam 1B

Photo 8: Look south at the downstream face of Dam 1B

Photo 9: Looking north at the downstream face of Dam 1B

Photo 10: Looking south at the upstream face of Dam 1C

Photo 11: Looking south at the downstream face of Dam 1C

Photo 12: Looking north at the upstream face of Dam 1C near the southern abutment

srk consulting	**Lupin Mines Incorporated**	2014 Annual Geotechnical Inspection Lupin Tailings Mine		
		Appendix A: Photo Log		
Job No: 1CL008.002 Filename:Appendix_A_Photo_Log_1CL008_002_JN_20141006	Lupin Mine	Date: Oct 2014	Approved: AT	Figure: 2

Photo 13: Looking south at the downstream face of Dam 6 near the northern abutment

Photo 14: Close up look at one of the large erosion gully in Dam 6.

Photo 15: Looking north at the downstream face of Dam 6 from the southern abutment

Photo 16: Looking east from at the upstream face of Dam 5, near the west abutment.

Photo 17: Looking east from at the downstream face of Dam 5.

Photo 18: View of the downstream face at the south abutment of Dam 6,

srk consulting	**Lupin Mines Incorporated**	2014 Annual Geotechnical Inspection Lupin Tailings Mine **Appendix A: Photo Log**		
Job No: 1CL008.002 Filename:Appendix_A_Photo_Log_1CL008_002_JN_20141006	Lupin Mine	Date: Oct 2014	Approved: AT	Figure: 3

Photo 19: Looking east at the downstream face of Dam 4 with exposed geogrid toward the east abutment.

Photo 20: Looking west at the downstream face of Dam 4 at near the east abutment.

Photo 21: Close up of erosion gully in Dam 4.

Photo 22: looking north at the erosion damage on crest of Dam 3.

Photo 23: Looking west at the runoff channel on Dam 3.

Photo 24: Looking east at the runoff channel on Dam 3.

srk consulting	**Lupin Mines Incorporated**	2014 Annual Geotechnical Inspection Lupin Tailings Mine
		Appendix A: Photo Log
Job No: 1CL008.002 Filename:Appendix_A_Photo_Log_1CL008_002_JN_20141006	Lupin Mine	Date: Oct 2014 | Approved: AT | Figure: 4

Photo 25: Looking west at the crest and top part of the downstream face of Dam 3D

Photo 26: Looking at the lower part of the downstream face of Dam 3D.

Photo 27: Looking northeast at the downstream face of Dam 3D.

Photo 28: Looking northwest at original tension cracks on Dam M, near Dam N.

Photo 29: Close up view of the original tension cracks on Dam M.

Photo 30: Looking southeast at the new tension cracks observed in 2014 on Dam M with Dam J in the left background.

srk consulting	**Lupin Mines Incorporated**	2014 Annual Geotechnical Inspection Lupin Tailings Mine **Appendix A: Photo Log**
Job No: 1CL008.002 Filename:Appendix_A_Photo_Log_1CL008_002_JN_20141006	Lupin Mine	Date: Oct 2014 · Approved: AT · Figure: **5**

Photo 31: Close up view of the new tension cracks observed in 2014, through the centerline of the dam.

Photo 32: Close up view of the new tension cracks observed in 2014, in face of the dam toward Pond 1.

Photo 33: Close up view of the new tension cracks observed in 2014, in face of the dam toward Pond 1, upwards of 0.3m wide and 0.5m deep.

Photo 34: Close up view of the new tension cracks observed in 2014, in face of the dam toward Pond 1.

Photo 35: Close up view of the new tension cracks observed in 2014, in face of the dam toward Pond 1.

Photo 36: Looking northeast of at the Dam M facing toward pond 2. Note the failure surfaces at the toe.

srk consulting	Lupin Mines Incorporated	2014 Annual Geotechnical Inspection Lupin Tailings Mine **Appendix A: Photo Log**
Job No: 1CL008.002 Filename:Appendix_A_Photo_Log_1CL008_002_JN_20141006	Lupin Mine	Date: Oct 2014 / Approved: AT / Figure: 6

Photo 37: Looking south on Dam J with pond 1 at the left.

Photo 38: Looking south on Dam J crest with pond 2 at the left.

Photo 39: Looking south on Dam J with pond 2 at the right.

Photo 40: Looking south at Dam K facing pond 2. Note the under cut from at the toe of the dam.

Photo 41: Close up view of erosion gully in Dam K facing pond 2.

Photo 42: Looking west at Dam K with pond 2 at the left.

srk consulting	**Lupin Mines Incorporated**	2014 Annual Geotechnical Inspection Lupin Tailings Mine **Appendix A: Photo Log**
Job No: 1CL008.002 Filename:Appendix_A_Photo_Log_1CL008_002_JN_20141006	Lupin Mine	Date: Oct 2014 | Approved: AT | Figure: 7

Photo 43: Looking north at the crest of Dam L with Cell 4 at the right.

Photo 44: View of erosion channel near the south abutment of Dam L with Cell in the background.

Photo 45: Looking north on Crest of Dam N with pond 2 on the left.

Photo 46: Looking north on Dam N with Dam M on the right background.

srk consulting	Lupin Mines Incorporated	2014 Annual Geotechnical Inspection Lupin Tailings Mine **Appendix A: Photo Log**
Job No: 1CL008.002 Filename:Appendix_A_Photo_Log_1CL008_002_JN_20141006	Lupin Mine	Date: Oct 2014 / Approved: AT / Figure: 8

Appendix B: LMI Liquid Waste Management Plan

Lupin Mines Incorporated

A wholly owned indirect subsidary of Elgin Mining Inc.

Lupin Mine Site

Nunavut, Canada

Liquid Waste Management Plan

(Care and Maintenance)

March 2013

Lupin Mines Incorporated
Elgin Mining Inc.
#201 - 750 West Pender Street
Vancouver, BC, V6C 2T7

Document Control

Revision No.	Date	Details	Author	Approver
1.0	20/03/12	Reformatted to Lupin Mines standard. Revised and updated to reflect new ownership and contact information. Updated figures to reflect current site conditions. Document re-write, primarily for clarity and organization. Addressed comments from AANDC (2010), EC (2009) Revised to include liquid waste management	S Hamm	P Downey
2.0	30/03/13	Combined *Discharge Procedure: Tailings Containment Area and Sewage Lakes Disposal Facility* with the *Liquid Waste and Stormwater Management Plan* to create the *Liquid Waste Management Plan.* Updated contact and general information. Additional details on preparation for discharge from the TCA added.	D Vokey	W. Osborne

Table of Contents

Tables

Figures

Appendices

1 Introduction

Lupin Mines Incorporated (LMI), a wholly owned indirect subsidiary of Elgin Mining Inc. (Elgin), has prepared this Liquid Waste Management Plan (the Plan).

An annual review of the Plan will take place and revisions will be submitted as necessary with the annual report. The current Type A Water Licence 2AM-LUP0914 (Water Licence) for the Lupin Gold Mine (Lupin or the Lupin Mine or the Site) is valid until March 31, 2014 and has been kept in good standing.

1.1 Project and Company Information

Elgin is a Canadian based company focused on the production at the Björkdal Gold Mine located in Sweden, and the exploration and development of the Lupin Gold Mine and Ulu Gold Project, both located in Nunavut, Canada.

Elgin purchased LMI, which owns the Lupin Mine, from MMG Resources Ltd. in July 2011. Lupin was in operation from 1982 to 2005 with temporary suspensions of activities between January 1998 and April 2000, and again between August 2003 and March 2004. The mine resumed production in March 2004 until February 2005. Since 2005, the Site has remained in Care and Maintenance.

General site maintenance and facilities upgrades are underway at the Lupin Mine in preparation for an underground exploration program. The activities underway were screened by the Nunavut Impact Review Board under file 99WR053 and approved by the Nunavut Water Board under Water Licence 2AM-LUP0914. Surface exploration is conducted under Water Licence 2BE-LEP1217. All camp infrastructure required for the surface exploration program currently exists at the Lupin Mine.

Company:	LMI
Project:	Lupin Mine, Nunavut
Company Address:	201 – 750 W Pender St, Vancouver, BC, V6C 2T7
Telephone:	604-682-3366
Email:	wosborne@elginmining.com
Attention:	Wayne Osborne, Project Manager
Effective date:	30 March 2013
Distribution List:	
Patrick Downey	Chief Executive Officer
Jim Currie	Chief Operating Officer
Peter Tam	Chief Financial Officer
Michele Jones	Manager, Corporate Affairs
Wayne Osborne	Project Manager
David Vokey	Sr. Environmental Coordinator
Karyn Lewis	General Administration

Additional copies of this Plan are available from General Administration. The Plan is available at the LMI Environmental Department office and a notice is posted in key locations at the site indicating where they can be found. All employees and contractors will be made aware of its contents.

1.2 Site Location

The Lupin Mine is located in Kitikmeot Region, Nunavut, 400 km north of Yellowknife, Northwest Territories and 285 km southeast of Kugluktuk. The airport serving this Site is at 65° 46'00" N and 111° 14'41" W. The Site is on the western shore of Contwoyto Lake, approximately 60 km south of the Arctic Circle (Figure 1).

1.3 *Environmental and Sustainable Development Policy*

Elgin Mining Inc. and its subsidiaries (collectively, "Elgin Mining") are committed to maintaining a safe, clean, compliant and respectful work environment. Elgin Mining looks to our employees, contractors and managers to adopt and grow a culture of social responsibility and environmental excellence. Together we achieve this by:

- Promoting environmental stewardship in all tasks. Nothing is too important that it cannot be done in a clean and responsible manner. We strive towards maintaining a zero-incident work place.
- Recognizing that we have a shared responsibility as stewards of the environment in which we operate. We will not walk away from a non-compliant act.
- Identifying, managing and mitigating environmental, business and social risks in an open, honest and transparent manner.
- Planning our work so it is done in the cleanest possible manner and executing work according to plan.
- Continually improving environmental and operational performance by setting and reviewing achievable targets.
- Providing appropriate and necessary resources in the form of training, personnel and capital, including that required for closure planning and reclamation.
- Managing our materials and waste streams, maintaining a high degree of emergency response preparedness and minimizing our operational footprint to maintain environmental protection at all stages of project development.
- Procuring goods and services locally, where available, and favouring suppliers with environmentally and socially responsible business practices.
- Seeking to understand, learn from and mitigate the root causes of environmental incidents and near misses when they do occur.

- Employing systems and technology to achieve compliance, increase efficiency and promote industry best practices in development, operations and environmental stewardship.
- Working with stakeholders to identify and pursue opportunities for sustainable social and economic development and capacity building.
- Conducting early and ongoing stakeholder engagement relevant to the stage of project and mine development and operation.
- Recognizing diversity in the workplace and building meaningful relationships with all stakeholders in a timely, collaborative and transparent manner.

Through implementation of this policy, Elgin Mining seeks to earn the public's trust and be recognized as a respectful and conscientious employer, neighbor and environmental steward.

Approved by the Board of Directors on August 10th, 2012

1.4 Purpose and Scope

This Plan is an appendix to the Care and Maintenance Plan. The purpose of this Plan is to provide the necessary information pertaining to liquid waste management during routine care and maintenance at the Lupin Mine. Liquid waste management planning is necessary to ensure waste water is appropriately stored, treated and discharged to the environment in compliance with the Water Licence and the *Metal Mining and Effluent Regulation* (MMER).

The objectives of the Plan are to:

- Describe source and fate waste water on the Lupin site, and
- Outline measures in place to mitigate impacts to the environment resulting from waste water discharge.

2 Sources of Liquid Waste

2.1 Stormwater

Water accumulates in secondary containment of fuel storage facilities due to precipitation. In order to maintain secondary containment dry, accumulated water needs to removed and managed.

Precipitation and the overland flow of surface water can encounter surficial materials such as disturbed native soils and the fine-grained fraction of waste rock materials, and can mobilize fine particulates, chemicals and contaminants contained therein. The majority of sediment contained in runoff at the Site is waste rock fines found stockpiles, roads, and miscellaneous "administrative" areas such as parking lots and storage yards (laydowns).

2.2 Sewage

Sewage and grey water are conveyed to the Sewage Lakes system. Liquid waste results from camp accommodations and kitchen facilities (dishwater and sanitary waste).

2.3 Tailings

There is a substantial amount of water present within the tailings containment area (TCA) (Figure 2). The containment is divided into three main components: solids retention cells (Cells 1, 2, 3, and 5), polishing ponds (Cell 4, Pond 1 and Pond 2) and the End Lake area (not used). All of this water is periodically transferred downstream to maintain a 1 m freeboard at all times at the perimeter dams. The water in Cell 4 is transferred to Pond 1 via gated valve, from here the water is transferred from Pond 1 to Pond 2 by way of siphon. Cell 5 is directly upstream of Pond 1 and water is transferred directly to Pond 2 via siphon. Pond 2 is the largest pond; here, water is treated with lime and eventually discharged to the environment by way of siphon.

3 Stormwater Management

The Lupin Mine is constructed on a topographic dome (Figure 3). Drainage to the northwest is towards the main tank farm, which is isolated by a containment berm system. Drainage to southwest and south reports to the Sewage Lakes Disposal Facility, which is contained by dykes. The north and east perimeter of the site is composed of laydown pads, graded to direct over land flow to either the airstrip access road, the surface crusher access road or the burn pit access road.

Site facilities at Lupin relevant to stormwater management planning include roads, the mine site infrastructure and the air strip.

3.1 Facilities

Mine Site Area

The mine site area referred to in this Plan includes: mine and mill buildings; shops; accommodations; laydown areas; storage facilities; weather station; and bulk fuel storage facilities. Surface runoff from these areas flows either towards the main tank farm area, the sewage pond system or access roads to the airstrip, burn pit or crusher as described above.

Roads

Runoff accumulating on roads is collected in a series of ditches and culverts. Road bases were constructed with non-acid forming materials.

Airstrip

The gradient of the airstrip results in run-off flow from south to north. Spring freshet and stormwater flow parallel to the strip, controlled through a combination of natural gradient, culverts, and ditches. The water flows naturally to Boot Lake, to the northwest, and typically carries negligible sediment.

3.2 Best Management Practices

LMI utilizes a number of best management practices (BMPs) to control the discharge of stormwater runoff to points outside the mine's footprint, as discussed in the following sections.

Good Housekeeping

Lupin management promotes good housekeeping to minimize exposure of materials to the environment and potential accumulation in stormwater. Materials and equipment are stored throughout the site such that leaks and leaching are minimized and contained.

Visual Inspections

Visual inspections of cold storage buildings, laydown areas, fuel containment, and tailings containment are conducted. These visual inspections are increased during spring freshet and after significant rain events.

Preventative Maintenance

Regularly scheduled maintenance for mobile equipment occurs to make sure fluids in process do not escape.

Material Handling Practices

The following material handling practices are used by Lupin personnel to minimize exposure of pollutants to stormwater:

- Containers are stored appropriately in designated storage locations at all times other than when in immediate use;
- Lids, covers, and caps are in place at all times other than when in immediate use; and
- Operators use caution when refueling equipment on site or transferring materials.

Spill Prevention and Emergency Response

Lupin has in effect a *Spill Contingency Plan*, designed to deal with proper procedures for oil and chemical spill prevention and response. Employees are trained in procedures to minimize the environmental and health risks associated with these events.

Sediment and Erosion Control

Ephemeral and intermittent drainages exist throughout the Lupin Mine site, many of which flow only because of significant rains events or during spring freshet. Ephemeral or intermittent drainages may require measures to control sedimentation and surface erosion; such as cross ditching, or silt fencing.

3.3 Bulk Fuel Storage Facility Discharge Procedures

LMI has in effect a *Fuel Containment Management Strategy*, designed to deal with proper procedures for the fuel and fuel handling facilities on site. Employees are trained in the procedures to maintain and operate the facilities.

Water accumulating in secondary containment of fuel storage facilities is tested prior to discharge to the environment to ensure it is in compliance with part E(9) of the Water Licence as listed below in Table 1. Samples for testing are collected in accordance with the *Water Quality Monitoring Plan and Quality Assurance/ Quality Control Plan* (the Monitoring Plan) found in Appendix A. Water that is not in compliance is pumped to a storage tank where it is held until it can be treated and subsequently released to the environment at LUP-27 (Figure 4, UTM coordinates: 7293609N 489072E). Snow that is contaminated with hydrocarbons is collected and melted. The hydrocarbon portion is removed and the water is then tested and either discharged or stored for further treatment. The hydrocarbon portion and water that cannot be treated on site is shipment off site for treatment and disposal.

Provide notice to the Aboriginal Affairs and Northern Development Canada (AANDC) Inspector at least ten (10) days prior to initiating discharge from the Bulk Fuel Storage Facilities including an estimated volume proposed for discharge and the receiving location.

Table 1: Monitoring station LUP-27 effluent quality criteria.

Parameter	Maximum Average Concentration (mg/L)	Maximum Concentration of any Grab sample (mg/L)
Total Ammonia	2.0	4.0
Total Lead	0.01	0.02
Benzene	0.37	
Toulene	0.002	
Ethylbenzene	0.090	
Total Suspended Solids	15	30
Oil and Grease	5.0 and no visual sheen	10
pH	6.0 to 9.0	

4 Sewage Waste Management

4.1 Sewage Lakes Disposal Facility

The sewage facilities consist of several lift stations within the camp and an 800 m long 6" diameter insulated steel pipeline to the first of two sewage lakes. Alternatively, when camp capacity requirements during care and maintenance do not warrants its use; sewage and grey water are collected in a sewage tank at the 1300 and 800 wing of the accommodation buildings. The tank is then hauled to the Upper

Sewage Lake wherein waste is deposited. A sewage line to convey camp sewage directly to the Uppers Sewage Lake may be utilized. Grey water originating from office cabin use is deposited in a leaching pit adjacent to the guesthouse.

A 'permeable' type dam with an emergency overflow and an installed siphon exists between the upper and lower sewage lakes. Under Part E(7) of the Water Licence, all sewage is to be discharged to the Sewage Lakes Disposal Facilities. Discharge from the Lower Sewage Lake is controlled by the use of a siphon. Water accumulating in the Lower Sewage Lake is tested prior to discharge to the environment to ensure it is in compliance with Part E(8) of the Water Licence as provided in Table 2 below. If compliant, water is discharged from LUP-14 (Figure 4, UTM coordinates: 7293013N 490187E) to the environment. Samples for testing are collected in accordance with the *Water Quality Monitoring Plan and Quality Assurance/ Quality Control Plan*.

4.2 Sewage Lakes Disposal Facility Discharge Procedures

4.2.1 Pre-Discharge

The following procedures must be followed in preparation for discharge of sewage effluent from the Sewage Lakes Disposal Facility during open water conditions from the siphons.

3 weeks prior to Discharge

1. Collected samples from the Lower Sewage Lake near the siphon intake and test for pH, TSS, Total Metals, BOD_5, and Faecal Coliforms to confirm compliance with the effluent quality limits outlined in Table 2 following the procedures outlined in the Monitoring Plan (Appendix A).
2. The samples must be collected the morning of the plane day to account for sample holding times.
3. Inform the lab when the samples are shipped.

10 days prior to Discharge

1. Notify the AANDC Inspector at least ten (10) days prior to initiating discharge from the sewage pond. Including in the notification the laboratory sample results, an estimated volume proposed for discharge and the receiving location.
2. Monitoring Station LUP-14 sample analysis results must not exceed the criteria outlined in Table 2 prior to commencing discharge.

5 days prior to discharge

1. Take pH measurements daily for 5 days before anticipated discharge with the portable pH meter in the Lower Sewage Lake, near the siphon intake.
2. pH must be in the range of 6.0 to 9.5 or discharge cannot commence.

4.2.2 Discharge

The following procedures must be followed during discharge from the Sewage Lakes Disposal Facility:

1. Measure pH on the pond-side of the Lower Sewage Lake dam by the siphon intakes. If pH is between 6.0 and 9.5, and effluent quality at LUP-14 does not exceed the criteria provided in Table 2, start the siphons.
2. Record the following information for the Discharge Siphon Log:
    a. Date and time that the siphons were started
    b. pH reading from the portable meter
    c. Flow volume from each siphon
    d. General condition of the discharge point
3. Enter all information in the Discharge Siphon Log spreadsheet.
4. Collect monthly samples from LUP-14 including quality control samples (field duplicates, trip blanks) as outlined in the sampling event schedule (Table 2.2) of the *Water Quality Plan and Quality Assurance/ Quality Control Plan*. Follow the sampling procedures outline in that Monitoring Plan (Appendix A).
5. Prepare samples for shipment to the lab on weekly flight following the procedures outlined in the Monitoring Plan. Each shipment must include at least one duplicate sample and one trip blank.
6. If field pH measurement is <6.0 or >9.5, IMMEDIATELY shut down the siphons, employ the Spill Contingency Plan, and notify the following:
    a. AANDC inspector at 867-975-4548
    b. 24 Hour Spill Report Line at (867)920-8130
7. Upon receipt of analytical results for LUP-14 from the lab, compare analytical results to the effluent quality criteria outlined in the following Table 2. If results exceed the effluent quality limits IMMEDIATELY shut down the siphons, employ the Spill Contingency Plan, and notify the following:
    a. AANDC inspector at 867-975-4548
    b. 24 Hour Spill Report Line at (867)920-8130

Table 2: Monitoring station LUP-14 effluent quality criteria.

Parameter	Maximum Concentration of any Grab sample (mg/L)
Total Arsenic	0.05
Total Copper	0.20
Total Lead	0.05
Total Nickel	0.30
Total Zinc	0.50
Total Suspended Solids	35
Faecal Coliforms	30
BOD_5	1000 colony forming units/ 100mL
Oil and Grease	Visual Sheen
pH	6.0 to 9.5

5 Tailings Effluent Management

5.1 Tailings Containment Area

The Tailings Containment Area (TCA) is located approximately six (6) km south of the Lupin Mine, and covers an area of about 361 ha within the 750 ha land lease. Water in the TCA is treated and tested prior to discharge to the environment to ensure it is in compliance with Part E(5) of the Water Licence. If compliant, water is discharged at LUP-10 (Figure 4, UTM coordinates: 7289689N 485843E). In accordance with Part E(2) and Part E(3) of the Water Licence discharge can commence no sooner than July 15 of any calendar year and the volume discharged cannot exceed 70,000 m^3 per day.

The procedures for sampling discharge from the TCA in accordance with the Monitoring Program in Schedule J of the Water Licence and the MMER is described in the *Water Quality Monitoring Plan and Quality Assurance/ Quality Control Plan* (the Monitoring Plan). Samples are also collected from reference areas and downstream exposure areas, LUP-20, 21, 22, 24 and 25 (Figure 4). The Environmental Effects Monitoring (EEM) program of the MMER requires biological monitoring studies be completed in addition to the water quality studies. Cycle 4 of the EEM program is planned for 2013 and the study design was filed with Environment Canada in February 2013.

The TCA is also managed in compliance with Part E(6) of the Water Licence, which stipulates the following:

6. The TCA shall be constructed, operated and maintained to engineering standards such that:

a. A freeboard limit of 1.0 m shall be maintain at all times or as recommended by a Geotechnical Engineer and as approved by the Nunavut Water Board (the Board) in writing;
b. Seepage from the TCA is minimized;
c. Any seepage that occurs is collected and returned immediately to the TCA;
d. Erosion of constructed facilities is addressed immediately;
e. The solids fraction of the mill Tailings shall be permanently contained within the TCA or underground as Backfill;
f. Weekly inspections of the dam(s), Tailings line(s), and catchment basin(s) shall be carried out and records of these inspections shall be kept for review upon the request of an Inspector, or as otherwise approved by the Board. More frequent inspections shall be performed at the request of an Inspector; and
g. An inspection of the TCA shall be carried out annually during ince free, open water conditions by a Geotechnical Engineer. The Engineer’s report shall be submitted to the Board within sixty (60) days following the inspection and shall include a covering letter from the Licensee outlining an implementation plan to respond to the Engineer’s recommendations.

5.2 Tailings Containment Area Discharge Procedures

5.2.1 Pre Discharge

The following procedures must be followed in preparation for discharge of tailings effluent from the Tailings Containment Area (TCA). Note that calendar months and dates are provided only as a guide. Specific dates will be based on environmental conditions.

One month prior to discharge (June)

1. Air Compressor Check
    - Inspect the portable air compressor to make sure it is working correctly. The compressor is needed to start the vacuum in the siphons. Get a spare jar for the compressor.
    - Transport the air compressor to Dam 1A.
2. Set-up Siphons
    - Check for holes in pipe, coupling integrity, plugged inlets and outlets (Only one 20" siphon worked in 2012).
    - Add four 8 inch siphons.
    - Ensure that a vacuum can be created in the pipe to induce siphon flow.
    - Correct any problems so that the siphon process can be started when needed.
    - Test and calibrate flow meters to confirm meter is working properly. Flow meters can be calibrated annually by the manufacturer prior to discharge. Calibration to MMER specifications is necessary. [1]
    - By 30 June, install the flow meter probes in the siphons and check to ensure that the meters are working (one in 20" pipe, and one in one of the 8" pipes).
3. Organize Water Quality Monitoring Equipment
    - Rent or purchase an immersion probe to measure pH, temperature, dissolved oxygen and conductivity with a 7.5 m cable to allow for profiling.
    - Ensure the immersion probe functions correctly and that the data logger can be downloaded.
    - Ensure the handheld pH, dissolved oxygen and conductivity meters and desktop pH meter function correctly. Order replacement meters or sensors if required.
    - Check expiry date on calibration and storage solutions and order fresh solutions as required.

[1] Flow meters can be calibrated manually by the manufacturer prior to discharge. Calibration to MMER specifications is necessary. Spare flow meters may be obtained directly from the manufacturer(s) or supplier(s) as back-up. See Environment Canada's *Guidance Document for Flow Measurement of Metal Mining Effluents*, EPS 2/MM/4, April 2001.

4. Contact Analytical Lab
    - Calculate the number and type of sample bottles that will be required for the sampling of monitoring program stations taking into consideration quality control samples such as field duplicates and trip blanks.
    - Order bottles from the analytical laboratory. Request an empty cooler be sent to site each week until requested by LMI to stop.
    - Ensure at least four large coolers to have on site before prior to discharge.
5. Contact Bioassay Lab
    - At least one month prior to discharge (before approximately 15 June), contact bioassay lab and order two sets of containers required for the Static pass/fail bioassay for Rainbow Trout (20 L) and one set of containers required the MMER LC50 bioassay for Rainbow Trout (40L).
    - Ensure there are sufficient 1 L bottles on site for the *Daphnia Magna* bioassays (1L for Static pass/fail and 2 L for MMER LC50).
6. Collect Pre-Discharge Samples
    - Sample Pond 2 as soon as ice is off for pH and all parameters as listed in Table 2.2 of the *Water Quality Plan and Quality Assurance/ Quality Control Plan* (Appendix A) and submit to the lab.
    - If the sample from Pond 2 meets the discharge criteria listed in Table 3 below and the pH range is between 6 and 9, collect the static pass/fail bioassay for Rainbow Trout and *Daphnia* following the procedures outlined in the Monitoring Plan. If the sample results to not meet discharge criteria wait to submit the bioassay until pH is above 6 following lime treatment.
    - Bioassay sample point is internal station 102, located approximately 100 m upstream from the siphon intake. UTM coordinates: 7289875N, 486196E.
    - The bioassay samples must be collected the morning of the plane day to account for sample holding times (there is a 3-day limit between taking the sample and start of analysis).
    - Inform the lab when the samples are shipped.
    - A “Pass” result must be received for the static pass/fail bioassay, Pond 2 sample analysis results must not exceed the limits listed in Table 3 and the pH of Pond 2 can be stabilized between 6.0 and 9.5 prior to commencing discharge.
7. Commence Lime Treatment
    - If the pH of Pond 2 is below 6 water treatment is to commence with the addition of a dilute lime slurry.
    - The pH, temperature and conductivity of Pond 2 is to be profiled at 1 m intervals in depth at various locations, including station 102 and a site near the siphon intake, to monitor the treatment rate.
8. Contact Environment Canada
    - Provide notice to the Environment Canada Enforcement Officer at least thirty (30) days in advance of the collecting the MMER LC50 bioassay samples.

Ten (10) days prior to discharge (July)

If pH is between 6.0 and 9.5, the results from the bioassay pass, and effluent quality at in Pond 2 does not exceed the limits listed in Table 3 additional steps to commencing discharge are to be undertaken.

- Provide notice to the AANDC Inspector at least ten (10) days prior to initiating discharge from the TCA including an estimated volume proposed for discharge and the receiving location, and copy the Environment Canada Enforcement Officer.
- Commence daily pH measurements with the portable pH meter in Pond 2 near the siphon intake to verify pH stability.
- As weather allows continue to profile Pond 2 at various locations to verify homogeneity.
- Continue water treatment to maintain a consistent pH throughout Pond 2 (ideally between pH 6.5 and 9).

5.2.2 Discharge

The following procedures must be followed during discharge from the Tailings Containment Area (TCA):

1. The discharge from the TCA at Monitoring Station LUP-10 shall commence no sooner than 15 July of any calendar year unless otherwise approved by the Board in writing.
2. Measure pH in Pond 2 near the siphon intakes. If pH is between 6.0 and 9.5, the results from the Rainbow Trout and *Daphnia* bioassay tests pass, and effluent quality at LUP-10 does not exceed the criteria provided in Table 3 below, start the siphons.
3. The discharge rate from the TCA shall not exceed 70,000 cubic metres per day, unless otherwise approved by the Board in writing.
4. Record the following information for the Discharge Siphon Log:
   a. Date and time that the siphons were started,
   b. pH reading from the portable meter,
   c. Flow volume from each siphon, and
   d. General condition of the discharge point.
5. Enter all information in the Discharge Siphon Log spreadsheet.
6. Collect daily, weekly, and monthly samples at LUP-10, 20, 21, 22, 24 and 25 including quality control samples (field duplicates, trip blanks) as outlined in the sampling event schedule (Table 2.2) of the *Water Quality Plan and Quality Assurance/ Quality Control Plan*. Follow the sampling procedures outline in that Monitoring Plan (Appendix A).
7. Prepare samples for shipment to the lab on weekly flight following the procedures outlined in the Monitoring Plan. Each shipment must include at least one duplicate sample and one trip blank.
8. Continue water treatment to maintain a consistent pH throughout Pond 2 (ideally between pH 6.5 and 9).
9. If field pH measurement is <6.0 or >9.5 at LUP-10, IMMEDIATELY shut down the siphons, employ the Spill Contingency Plan, and notify the following:
   a. Environment Canada MMER enforcement officer at 867-669-4794 or 867-446-0924,
   b. AANDC inspector at 867-975-4548, and
   c. 24 Hour Spill Report Line at (867)920-8130.

10. Upon receipt of analytical results for LUP-10 from the lab, compare analytical results to the effluent quality criteria outlined in the Table 3 below. If results exceed the effluent quality limits IMMEDIATELY shut down the siphons, employ the Spill Contingency Plan, and notify the following:
    c. Environment Canada MMER enforcement officer at 867-669-4794 or 867-446-0924,
    a. AANDC inspector at 867-975-4548, and
    d. 24 Hour Spill Report Line at (867)920-8130.

Table 3: Monitoring station LUP-10 effluent quality criteria.

<table>
<tr><th>Parameter</th><th colspan="2">Maximum Average Concentration (mg/L)</th><th colspan="2">Maximum Concentration of any Grab sample (mg/L)</th></tr>
<tr><td>Total Arsenic</td><td colspan="2">0.50</td><td colspan="2">1.00</td></tr>
<tr><td>Total Copper</td><td colspan="2">0.15</td><td colspan="2">0.30</td></tr>
<tr><td>Total Cyanide</td><td colspan="2">0.80</td><td colspan="2">1.60</td></tr>
<tr><td>Total Lead</td><td colspan="2">0.10</td><td colspan="2">0.20</td></tr>
<tr><td>Total Nickel</td><td colspan="2">0.20</td><td colspan="2">0.40</td></tr>
<tr><td>Total Zinc</td><td colspan="2">0.40</td><td colspan="2">0.80</td></tr>
<tr><td>Total Suspended Solids</td><td colspan="2">15</td><td colspan="2">30</td></tr>
<tr><td>Oil and Grease</td><td colspan="4">Visual Sheen</td></tr>
<tr><td>pH</td><td colspan="4">6.0 to 9.5</td></tr>
<tr><th>Parameter</th><th>Max Mean Concentration</th><th colspan="2">Max Concentration in a Composite Sample</th><th>Max Concentration in a Grab Sample</th></tr>
<tr><td>Radium</td><td>0.37 Bq/L</td><td colspan="2">0.74 Bq/L</td><td>1.11 Bq/L</td></tr>
</table>

Legend

★ Project Location

Coordinate System: NAD_1983_UTM_Zone_12N

Map Sources/Notes:
Various Canadian Government Websites - Feb 2012

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Approved By: SH
Project No.: LUP
Prepared By: PW
Date Revised: 21 Mar 2012
File Name: Lup-12-10-01-LocationMap-A.mxd

Project: **Lupin Project**
Location: Kitikmeot Region, Nunavut, Canada
Lupin Mine Annual Report - Water Licence 2AM-LUP0914

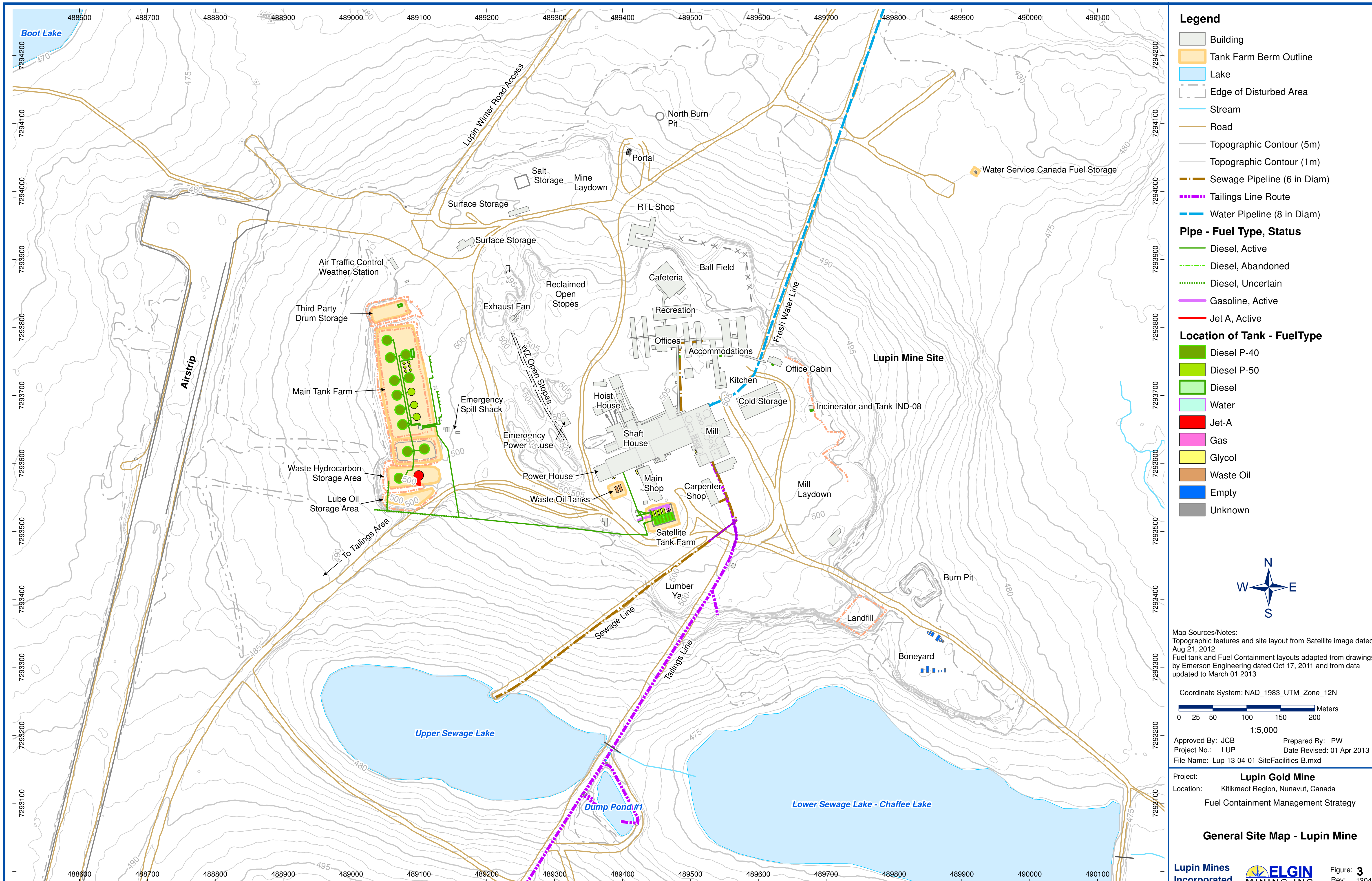
Location Map - Lupin Mine

Lupin Mines Incorporated

ELGIN MINING INC.

Figure: 1
Rev: 120321

Legend
Building
Lake
Stream
Road
Contour (10m)
Tailings Line Route
Fuel Pipe
Boundary of Surface Lease 3594
Cell Areas
Location of Thermistor
Road to Explosives Magazine
Environment Canada Satellite Dish
Dam 2 Lake
Dam 1 Lake
Lori Lake
Norma Lake
Ferguson Lake
Long Lake (Decant Lake)
Boomerang Lake
Der Lake
Fox Lake
Chain Lakes
End Lake
Black Lake
D2-00-2N
D2-00-3S
D1A-00-2N
D1A-00-1S
DK-3
TC3-1
TC1-6
TC1-3
TC1-7
D3D-1
D4-1
D4-4
D4-3
Dam 2
Dam 1A
Dam 1B
Dam 1C
Dam 6
Dam 5
Dam 4
Dam 3
Dam 3C
Dam 3E
Dam 3D
Dam X
N Dam
M Dam
J Dam
K Dam
Divider Dike
Proposed Dam
Cell 5
Cell 1A
Cell 2
Cell 1
Cell 3A
Cell 3B
Cell 3
Cell 4
Tailings Pond 1
Tailings Pond 2
Syphons
Syphons Discharge to Environment
Arsenic Treatment Plant
Tailings Containment Area
Tailings Containment Area
N
W
E
S
Map Sources/Notes:
Topographic features and site layout from Satellite image dated Aug 21, 2012
Coordinate System: NAD_1983_UTM_Zone_12N
Meters
0 50 100 200 300 400 500
1:12,500
Approved By: JCB
Project No.: LUP
Prepared By: PW
Date Revised: 15 Apr 2013
File Name: Lup-13-08-02-TailingsArea-B.mxd
Project: Lupin Gold Mine
Location: Kitikmeot Region, Nunavut, Canada
Mine Tailings Containment Area
Lupin Mines Incorporated
ELGIN MINING INC.
Figure: 2
Rev: 130415


Boot Lake
Lupin Winter Road Access
North Burn Pit
Portal
Salt Storage
Mine Laydown
Surface Storage
RTL Shop
Water Service Canada Fuel Storage
Surface Storage
Air Traffic Control Weather Station
Exhaust Fan
Reclaimed Open Stopes
Ball Field
Cafeteria
Recreation
Fresh Water Line
Third Party Drum Storage
Airstrip
WZ Open Stopes
Offices
Accommodations
Office Cabin
Lupin Mine Site
Main Tank Farm
Emergency Spill Shack
Kitchen
Hoist House
Cold Storage
Incinerator and Tank IND-08
Shaft House
Mill
Emergency Power House
Waste Hydrocarbon Storage Area
Power House
Main Shop
Carpenter Shop
Mill Laydown
Lube Oil Storage Area
Waste Oil Tanks
Satellite Tank Farm
To Tailings Area
Burn Pit
Lumber Yard
Landfill
Sewage Line
Boneyard
Tailings Line
Upper Sewage Lake
Dump Pond #1
Lower Sewage Lake - Chaffee Lake
Legend
Building
Tank Farm Berm Outline
Lake
Edge of Disturbed Area
Stream
Road
Topographic Contour (5m)
Topographic Contour (1m)
Sewage Pipeline (6 in Diam)
Tailings Line Route
Water Pipeline (8 in Diam)
Pipe - Fuel Type, Status
Diesel, Active
Diesel, Abandoned
Diesel, Uncertain
Gasoline, Active
Jet A, Active
Location of Tank - FuelType
Diesel P-40
Diesel P-50
Diesel
Water
Jet-A
Gas
Glycol
Waste Oil
Empty
Unknown
N
W
E
S
Map Sources/Notes:
Topographic features and site layout from Satellite image dated Aug 21, 2012
Fuel tank and Fuel Containment layouts adapted from drawings by Emerson Engineering dated Oct 17, 2011 and from data updated to March 01 2013
Coordinate System: NAD_1983_UTM_Zone_12N
Meters
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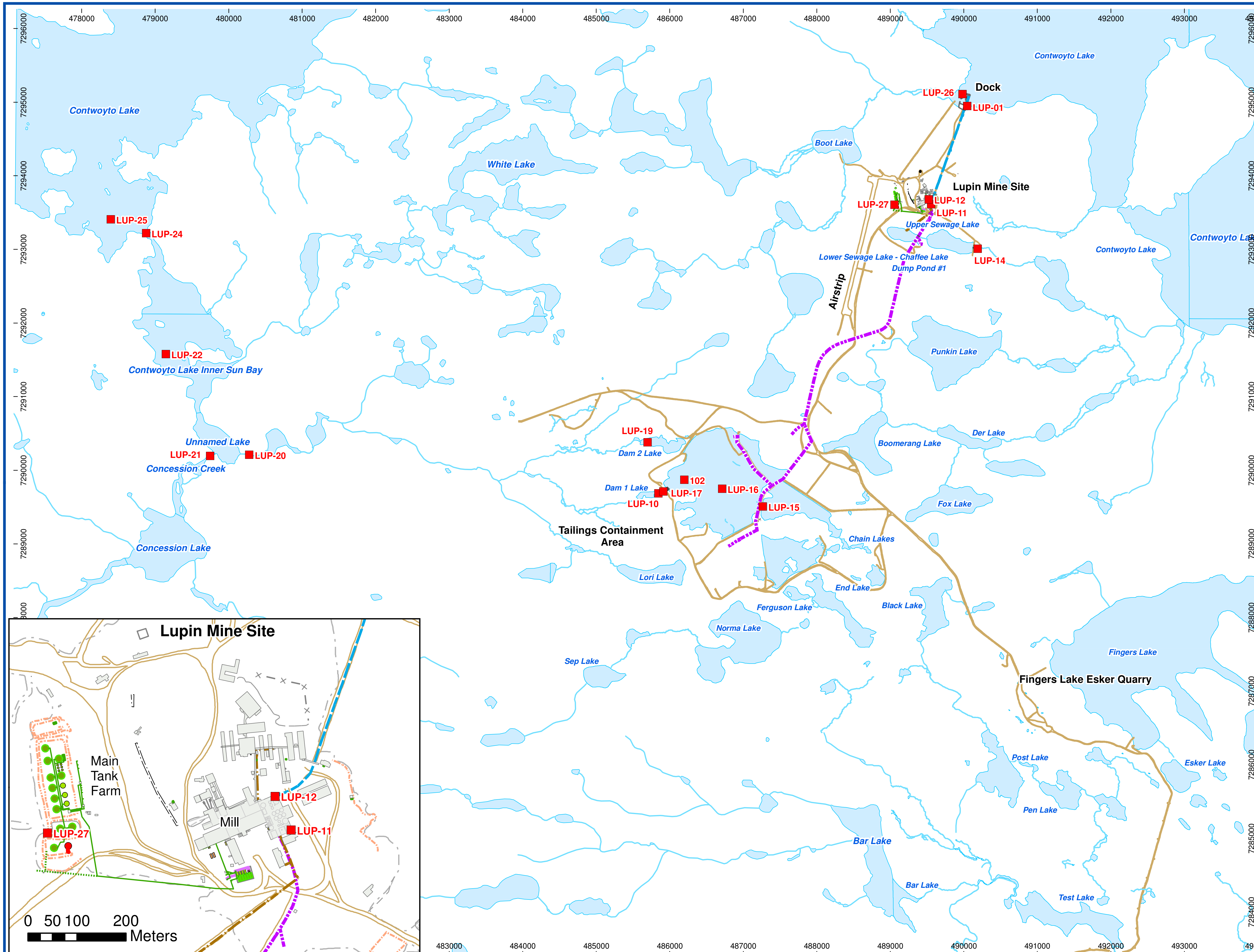
1:5,000
Approved By: JCB
Prepared By: PW
Project No.: LUP
Date Revised: 01 Apr 2013
File Name: Lup-13-04-01-SiteFacilities-B.mxd
Project: Lupin Gold Mine
Location: Kitikmeot Region, Nunavut, Canada
Fuel Containment Management Strategy
General Site Map - Lupin Mine
Lupin Mines Incorporated
ELGIN MINING INC.
Figure: 3
Rev: 130401



Legend

- Building
- Lake
- Stream
- Road
- Sewage Pipeline (6 in Diam)
- Tailings Line Route
- Water Pipeline (8 in Diam)
- Water Sampling & Discharge Location

N / W / E / S

Map Sources/Notes:
Topographic features and site layout from Satellite image dated Aug 21, 2012
Fuel tank and Fuel Containment layouts adapted from drawings by Emerson Engineering dated Oct 17, 2011 and from data updated to March 01 2013

Coordinate System: NAD_1983_UTM_Zone_12N

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Approved By: AL	Prepared By: PW
Project No.: LUP	Date Revised: 15 Apr 2013
File Name: Lup-13-08-04-MonProgramStat-A.mxd	

Project: **Lupin Gold Mine**
Location: Kitikmeot Region, Nunavut, Canada

Monitoring Program Stations

Lupin Mines Incorporated

ELGIN MINING INC.

Figure: 4
Rev: 130415

Appendix A: Water Quality Monitoring Plan and Quality Assurance/ Quality Control Plan

Lupin Mines Incorporated

A wholly owned indirect subsidary of Elgin Mining Inc.

Lupin Mine Site

Nunavut, Canada

Water Quality Monitoring Plan and Quality Assurance/ Quality Control Plan

(Care and Maintenance)

March 2013

Lupin Mines Incorporated
Elgin Mining Inc.
#201 - 750 West Pender Street
Vancouver, BC, V6C 2T7

Document Control

Revision No.	Date	Details	Author	Approver
1.0	30/03/13	Replaces Care and Maintenance Plan – *Sampling Procedure: Tailings Containment Area and Sewage Lakes Disposal Facility*, March 2012. Replaces the *Environmental Laboratory Quality Assurance / Control Plan*, Prepared: March 1993, Revised: December 1995. Update contact and general information. Revised to include bioassay sample requirements.	D. Vokey	W. Osborne

Table of Contents

Tables

Figures

Appendices

1 Introduction

Lupin Mines Incorporated (LMI), an indirect wholly owned subsidiary of Elgin Mining Inc. (Elgin), has prepared this Water Quality Monitoring Plan and Quality Assurance / Quality Control Plan (the Plan).

An annual review of the Plan takes place and revisions are submitted as necessary with the annual report. The current Type A Water Licence 2AM-LUP0914 (Water Licence) for the Lupin Gold Mine (Lupin or the Lupin Mine or the Site) is valid until March 31, 2014 and has been kept in good standing.

1.1 Project and Company Information

Elgin is a Canadian based company focused on the production at the Björkdal Gold Mine located in Sweden, and the exploration and development of the Lupin Gold Mine and Ulu Gold Project, both located in Nunavut, Canada.

Elgin purchased LMI, which owns the Lupin Mine, from MMG Resources Ltd. in July 2011. Lupin was in operation from 1982 to 2005 with temporary suspensions of activities between January 1998 and April 2000, and again between August 2003 and March 2004. The mine resumed production in March 2004 until February 2005. Since 2005, the Site has remained in Care and Maintenance.

General site maintenance and facilities upgrades are underway at the Lupin Mine in preparation for an underground exploration program. The activities underway were screened by the Nunavut Impact Review Board under file 99WR053 and approved by the Nunavut Water Board under Water Licence 2AM-LUP0914. Surface exploration is conducted under Water Licence 2BE-LEP1217. All camp infrastructure required for the surface exploration program currently exists at the Lupin Mine.

Company:	LMI
Project:	Lupin Mine, Nunavut
Company Address:	201 – 750 W Pender St, Vancouver, BC, V6C 2T7
Telephone:	604-682-3366
Email:	wosborne@elginmining.com
Attention:	Wayne Osborne, Project Manager
Effective date:	30 March 2013
Distribution List:	
Patrick Downey	Chief Executive Officer
Jim Currie	Chief Operations Officer
Peter Tam	Chief Financial Officer
Wayne Osborne	Project Manager
Michele Jones	Manager, Corporate Affairs
David Vokey	Sr. Environmental Coordinator
Karyn Lewis	General Administration

Additional copies of this Plan are available from General Administration. The Plan is available at the LMI Environment Department office and a notice is posted in key locations at the site indicating where they can be found. All employees and contractors will be made aware of its contents.

1.2 Site Location

The Lupin Mine is located in Kitikmeot Region, Nunavut, 400 km north of Yellowknife, Northwest Territories and 285 km southeast of Kugluktuk. The airport serving this Site is at 65° 46'00" N and 111° 14'41" W. The Site is on the western shore of Contwoyto Lake, approximately 60 km south of the Arctic Circle (Figure 1).

1.3 *Environmental and Sustainable Development Policy*

Elgin Mining Inc. and its subsidiaries (collectively, "Elgin Mining") are committed to maintaining a safe, clean, compliant and respectful work environment. Elgin Mining looks to our employees, contractors and managers to adopt and grow a culture of social responsibility and environmental excellence. Together we achieve this by:

- Promoting environmental stewardship in all tasks. Nothing is too important that it cannot be done in a clean and responsible manner. We strive towards maintaining a zero-incident work place.
- Recognizing that we have a shared responsibility as stewards of the environment in which we operate. We will not walk away from a non-compliant act.
- Identifying, managing and mitigating environmental, business and social risks in an open, honest and transparent manner.
- Planning our work so it is done in the cleanest possible manner and executing work according to plan.
- Continually improving environmental and operational performance by setting and reviewing achievable targets.
- Providing appropriate and necessary resources in the form of training, personnel and capital, including that required for closure planning and reclamation.
- Managing our materials and waste streams, maintaining a high degree of emergency response preparedness and minimizing our operational footprint to maintain environmental protection at all stages of project development.
- Procuring goods and services locally, where available, and favouring suppliers with environmentally and socially responsible business practices.
- Seeking to understand, learn from and mitigate the root causes of environmental incidents and near misses when they do occur.
- Employing systems and technology to achieve compliance, increase efficiency and promote industry best practices in development, operations and environmental stewardship.
- Working with stakeholders to identify and pursue opportunities for sustainable social and economic development and capacity building.

- Conducting early and ongoing stakeholder engagement relevant to the stage of project and mine development and operation.
- Recognizing diversity in the workplace and building meaningful relationships with all stakeholders in a timely, collaborative and transparent manner.

Through implementation of this policy, Elgin Mining seeks to earn the public's trust and be recognized as a respectful and conscientious employer, neighbor and environmental steward.

Approved by the Board of Directors on August 10th, 2012

1.4 Purpose and Scope

This Plan is an appendix to the Care and Maintenance Plan. The purpose of this Plan is to identify water quality monitoring requirements for the Site and minimize the impacts of potential sampling and analytical errors by providing a set of standardized procedures for sampling, analysis and reporting. These procedures are to be implemented by any personnel involved in monitoring for the purpose of regulatory compliance or internal environmental management.

The Plan documents Quality Assurance (QA) and Quality Control (QC) procedures for the Lupin Mine Monitoring Program as required by Type A Water Licence 2AM-LUP0914 Part J, Items 5, 6 and 7. The Plan also documents QA/QC procedures for the Lupin Mine Monitoring Program as required by the *Metal Mine Effluent Regulations* (MMER) under the *Fisheries* Act Part 2 Division 1 Item 11 and Part 2 Division 2 Items 12(2), 14(1), 17(1), and 19(3).

QA/QC planning has been developed in accordance with the Indian and Northern Affairs Canada (INAC), *Quality Assurance (QA) and Quality Control (QC) Guidelines for use by Class 'A' Licensees in meeting SNP Requirements and for Submission of a QA/QC Plan*, July 1996 which defines QA and QC as follows:

> Quality Assurance: is the system of activities designed to better ensure that quality control is one effectively.
>
> Quality Control: is the use of established procedures to achieve standards of measurement for the three principal components of quality: precision, accuracy and reliability.

Overall this Plan outlines field sample collection procedures including sampling requirements and methods; field sample identification, preservation and transport procedures; field sampling quality control measures; analytical laboratory information; and reporting requirements.

2 Field Sampling

2.1 Sample Collection

2.1.1 Sampling Station Locations, Requirements and Parameters

Sampling station locations, requirements, and parameter analyses are set out in the Type A Water Licence 2AM-LUP0914 Table 1 of Schedule J and in the MMER Part 2 Division 2 Items 12 thru 18 and Schedules 4 and 5.

Generally, samples are required from the following locations:

- Freshwater intake at Contwoyto Lake,
- Tailings Containment Area (TCA):
    - TCA prior to discharge;
    - TCA during discharge;
    - Reference areas; and
    - Downstream exposure areas,
- Sewage Lakes Disposal Facility, and
- Bulk Fuel Storage Facility.

The monitoring requirements outlined in the Water Licence and MMER effluent monitoring requirements are outlined in Table 1. Water sampling under the Environmental Effects Monitoring Program of the MMER will accompany any planned discharges from the TCA.

A sample event schedule is also provided in Table 2 which outlines the Water Licence and MMER effluent monitoring requirements as well as field monitoring and QC sample requirements (see Section 3 of this Plan for more details about QC monitoring). This table is intended to serve as a guide to on-site personnel with sampling responsibilities.

Regulatory authorities are to be notified of planned discharge events. Table 3 provides the notification schedule.

Table 1: Sample collection requirements

Station	Description	Samples											Frequency
		Routine[1]	Total Metals[2]	Nutrient [3]	Hg	CN	^{226}Ra [6]	BOD_5 [7]	Faecal Coliform	Bio-assay[8]	BTEX [9]	OG [10]	
LUP-01	Freshwater intake from Contwoyto Lake	pH, Conductivity, TSS	X		X				X				Annually
LUP-10	TCA Pond 2 discharge at Dam 1A	pH, TSS	X			X							Daily during periods of discharge
		Daily	Daily	NH_4			X						Weekly during periods of discharge
		Daily, hardness, Alkalinity, NO_2, NO_3	Daily	Weekly		X				X			Monthly (no less than one month intervals) beginning at start of decant
LUP-10/ 102 [11]	Internal station in TCA Pond 2 approximately 100 m upstream from siphon intake.	X	X	X	X	X	X			Static pass/ fail test			Twice per year, prior to initiation of decant and just prior to termination of decant
LUP-11	Minewater discharge at automatic sampler in the mill	INACTIVE											
LUP-12	Mill tailings taken at the mill	INACTIVE											
LUP-14	Decant structure from the Sewage Lakes Disposal Facilities	pH, TSS, Alkalinity, Hardness, NO_2, NO_3	X	NH_4, TKN, TP, OPO_4				X	X				First day of discharge and then monthly thereafter during periods of flow
LUP-15	Discharge from TCA Pond 1 (east pond) into TCA Pond 2 (west pond)	INACTIVE											
LUP-16	TCA Pond 2 at center	INACTIVE											
LUP-17	TCA Pond 2 upstream of station LUP-10	INACTIVE											
LUP-19	East end of Seep Creek in Dam 2 Lake	INACTIVE											
LUP-20	West end of Seep Creek before discharge into Unnamed Lake	pH, TSS, Alkalinity, hardness	X	NH_4		X							Weekly during discharge from the TCA

Station	Description	Samples											Frequency
		Routine[(1)]	Total Metals[(2)]	Nutrient [(3)]	Hg	CN	^{226}Ra [(6)]	BOD_5 [(7)]	Faecal Coliform	Bio-assay[(8)]	BTEX [(9)]	OG [(10)]	
LUP-21	North end of Concession Creek before discharge into Unnamed Lake[(12)]	pH, TSS, Alkalinity, hardness	X	NH_4		X							Weekly during discharge from the TCA
		Weekly, NO_3	X	Weekly		X	X						Monthly at mid-depth and when bioassay sample is collected at LUP-10 just prior to termination of decant
LUP-22	Inner Sun Bay near centre midway between end of peninsula and west shore	pH, TSS, Alkalinity, hardness	X	NH_4		X							Weekly at mid-depth, commencing one week prior to discharge from the TCA and concluding two weeks after cessation of discharge
LUP-24	Inner Sun Bay near narrows[(12)]	pH, TSS, Alkalinity, hardness	X	NH_4		X							Weekly at mid-depth, commencing one week prior to discharge from the TCA and concluding two weeks after cessation of discharge and when bioassay sample is collected at LUP-10 just prior to termination of decant
		Weekly, NO_3	X	Weekly		X	X						Monthly at mid-depth
LUP-25	Outer Sun Bay	pH, TSS, Alkalinity, hardness	X	NH_4		X							Weekly at mid-depth commencing one week prior to discharge from the TCA and concluding two weeks after cessation of discharge
LUP-26	Contwoyto Lake in bay east of water intake	INACTIVE											
LUP-27	Bulk Fuel Storage Facility	pH, TSS, Alkalinity, hardness, NO_2, NO_3	X	NH_4							X	X	Once prior to discharge and weekly during periods of discharge

Notes:

(1) Routine sampling may include analyses for pH, temperature, Total Suspended Solids, alkalinity, hardness, Nitrite (NO_2), Nitrate (NO_3);
(2) Total metals refers to a whole suite of metals unless otherwise specified;
(3) Nutrient means Ammonium (NH_4), Total Kjeldahl Nitrogen (TKN), Total Phosphorus (TP), and Orthophosphate (OPO_4);
(7) BOD_5 means five (5) day Biological Oxygen Demand;
(8) Bioassay means static pass/fail bioassay for both rainbow trout and *Daphnia* species under the Water Licence and acute lethality testing and *Daphnia magna* monitoring tests under the MMER;
(9) BTEX means Benzene, Toluene, Ethylbenzene and Xlyene
(10) OG means Oil and Grease;
(11) Water licence erroneously refers to this station as LUP-10; and
(12) Field temperature and dissolved oxygen are also required.

Table 2: Sampling event schedule.

Sampling Events	Station	Samples and Parameters	Quality Control[1]
TAILINGS CONTAINMENT FACILITY			
One month prior to discharge	Station 102	Field pH, temperature, conductivity	1 field duplicate
		pH, TSS, alkalinity, hardness, NO_2, NO_3	
		Total Metals	
		CN (total cyanide)	
		NH_4	
		Total Hg	
		^{226}Ra	
Daily during water treatment prior to discharge	Station 102	Field pH, temperature and conductivity	
Upon receipt of results meeting discharge criteria and not less than one week prior to discharge	Station 102	Static pass/ fail Bioassay	
One week prior to discharge	Station 102	Field pH, temperature, and conductivity (Daily)	1 field duplicate
		Field observation of visual sheen	
	LUP-22, 24, 25 (at mid-depth)	pH, TSS, alkalinity, hardness	
		Total Metals	
		NH_4	
		CN	
Daily during discharge	LUP-10	Field pH, temperature, and conductivity	1 field duplicate per week
		Field observation of visual sheen	
		flow rate m^3	
		pH and TSS	
		CN	
		Total Metals (As, Cu, Zn)	
First day of discharge [2] (in addition to daily sampling)	LUP-10	Alkalinity, Hardness, NO_2, NO_3	1 field duplicate
		NH_4	
		Total Metals	
		Total Hg	
		MMER Bioassay LC50	
		^{226}Ra	
		Field dissolved oxygen	
	LUP-20, 21 (surface), LUP-22, 24, 25 (at mid-depth)	pH, TSS, alkalinity, hardness	
		Total Metals	
		NH_4	
		CN	
	LUP-21 (surface), LUP-24 (at mid-depth)	NO_3	
		Total Hg	
		^{226}Ra	
		Field pH, temperature, conductivity, dissolved oxygen	

Sampling Events	Station	Samples and Parameters	Quality Control[1]
Weekly during discharge (in addition to daily sampling)	LUP-10	Alkalinity, hardness, NO_2, NO_3	1 field duplicate
		NH_4	
		Total Metals (Pb, Ni, Cd)	
	LUP-20, 21 (surface), LUP-22, 24, 25 (at mid-depth)	pH, TSS, alkalinity, hardness	
		Total Metals	
		NH_4	
		CN	
Monthly during discharge (in addition to daily and weekly sampling)	LUP-10	Total Metals	1 field duplicate
		MMER Bioassay LC50	
		Total Hg	
		^{226}Ra	
		Field dissolved oxygen	
	LUP-21 (surface), LUP-24 (at mid-depth)	NO_3	
		Total Hg	
		^{226}Ra	
		Field pH, temperature, conductivity, dissolved oxygen	
Last day of discharge (in addition to daily sampling)	LUP-10	Static Pass/ Fail Bioassay	
Weekly for two weeks following termination of discharge	LUP-22, 24, 25 (at mid-depth)	pH, TSS, alkalinity, hardness	1 field duplicate
		Total Metals	
		NH_4	
		CN	
SEWAGE LAKES DISPOSAL FACILITY			
Three weeks prior to discharge	LUP-14	Field pH, temperature, conductivity	1 field duplicate
		Field observation for visual sheen	
		pH, TSS, alkalinity, hardness, NO_2, NO_3	
		Total Metals (As, Cd, Cu, Ni, Pb, Zn)	
		Nutrient for NH_4, TKN, TP, OPO_4	
		BOD_5	
		Faecal Coliforms	
Daily during discharge	LUP-14	Field flow rate in m^3	
		Field pH, temperature, conductivity	
		Field observation for visual sheen	
First day of discharge[2] and Monthly thereafter (in addition to daily sampling)	LUP-14	pH, TSS, alkalinity, hardness, NO_2, NO_3	1 field duplicate
		Total Metals	
		BOD_5	
		Faecal Coliforms	
		Nutrient for NH_4, TKN, TP, OPO_4	

Sampling Events	Station	Samples and Parameters	Quality Control[1]
FRESHWATER INTAKE FACILITY			
Daily during intake	LUP-01	Field flow rate in m^3	
Annually		Field pH, temperature, conductivity,	1 field duplicate
		pH, TSS	
		Total Metals (As, Cd, Cu, Ni, Pb, Zn)	
		Total Hg	
		Faecal Coliforms	
BULK FUEL STORAGE FACILITY			
One week prior to discharge (RUSH 48 hour turnaround for sample results are to be requested of the laboratory)	LUP-27	Field pH, temperature, conductivity	1 field duplicate
		Field observation for visual sheen	
		pH. TSS	
		Total Lead	
		Total Oil and Grease	
		BTEX	
		Nutrient for NH_4	
Daily during discharge		Field flow rate in m^3	
		Field pH, temperature, conductivity	
		Field observation for visual sheen	
Weekly during discharge (in addition to daily testing)		Field pH, TSS	1 field duplicate
		Total Lead	
		Oil and Grease	
		BTEX	
		Nutrient for NH_4	

Notes:

(1) Duplicate samples must be collected for approximately every ten (10) field samples collected across the range of parameters. At least one duplicate must be submitted per sample shipment.

(2) Samples are be collected on the morning of the next plane departure after discharge commences.

Table 3: Discharge notification schedule.

Discharge Event	Schedule	Action Required
TAILINGS CONTAINMENT AREA	30 days prior to MMER Bioassay	Provide notice to Environment Canada of planned sample date.
	10 days prior to discharge	Provide notice to the AANDC inspector, include analytical results and estimated volume of discharge.
LOWER SEWAGE LAKE	10 days prior to discharge	Provide notice to the AANDC inspector, include analytical results and estimated volume of discharge.
BULK FUEL STORAGE FACILITY	10 days prior to discharge	Provide notice to the AANDC inspector and estimated volume of discharge [1]. Analytical results will be provided upon receipt and no discharge to occur prior to AANDC acknowledgment of receipt.

Note:

(1) Discharge from the bulk fuel storage facilities needs to commence as soon as possible when water starts accumulating in the spring.

Active monitoring (sampling) station locations as shown in Figure 2.1 are clearly identified in the field with permanent stakes and appropriate signage.

Samples must always be collected from the same locations, unless the sampling locations are relocated at the request of the designated AANDC Inspector or sampling location modifications are approved in writing by the Nunavut Water Board.

The following Table 4 summarizes the current UTM coordinates of the active sampling locations:

Table 4: Water quality monitoring program station locations.

Monitoring Station No.	Description	UTM Northing	UTM Easting
LUP-01	Freshwater intake from Contwoyto Lake	7294933	490030
LUP-10	TCA Pond 2 discharge at Dam 1A	7289689	485843
LUP-14	Decant structure from the Sewage Lakes Disposal Facilities	7293013	490187
LUP-20	West end of Seep Creek before discharge into Unnamed Lake	7290197	480149
LUP-21	North end of Concession Creek before discharge into Unnamed Lake	7290217	479841
LUP-22	Inner Sun Bay near centre midway between end of peninsula and west shore	7291749	479175
LUP-24	Inner Sun Bay near narrows	7293121	479017
LUP-25	Outer Sun Bay	7293765	478352
LUP-27	Bulk Fuel Storage Facility	7293609	489072
Station 102	Approximately 100 m upstream from the siphon intake in TCA Pond 2	7289875	486196

2.1.2 Field Measurements and Field Log Book

Where required by the monitoring program, pH, temperature and, conductivity and dissolved oxygen of water is measured and recorded in the field directly from the water body being sampled wherever possible. Where it is not possible to take field measurements directly from the water body, the measurements can be taken from the sample bottle.

The pH and conductivity meters must be calibrated in advance of each day's sampling activities according to the manufactures instructions, using fresh standard calibration solutions. Any discrepancies must be recorded in the Field Log Book along with the sampling data; however recorded field measurements must not be altered due to calibration issues. Refer to the pH and conductivity meter manuals for instructions regarding how to calibrate and take measurements with the particular devices.

Details of all sampling activities are recorded in the Field Log Book including:

- Date and time of each sample collected,
- Sampling location visited,
- Weather conditions and air temperature,
- Flow rates where applicable,
- Integrity of sample location and water observations,

- Samples collected at each location including identification number (see Section 2.2), whether the sample will be submitted for analysis, and type of analysis as well and sample preservation measures,
- Sample depth where applicable, and
- Field measurements (i.e. pH, conductivity, temperature, dissolved oxygen) as well as any calibration discrepancies with the field meters.

Immediately following field activities, an electronic copy of the Field Log data must be made. Field log entries in the Field Log Book must not be altered; pages must not be removed; space or pages left blank must be labeled as such and crossed with a diagonal line; and errors must be crossed out, not erased.

2.1.3 Sample Containers

Sample container sizes and materials of construction depend upon the parameter(s) of the sample to be analyzed. A summary of sample container requirements for various parameters is provided in Table 2.5 (Section 2.3 of this Plan).

All water quality sample containers will be prepared and supplied by the contracted laboratory. Only clean, unused containers should be used to limit contamination and preservation errors. Samples analyzed for faecal coliform tests must be contained in bottles provided by the laboratory to ensure that the bottle is sterilized prior to use. Toxicity samples are to be collected in food grade containers, such as water jugs or buckets. The food grade containers must be thoroughly cleaned and rinsed and then triple rinsed with the sample water prior to being filled.

2.1.4 Sampling Methods

Water quality sampling methods are as follows:

- Record details of the sampling activity and field measurements in the Field Log Book (see Section 2.1.2 for details).
- In the field, disposable nitrile sampling gloves must be worn during handling of all the bottles and equipment.
- Triple rinse sample bottles with the source water prior to sample collection, except for those bottles with preservative already added by the laboratory (i.e. BTEX), as well as those bottles for Oil and Grease or Feacal Coliform analysis.
- Collect samples off-shore as much as possible without disturbing bottom sediments.
- When collecting samples from flowing bodies of waters (i.e. stream, creeks):
    - The sample must be collected as close as possible to the middle of the flowing water body. To prevent the stirring up of sediment, use a container attached to a pole extension. Otherwise, if wading into the stream is unavoidable, wait for the sediment to settle or flow away before collecting the sample.
    - When rinsing, plunge the sample bottle into the flowing water toward the current allowing it to fill at a depth of approximately half the stream depth. If the stream depth is too shallow to collect a clean sample without disturbing sediment or too shallow to fill the bottle completely, use a smaller bottle and transfer the water to the larger sample bottle.

  - Empty rinse water downstream of the sample locations so as not to disturb sediments.

- When collecting samples from surface water bodies (ponds, lakes) follow the same procedures as above for flowing bodies of water, ensuring that subsequent samples are collected at the same location, and by plunging the sample bottle into the water to a depth of about six (6) inches below the water surface.
- Sample bottles must be filled with room left for preservative addition and mixing. Add preservatives after filling as directed by the laboratory (unless the bottle was provided pre-loaded with preservatives by the laboratory).
- Record field measurements (pH, temperature, conductivity, dissolved oxygen) and any deviations from the sample collection method in the Field Log Book.

2.2 Sample Identification

All water samples must be provided with a unique sample identification number based on the following example:

Example: LUP-22-130801-50

LUP-22 Refers to the monitoring station.

130801 Refers to the date that the sample was collected (yy/mm/dd). In this example the date the sample was collected was August 1, 2013.

50 Refers to the depth in centimeters from surface which the same was collected. If the depth of the sample is not applicable do not include the suffix.

Sample labels including at a minimum: sample identification number, location, date, and parameters for analyses should be prepared as much as possible before entering the field for the sampling event with a waterproof, non-smear pen. Then, sample labels, bottles and preservatives should be packed, preferably in a cooler to maintain constant temperature, for transport to the field.

Sample bottle labels must be clearly and consistently labeled prior to being sent to the external laboratory with the following information:

- Company name,
- Site name,
- Sample Station Number,
- Sample Number,
- Sample Date and Time, and
- Analysis required.

Quality Control (QC) samples (i.e. field blanks, trip blanks, duplicates) are provided with unique sample identification numbers and note of the sample as a QC sample is recorded in the Field Log Book.

2.3 Sample Preservation

Water quality samples must be preserved, either by laboratory issued chemical preservative or temperature control, immediately following sample collection to ensure that the quality of the water sample remains similar to the source water. The following Table 2.5 summarizes the required containers, preservatives, holding times, and minimum sample volumes for each parameter as outlined in ALS Environmental's Western Canada Sampling/ Handling Guide, May 2012.

Table 5: Required sample containers, preservation, holding times, and sample volumes for analysis of specific parameters.

Parameter	Container Type	Preservative	Holding Time	Min. Sample Volume
pH (1,6)	0.5 – 1 L plastic	4° C	0.25 hours	50 mL
TSS (1)	0.5 – 1 L plastic	4° C	7 days	200 mL
Conductivity (1,6)	0.5 – 1 L plastic	4° C	28 days	50 mL
Total Metals and Hardness (2,5)	250 mL plastic	3 mL 1:3 Nitric Acid	6 months	200 mL
Mercury	250 mL plastic	3 mL 1:3 Nitric Acid	28 days	50 mL
$Radium^{226}$	1 L plastic	9 mL 1:3 Nitric Acid	6 months	1 L
Cyanide (Total, WAD or Free)	250 – 500 mL plastic	1 – 2 mL 6N Sodium Hydroxide	14 days	100 mL
Cyanide (Total or WAD (low level))	1 L plastic	3 mL 6N Sodium Hydroxide	14 days	750 mL
Alkalinity (1)	0.5 – 1 L plastic	4° C	14 days	150 mL
Total Ammonia Nitrogen	250 mL plastic/glass	1 mL 1:1 Sulphuric Acid	28 days	100 mL
Nitrate, Nitrite, Ammonia (unpreserved) (1)	0.5 – 1 L plastic	4° C	2 days	50 mL
Kjeldahl or Organic Nitrogen	250 mL plastic or glass	1 mL 1:1 Sulphuric Acid	28 days	200 mL
Total Nitrogen	250 mL plastic or glass	1 mL 1:1 Hydrochloric Acid	28 days	200 mL
Total Phosphorus	250 mL plastic	1 mL 1:1 Sulphuric Acid	28 days	100 mL
Ortho Phosphate(1)	0.5 – 1 L plastic	4° C	2 days	50 mL
BOD_5 (1)	0.5 – 1 L plastic	4° C	2 days	500 mL
Faecal Coliforms	250 mL sterilized plastic	Sodium Thiosulphate	30 hours	250 mL
Oil and Grease	2 x 0.5-1 L amber glass	2 mL 1:1 HCL or 1:1 H_2SO_4	28 days	1 L
BTEX (3,4)	2-3 x 40 mL glass vials	Sodium Bisulphate or Thiosulphate	14 days	40 mL
Daphnia Magna (pass/fail, LC50) (7)	1-2 L glass or plastic	4° C	5 days	1 – 2 L
Rainbow Trout (pass/ fail, LC50) (8)	1-2 20 L bladder	4° C	5 days	20 – 40 L

Notes:

(1) Parameters may be analyzed from a single unpreserved bottle.
(2) For dissolved parameters, samples must be field filtered before preservation.
(3) 40 mL glass vials must be filled with no headspace. May contain preservative. Do not pre-rinse with sample. If sample is chlorinated use thiosulphate preservative.
(4) All volatile organics in water (chlorinated aromatics, BTEX, volatile organics, THMs and halogenated aliphatics) can be analysed from the same set of vials. Consult ALS whether 2 or 3 vials are required.
(5) If field filtering is not possible, or poses unacceptable risks for sample contamination, then send the samples unfiltered to and unpreserved to the laboratory as soon as possible.
(6) Testing in the field is recommended.
(7) For Daphnia Magna (LC50), require 2 L minimum volume. For Daphnia Magna (Pass/Fail), require 1 L minimum volume.
(8) For Rainbow Trout (LC50), 2 x 20 L bladder and 40 L minimum volume required. For Rainbow Trout (Pass/Fail), 1 x 20 L bladder and 20 L minimum volume required.

2.4 Sample Transportation

Sample integrity will be preserved from the time of sample collection to completion of delivery to the laboratory by limiting exposure of samples to heat, light, and agitation.

Sample bottles will be packed standing upright and immobile in a new or laboratory issued portable cooler. Samples suspected of elevated contaminant levels, such as a sewage sample, will be shipped separately from clean samples. All samples will be stored and transported at 10°C to 1°C in the coolers with ice packs and the cooler will be securely closed prior to shipping. Samples will be shipped as soon as possible following sample collection with appropriate transportation instructions such as “refrigerate” and “do not freeze”.

2.5 Chain of Custody Forms

A Chain of Custody Form containing the following information is completed by the sampler for every cooler shipment of samples:

- Company name and contact information,
- Analytical laboratory name, address , and contact person,
- Invoicing instructions,
- Report format requested,
- Project information,
- Sampler’s name,
- Sample identification number, time and date of sampling, sample type, and analyses requested,
- Any special instructions, and
- Name of person releasing the shipment as well as date and time of release. Each person relinquishing and receiving the samples, including the courier, must sign the Chain of Custody form.

Each cooler shipped must have a Chain of Custody form indicating those samples contained in the particular cooler. Chain of Custody forms should be enclosed in a Ziploc bag to protect them from possible water damage during shipment.

One copy of the Chain of Custody form is included with the shipment and one copy must remain at the mine site for recording keeping. An example of the Chain of Custody Form is provided in Appendix A.

3 Field Quality Control

3.1 Trip or Travel Blanks

Travel blanks are supplied and shipped by the laboratory to test for possible contamination that might arise during the handling, transport, or storage of the samples. The identity of these samples must be recorded in the Field Log Book.

One travel blank must be submitted per sample shipment.

3.2 Duplicates or Replicates

Duplicate or replicate sampling is the collection of more than one sample for a given analysis at a given location to test the validity of sampling procedures and laboratory methodology. Duplicates are collected, handled, and analysed using the same procedures applied to routine samples. Duplicates are submitted to the laboratory with a unique (ficticious) identifier to prevent association of the paired samples. The identity of these samples must be recorded in the Field Log Book.

Duplicate samples must be collected for approximately every ten (10) field samples collected across the range of parameters. At least one duplicate must be submitted per sample shipment.

4 Laboratory Analyses

ALS Environmental laboratories (ALS) located in Edmonton, AB performs the required environmental analyses for the Lupin Mine, with the exception of MMER toxicity testing which is subcontracted by ALS to Nautilus Environmental in Burnaby, BC.

ALS is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) and conforms to the requirements of ISO/IEC Standard 17025. Attached in Appendix B is a copy of the ALS Edmonton laboratory scope of accreditation. The scope of accreditation of all ALS laboratories is available from their website at http://www.alsglobal.com/en/Our-Services/Life-Sciences/Environmental/Quality-Assurance.

Nautilus Environmental is accredited by the CALA to conduct acute lethality and Daphnia magna monitoring tests and conforms to the requirements of ISO/IEC Standard 17025. Attached in Appendix B is a copy of the Nautilus Environmental Burnaby laboratory scope of accreditation.

The scope of accreditation of Nautilus Environmental laboratories is available from their website at http://www.nautilusenvironmental.com/accreditation.aspx.

Taiga's drinking water package covers the drinking water standards of the Department of Health and Social Services requirements for the sampling and testing of drinking water. Attached in Appendix B is a copy of the Taiga Environmental Laboratory accreditation for feacal coliform analysis.

All analyses are conducted in accordance with methods prescribed in the current edition of Standard Methods for the Examination of Water and Wastewater including regular QA/QC during the analysis of field samples including a program of method blanks, laboratory control samples, instrument calibration samples, matrix spikes, and duplicates.

5 Reporting

All analytical results will be forwarded in electronic format from ALS to LMI for data collection and management. Upon receipt, LMI will review the results to identify any anomalies. Anomalous results will be either re-analyzed by the laboratory or new samples will be collected to confirm the analytical results.

Any analytical results that indicate exceedance of regulatory criteria will be reported to the appropriate agencies including the NWB and the AANDC inspector.

Part J Item 9 of the Lupin Mine Water Licence requires LMI to include in its Annual Report (due March 31st), all data, monitoring results and information required by Part J of the Water Licence. Under the MMER effluent monitoring reporting of all tests and monitoring conducted during each quarter is to be reported not later than 45 days after the end of a quarter. A report summarizing the previous calendar year is also required under the MMER to Environment Canada (due March 31st).

To facilitate the required annual reporting, LMI prepares written monthly reports supported by laboratory analyses results table summaries and quality assurance review. Each monthly report includes the following:

- A description of the sample activities undertaken,
- Description of the existing conditions at each sampling station,
- Tabular summary of analytical lab result including the results of the quality control samples (travel blank, field blank, duplicate samples), and
- Interpretation of the analytical lab results including comparison of the results with water licence criteria and assessment of the reliability of the results.

Within the annual report, the acceptability of samples will be evaluated qualitatively by examination of the trip blanks and field duplicate sample data. Reproducibility of samples will be expressed as relative percent difference (RPD):

$$RPD = 100 * ((X_1 – X_2) / (X_1 + X_2) / 2)$$

Where X_1 is the original sample concentration, X_2 is the duplicate sample concentration, and X_1-X_2 denotes the absolute value of the difference between these two concentrations.

Legend

★ Project Location

Coordinate System: NAD_1983_UTM_Zone_12N

Map Sources/Notes:
Various Canadian Government Websites - Feb 2012

0 60 120 240 360 480 600 Km

1:15,000,000

Approved By: SH
Prepared By: PW
Project No.: LUP
Date Revised: 21 Mar 2012
File Name: Lup-12-10-01-LocationMap-A.mxd

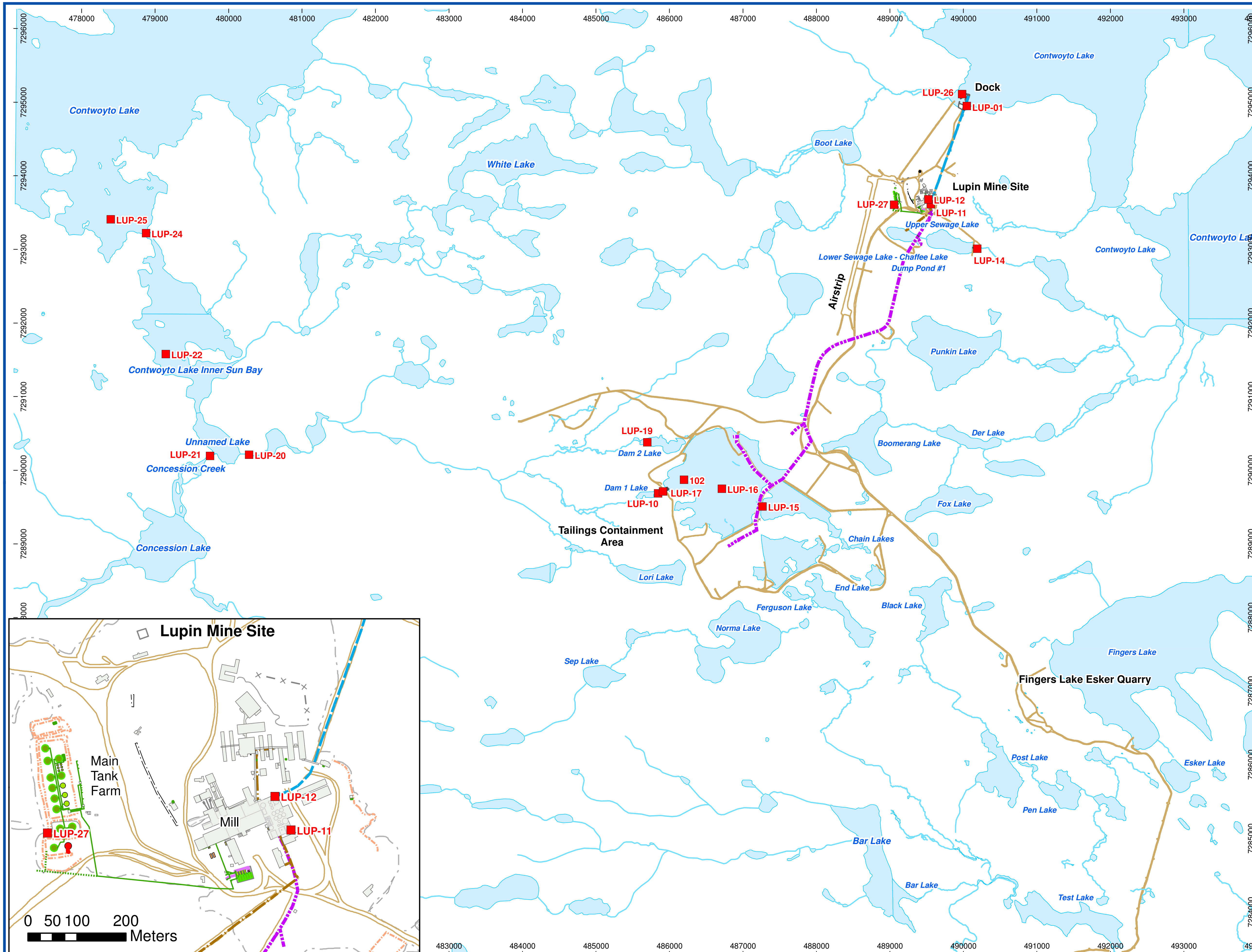
Project: **Lupin Project**
Location: Kitikmeot Region, Nunavut, Canada
Lupin Mine Annual Report - Water Licence 2AM-LUP0914

Location Map - Lupin Mine

Lupin Mines Incorporated

ELGIN MINING INC.

Figure: **1**
Rev: 120321



Legend

- Building
- Lake
- Stream
- Road
- Sewage Pipeline (6 in Diam)
- Tailings Line Route
- Water Pipeline (8 in Diam)
- Water Sampling & Discharge Location

N W E S

Map Sources/Notes:
Topographic features and site layout from Satellite image dated Aug 21, 2012
Fuel tank and Fuel Containment layouts adapted from drawings by Emerson Engineering dated Oct 17, 2011 and from data updated to March 01 2013

Coordinate System: NAD_1983_UTM_Zone_12N

0 500 1,000 2,000 Meters

1:50,000

Approved By: AL
Prepared By: PW
Project No.: LUP
Date Revised: 15 Apr 2013
File Name: Lup-13-08-04-MonProgramStat-A.mxd

Project: **Lupin Gold Mine**
Location: Kitikmeot Region, Nunavut, Canada

Monitoring Program Stations

Lupin Mines Incorporated

ELGIN MINING INC.

Figure: 2
Rev: 130415

Appendices

Appendix A: Chain of Custody

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # ____________

Report To			Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)
Company:	Elgin Mining - Lupin Mine		☑ Standard	☐ Other			◉ Regular (Standard Turnaround Times - Business Days)
Contact:	D. Vokey		☑ PDF	☑ Excel	☐ Digital	☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	201 - 750 W. Pender St.		Email 1:	dvokey@elginmining.com			○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6T 2T7		Email 2:	jbartlett@elginmining.com			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	778-372-3272	Fax:	Email 3:				

Invoice To	Same as Report ?	☑ Yes	☐ No	Client / Project Information	
Hardcopy of Invoice with Report?		☑ Yes	☐ No	Job #:	Lupin
Company:				PO / AFE:	
Contact:	P. Law; plaw@elginmining.com			LSD:	
Address:	Same as Report				
Phone:	604-682-3366	Fax:	604-682-3363	Quote #:	Q35666

Lab Work Order # (lab use only)		ALS Contact:	B. Stuart	Sampler:	name

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	pH, TSS	T-Metals, hardness	Hg	Faecal Coliform	NH4, NO2	T-Lead	BOD5	Alkalinity	TKN. OPO4, T-Phosphorus	T-Nitrogen	Oil and Grease	BETX	Number of Containers
						P	P	P		P			P	P	P		
	LUP-01-yymmdd	dd-mmm-yy	hh:mm	Water	X	X	X	X									4
	LUP-14-yymmdd	dd-mmm-yy	hh:mm	Water	X	X		X	X		X	X	X	X	X		9
	LUP-27-yymmdd	dd-mmm-yy	hh:mm	Water	X				X	X					X	X	7
	LUP-00-yymmdd	dd-mmm-yy	hh:mm	Water	X				X						X		3
	Travel Blank-yymmdd	dd-mmm-yy	hh:mm	Water		X		X									2

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

drinking water standards for LUP-01, CCME FWAL for others.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: D. Vokey	Date (dd-mmm-yy) dd-mmm-yyy	Time (hh-mm) hh:mmm	Received by:	Date:	Time:	Temperature: °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

Appendix B: Scope of Accreditations

ALS Quality Control Protocols

08 May, 2012

Quality control samples are introduced into batches of samples at critical points of sample handling, preparation and analysis to demonstrate the processes are performing as expected. In general, quality control samples are considered either Instrument QC or Method QC.

Instrument QC:

Instrument QC samples demonstrate control for the instrumental portion of a method. Instrument QC requirements must be successfully met before the analysis of Method QC or samples may proceed.

- Verification of initial calibration - criteria varies with each test.
- 2nd source Calibration Verification Standard (CVS) – at minimum, with each initial calibration.
- Continuing Calibration Verification (CCV) – frequency varies by test.
- Instrument Blanks – usage and frequency varies by test.

Method QC:

Method QC samples encompass the entire method and are initiated at the earliest point of the method where appropriate. Refer to the QC Definitions below. One set of Method QC is included for each batch of up to 20 client samples. Each set includes:

- 1 Method Blank.
- 1 Sample Duplicate. *
- 1 Lab Control Sample.
- 1 Reference Material or Matrix Spike. **
- Surrogate Compounds.

* Duplicate analyses are not performed where sub-sampling is not possible – e.g. most tests for organics in water.
** Spikes and Reference Materials are unavailable for Microbiology tests.

Method QC must be successfully analyzed before sample results are approved. Method QC results are normally reported to ALS clients with data reports.

Data Quality Objectives (DQOs):

DQOs are established for each QC sample, based on a combination of reference method objectives, customer requirements and historical test method performance. Where applicable, prescriptive elements of reference methods take precedence over internal DQOs. Current DQOs are available upon request.

Detailed descriptions of how DQOs are evaluated for different types of Quality Control samples are described on the following pages.

Types of Quality Control – Definitions and Evaluation Protocols

Method Blank (MB) - A blank sample prepared to represent the sample matrix as closely as possible and analyzed exactly like the calibration standards, samples, and quality control (QC) samples. Results of Method Blanks provide an estimate of the within batch variability of the blank response and an indication of bias introduced by the analytical procedure.

Except in special cases (as outlined in ALS DQO summary documents) the ALS DQO for Method Blanks is for all results to lie below the Limit of Reporting (LOR).

Laboratory Sample Duplicate (DUP) - A second portion of sample taken from the same container as the sub-sample used for the primary analysis, that is analyzed independently through all steps of the laboratory's sampling and analytical procedures. Duplicate samples are used to assess variance of the total method including sampling and analysis.

Duplicate precision is normally measured as Relative Percent Difference (RPD), where RPD = |(Result2 - Result1) / Mean| * 100. Duplicate samples should normally agree to within the ALS Precision DQO for the test and parameter (expressed as RPD), or within ± 2 x the LOR (for low level results). Refer to the ALS DQOs for Precision for specific limits for any given test.

ALS does not establish DQOs for Field Sample Duplicates. However, it is generally understood and accepted that the variability of Field Sample Duplicates is significantly more than what is observed with Laboratory Sample Duplicates.[1]

Laboratory Control Sample (LCS) - A known matrix spiked with compound(s) representative of the target analytes. An LCS is used to verify the accuracy of the laboratory's performance of the test.

LCS accuracy is calculated as the measured amount divided by the target concentration, and is normally expressed as percent recovery. LCS recoveries should normally lie within the ALS Accuracy DQOs for the test and parameter. For a low level LCS, the result should lie within ± 1 x the LOR of the target concentration. Refer to the ALS Accuracy DQOs for specific limits for any given test.

Reference Material (RM) – A material or substance, one or more of whose property values are sufficiently homogeneous and well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials. An RM is similar to an LCS, but encompasses a representative sample matrix. Similar to an LCS, an RM is used to verify the accuracy of the laboratory's performance of the test, but including the challenges of a complex sample matrix.

RM accuracy is calculated, expressed, and evaluated similarly to LCS accuracy. Refer to ALS Accuracy DQOs for specific limits for any given test.

Matrix Spike (MS) - A sample prepared by adding a known amount of a target analyte to a specified amount of a sample for which an independent estimate of the target analyte concentration is available. Spiked samples are used, for example, to determine the effect of the sample matrix on a method's recovery efficiency.

Matrix Spike results are calculated and expressed as percent recovery, by dividing the measured result (minus any analyte contribution from the unspiked sample) by the target analyte concentration. Matrix Spike results should normally lie within the ALS Accuracy DQOs for Matrix

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1 Depending on the type of Field Sample Duplicates being evaluated (e.g. Co-located versus Split Sample Duplicates), ALS recommends DQOs for Field Sample Duplicates that are between 1.5 – 2.0 times higher than our Laboratory Sample Duplicate DQOs. Co-located Sample Duplicates generally require higher DQOs than Split Sample Duplicates.

Spikes. Matrix Spike results cannot be calculated or reported in cases where the background concentration of the test parameter in the sample is too high relative to the spike level.

Surrogate Compounds (SURR) – Surrogate Compounds are added to every sample where applicable (organics tests only). They are substances with properties that mimic the analyte of interest, and which are unlikely to be found in environmental samples. They are added at known concentration to samples to establish that the analytical method has been properly performed.

Surrogate results are calculated and expressed as percent recovery, by dividing the measured result against the expected target concentration. Refer to ALS Accuracy DQOs for specific limits for any given test.

Automated Relational Checks

In addition to all our standard Quality Control checks, ALS also employs dozens of "Relational Checks", which are programmed into our Laboratory Information Systems (LIMS) to automatically highlight any situations where the expected relationships between different test parameters are violated, which can often point to errors. Such errors may originate with field sampling, or from laboratory processes, but should always be identified and pro-actively investigated.

Total versus Dissolved Metals ("D > T" Check) – One of the most important and common relational checks we do is a check for situations where Dissolved Metal concentrations significantly exceed Total Metal concentrations. By definition, this situation should not occur. However, there are a few reasons why this can occur:

i) Circumstances where Dissolved Metals slightly exceed Total Metals are expected in a small percentage of samples, simply due to normal random variability. In fact, when all metals in a test sample exist in the dissolved form, we expect that Dissolved Metals measurements will numerically exceed Total Metals measurements exactly half the time (by a small margin), simply due to random chance.

ii) Samples to be analyzed for Dissolved Metals must be filtered, which is normally done in the field. Filtration processes are a common source of low level metals contaminants. Contamination of a sample during filtration is the most common source of significant D > T issues.

iii) Field samples for Dissolved and Total Metals are normally collected independently, so variability of the sampling process is another common cause of D > T issues.

If none of the above causes can explain a situation where Dissolved Metals exceed Total Metals, then another type of error may be indicated, either with the collection of the sample in the field, or with sample containers or preservatives, or with the laboratory testing process.

ALS automatically highlights and investigates all circumstances where a Dissolved Metal result exceeds the Total Metal result by 20% RPD or more, but only if the absolute difference between the two results is greater than the sum of the Limits of Reporting (Detection Limits) of the two results.

The mechanism of this relational check is derived from the ALS Duplicate DQOs for Metals in Water.

All D > T relational checks that violate the rule above are flagged internally, and are investigated by ALS before sample results will be released to our clients. In most cases, results will be re-analyzed to confirm or correct the anomalous relationship. If results are confirmed by re-analysis, the following data qualifier is applied:

DTC: Dissolved concentration exceeds total. Results were confirmed by re-analysis.

Other Important Relational Checks Conducted by ALS

ALS employs dozens of other relational checks to highlight anomalous relationships between test parameters. Some of more common checks include the following:

- *Total Ammonia should not exceed Total Kjeldahl Nitrogen*
- *Weak Acid Dissociable Cyanide should not exceed Total Cyanide*
- *E. coli should not exceed Fecal Coliforms*
- *Nitrate + Nitrite should not exceed Total Nitrogen*
- *Hexavalent Chromium should not exceed Total Chromium*
- *True Colour should not exceed Apparent Colour*
- *Mineral Oil and Grease should not exceed Total Oil and Grease*
- *Reactive Phosphorus should not exceed Total Phosphorus*

Canadian Association for Laboratory Accreditation Inc.

CALA Directory of Laboratories

Membership Number: 1352
Laboratory Name: ALS Environmental (Edmonton)
Parent Institution: ALS Canada Ltd.
Address: 9936 - 67th Ave. NW Edmonton AB T6E 0P5
Contact: Ms. Anne Beaubien
Phone: (780) 413-5988
Fax: (780) 437-2311
Email: alsed.quality@alsglobal.com

Standard: Conforms with requirements of ISO/IEC 17025
Clients Served: All Interested Parties
Revised On: November 27, 2012
Valid To: May 28, 2015

Scope of Accreditation

Air (Inorganic)
Dustfall - Air (120)
ED-TM-1030; modified from AB ENVIRONMENT 32020
GRAVIMETRIC
Dustfall, Fixed
Dustfall, Total

Air (Inorganic)
Fluoride - Air (188)
ISOP 145, ISOP 117; modified from SM 4500-F C
SELECTIVE ION ELECTRODE
Fluoride

Air (Inorganic)
Mercury - Air Filter (190)
ISOP32/ISOP160; modified from NIOSH 6009/EPA 245.1
COLD VAPOUR AA - DIGESTION
Mercury

Air (Inorganic)
Metals - Air Filter (016)
ISOP 32/ISOP 96; modified from EPA 200.8, NIOSH 7303
ICP/MS - DIGESTION
Aluminum
Barium
Beryllium
Cadmium
Calcium
Chromium
Cobalt

† "OSDWA" indicates the appendix is used for the analysis of Ontario drinking water samples, which is subject to the rules and related regulations under the Ontario "Safe Drinking Water Act" (2002).

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Copper
Iron
Lead
Magnesium
Manganese
Molybdenum
Nickel
Potassium
Silver
Sodium
Strontium
Thallium
Tin
Vanadium
Zinc

Air (Organic)

Dioxins and Furans (PCDD/PCDF) - Air (138)
EX-TM-1605/EX-TM-1606; modified from EPA 1613 AND ENVIRONMENT CANADA, EPS 1/RM/19
GC-HRMS-EXTRACTION

1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
1,2,3,4,6,7,8-Heptachlorodibenzofuran
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin
1,2,3,4,7,8-Hexachlorodibenzofuran
1,2,3,4,7,8,9-Heptachlorodibenzofuran
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin
1,2,3,6,7,8-Hexachlorodibenzofuran
1,2,3,7,8-Pentachlorodibenzofuran
1,2,3,7,8-Pentachlorodibenzo-p-dioxin
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin
1,2,3,7,8,9-Hexachlorodibenzofuran
2,3,4,6,7,8-Hexachlorodibenzofuran
2,3,4,7,8-Pentachlorodibenzofuran
2,3,7,8-Tetrachlorodibenzo-p-dioxin
2,3,7,8-Tetrachlorodibenzofuran
Heptachlorodibenzo-p-dioxins (Total)
Heptachlorodibenzofurans (Total)
Hexachlorodibenzo-p-dioxins (Total)
Hexachlorodibenzofurans (Total)
Octachlorodibenzo-p-dioxin
Octachlorodibenzofuran
Pentachlorodibenzo-p-dioxins (Total)
Pentachlorodibenzofurans (Total)
Tetrachlorodibenzo-p-dioxins (Total)
Tetrachlorodibenzofurans (Total)

Biological Tissue (Inorganic)

Metals - Tissue (186)
NA-TP-2003/ISOP 100; modified from EPA 200.3/EPA 200.7
ICP - DIGESTION

Aluminum
Beryllium
Cadmium
Calcium
Chromium

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Cobalt
Copper
Iron
Magnesium
Manganese
Phosphorus
Potassium
Sodium
Strontium
Titanium
Zinc

Oil (Organic)
Polychlorinated Biphenyls (PCB) - Oil (002)
MSOP 8; modified from EPA 8082, ASTM D4059
GC/ECD - EXTRACTION
Aroclor 1016
Aroclor 1221
Aroclor 1232
Aroclor 1242
Aroclor 1248
Aroclor 1254
Aroclor 1260
Aroclor 1262
Aroclor 1268
Total PCB

Paint
Lead - Paint (153)
ISOP 100, ISOP 165; modified from EPA 200.2, EPA 200.7
ICP - DIGESTION
Lead

Serum
Perfluorinated Organics (PFC) - Serum (147)
EX-TM-1603; modified from ENVIRO. SCI. TECH, 38, 3698-3704
LC-MS/MS - EXTRACTION
Perfluorobutane sulfonate
Perfluorobutanoic acid
Perfluorodecane sulfonate
Perfluorodecanoic acid
Perfluorododecanoic acid
Perfluoroheptanoic acid
Perfluorohexane sulfonate
Perfluorohexanoic acid
Perfluorononanoic acid
Perfluorooctane sulfonamide
Perfluorooctane sulfonate
Perfluorooctanoic acid
Perfluoroundecanoic acid

Solids (Inorganic)
Ammonia - Soil (177)
ISOP 49/70; modified from CSSS 15.2.1/SM 4500-NH3
COLORIMETRIC (SATURATED PASTE)
Ammonia

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Solids (Inorganic)
Anions - Soil (176)
ISOP 49, NA-TM-1001; modified from CSSS 15.2.1/SM 4110 B
ION CHROMATOGRAPHY (SATURATED PASTE)
Nitrate
Nitrite
Sulfate

Solids (Inorganic)
Barium - Soil (172)
ISOP 158, ISOP 100; modified from SSSA PART 3, 1996, PG 202
ICP - FUSION
Barium

Solids (Inorganic)
Barium (Extractable) - Soil (182)
ISOP 164, ISOP 100; modified from BARITE WASTE GUIDELINES
ICP - EXTRACTION
Barium

Solids (Inorganic)
Chloride - Saturated Paste, Soil (168)
ISOP 49/ED-TM-1032; modified from CSSS 15.2.1/SM 4500 - CL E
COLORIMETRIC
Chloride

Solids (Inorganic)
Conductivity - Soil (156)
ISOP 49/ISOP19; modified from CARTER CSSS 15.2.1, 15.3
SATURATED PASTE, METER
Conductivity

Solids (Inorganic)
Conductivity - Soil (157)
ISOP 19; modified from CARTER CSSS 15.3
1:2 EXTRACTION, METER
Conductivity

Solids (Inorganic)
Density - Soil (170)
ISOP 114; modified from ASTM D5057
GRAVIMETRIC
Density

Solids (Inorganic)
Grain Size - Soil (028)
ISOP 68; modified from ASTM D422-63
SIEVING
Grain Size

Solids (Inorganic)
Hexavalent Chromium - Soil (148)
ISOP 108; modified from EPA 3060 A
IC-ALKALINE DIGESTION
Chromium

Solids (Inorganic)
Hot Water Soluble Boron - Soil (145)
ISOP144/ISOP100; modified from KEREN 1996 METHODS OF SOIL ANALYSIS
ICP - EXTRACTION
Boron

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Solids (Inorganic)
Mercury - Soil (164)
ISOP165, ISOP 160; modified from EPA 200.2, EPA 245.1
COLD VAPOUR AA - DIGESTION
Mercury

Solids (Inorganic)
Metals - Soil (023)
ISOP165/ISOP 96; modified from EPA 200.2/6020
ICP/MS - DIGESTION
Aluminum
Antimony
Arsenic
Barium
Beryllium
Bismuth
Boron
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Lithium
Magnesium
Manganese
Molybdenum
Nickel
Phosphorus
Potassium
Selenium
Silver
Sodium
Strontium
Thallium
Tin
Titanium
Uranium
Vanadium
Zinc

Solids (Inorganic)
Oil and Grease - Soil (029)
MSOP176; modified from SM 5520
GRAVIMETRIC - EXTRACTION
Oil and Grease

Solids (Inorganic)
Particle Size - Soil (110)
ISOP 162; modified from CARTER CSSS 47.3
PARTICLE SIZE
% Clay
% Sand
% Silt

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Solids (Inorganic)
Percent Moisture - Soil (179)
MSOP104; modified from ASTM D2216-80
GRAVIMETRIC
% Moisture

Solids (Inorganic)
Percent Saturation - Soil (169)
ISOP 49; modified from CSSS 15.2.1
GRAVIMETRIC
% Saturation

Solids (Inorganic)
pH - Soil (099)
ISOP 49/ISOP 18; modified from CARTER CSSS 15.2.1,16.2
SATURATED PASTE, METER
pH

Solids (Inorganic)
pH - Soil (100)
ISOP 18; modified from CARTER CSSS 16.2
1:2 EXTRACTION, METER
pH

Solids (Inorganic)
pH (1:2 CaCl2) - Soil (163)
ISOP 69; modified from CSSS 16.3
1:2 CaCl2 EXTRACTION - METER
pH (1:2 CaCl2)

Solids (Inorganic)
Salinity - Soil (160)
ISOP 49/ISOP 100; modified from CARTER CSSS 15.2.1, EPA 200.7
ICP (SATURATED PASTE)
Calcium
Magnesium
Potassium
Sodium
Sulfur SO4

Solids (Inorganic)
Sulfate - Solids (173)
ISOP 155; modified from CSA A23.2
IC - DIGESTION
Sulfate

Solids (Organic)
Aldehydes - Soil (180)
ED-TM-1110; EPA 8270
GC/MS
Acetaldehyde
Formaldehyde

Solids (Organic)
Dioxins, Furans (PCDD/PCDF) - Soil, Sediment (085)
EX-TM-1605/EX-TM-1606; modified from EPA 1613, EPS 1/RM/19
HRGC/HRMS - EXTRACTION
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
1,2,3,4,6,7,8-Heptachlorodibenzofuran
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin

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1,2,3,4,7,8-Hexachlorodibenzofuran
1,2,3,4,7,8,9-Heptachlorodibenzofuran
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin
1,2,3,6,7,8-Hexachlorodibenzofuran
1,2,3,7,8-Pentachlorodibenzofuran
1,2,3,7,8-Pentachlorodibenzo-p-dioxin
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin
1,2,3,7,8,9-Hexachlorodibenzofuran
2,3,4,6,7,8-Hexachlorodibenzofuran
2,3,4,7,8-Pentachlorodibenzofuran
2,3,7,8-Tetrachlorodibenzo-p-dioxin
2,3,7,8-Tetrachlorodibenzofuran
Heptachlorodibenzo-p-dioxins (Total)
Heptachlorodibenzofurans (Total)
Hexachlorodibenzo-p-dioxins (Total)
Hexachlorodibenzofurans (Total)
Octachlorodibenzo-p-dioxin
Octachlorodibenzofuran
Pentachlorodibenzo-p-dioxins (Total)
Pentachlorodibenzofurans (Total)
Tetrachlorodibenzo-p-dioxins (Total)
Tetrachlorodibenzofurans (Total)

Solids (Organic)
Extractable Petroleum Hydrocarbons (EPH) - Soil (109)
MSOP 119; modified from BC MELP EPH IN SOLIDS BY GC/FID
GC/FID - EXTRACTION
EPH 10-19
EPH 19-32

Solids (Organic)
Petroleum Hydrocarbons (PHC) - Soil (154)
MSOP 173; CCME
GC/MS - HEADSPACE
Benzene
Ethylbenzene
m/p-xylene
o-xylene
Toluene

Solids (Organic)
Petroleum Hydrocarbons (PHC) - Soil (155)
MSOP 173; CCME
GC/FID - HEADSPACE
F1: C6-C10
VH: C6-C10

Solids (Organic)
Petroleum Hydrocarbons (PHC) - Soil (158)
NA-TM-1100, NA-TP-2100; CCME
GC/FID - EXTRACTION TUMBLER
F2: C10-C16
F3: C16-C34
F4: C34-C50

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Solids (Organic)
Petroleum Hydrocarbons (PHC) - Soil (171)
NA-TM-1100, NA-TP-2100; CCME
GRAVIMETRIC - TUMBLER
F4: Gravimetric

Solids (Organic)
Phenols - Soil (077)
MSOP70; modified from EPA 8270/3540
GC/MS - EXTRACTION
2-Chlorophenol
2-Methylphenol (o-Cresol)
2-Nitrophenol
2,3-Dichlorophenol
2,3,4-Trichlorophenol
2,3,4,5-Tetrachlorophenol
2,3,4,6 Tetrachlorophenol
2,3,5-Trichlorophenol
2,3,5,6-Tetrachlorophenol
2,3,6-Trichlorophenol
2,4 & 2,5-Dichlorophenol
2,4-Dimethylphenol
2,4-Dinitrophenol
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
2,6-Dichlorophenol
3-Chlorophenol
3-Methylphenol (m-Cresol)
3,4-Dichlorophenol
3,4,5-Trichlorophenol
3,5-Dichlorophenol
4-Chloro-3-methylphenol
4-Chlorophenol
4-Methylphenol (p-Cresol)
4-Nitrophenol
4,6-Dinitro-2-methylphenol
Pentachlorophenol
Phenol

Solids (Organic)
Polychlorinated Biphenyls (PCB) - Soil (097)
MSOP 7; modified from EPA 3550/8082
GC/ECD - EXTRACTION
Aroclor 1016
Aroclor 1221
Aroclor 1232
Aroclor 1242
Aroclor 1248
Aroclor 1254
Aroclor 1260
Aroclor 1262
Aroclor 1268
Total PCB

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Solids (Organic)
Polychlorinated Biphenyls (PCB) - Soil, Sediment (088)
EX-TM-1605/EX-TM-1607; modified from EPA 1668A
HRGC/HRMS - EXTRACTION

PCB 1
PCB 100
PCB 101
PCB 102
PCB 103
PCB 104
PCB 105
PCB 106
PCB 108/86/125
PCB 11
PCB 110
PCB 111/117
PCB 112
PCB 113
PCB 114
PCB 115
PCB 116
PCB 118
PCB 12
PCB 120
PCB 122
PCB 123/107/109
PCB 124
PCB 126
PCB 127
PCB 128/162
PCB 13
PCB 130
PCB 131/142/133
PCB 132
PCB 134
PCB 135
PCB 136
PCB 137
PCB 138
PCB 139/143
PCB 14
PCB 140
PCB 141
PCB 144
PCB 145
PCB 146
PCB 147/149
PCB 148
PCB 15
PCB 150
PCB 151
PCB 152
PCB 153/168

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PCB 154
PCB 155
PCB 156
PCB 157
PCB 158/129
PCB 159
PCB 16
PCB 160/163
PCB 161
PCB 164
PCB 165
PCB 166
PCB 167
PCB 169
PCB 17
PCB 170
PCB 171
PCB 172
PCB 173
PCB 174
PCB 175/182
PCB 176
PCB 177
PCB 178
PCB 179
PCB 18
PCB 180
PCB 181
PCB 183
PCB 184
PCB 185
PCB 186
PCB 187
PCB 188
PCB 189
PCB 19
PCB 190
PCB 191
PCB 192
PCB 193
PCB 194
PCB 195
PCB 197
PCB 198
PCB 199
PCB 2
PCB 200
PCB 201/204
PCB 202
PCB 203/196
PCB 205
PCB 206
PCB 208

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PCB 209
PCB 21/20/23
PCB 22
PCB 23
PCB 24
PCB 25
PCB 26
PCB 27
PCB 28
PCB 29
PCB 3
PCB 30
PCB 31
PCB 32
PCB 34
PCB 35
PCB 36
PCB 37
PCB 38
PCB 39
PCB 4/10
PCB 40/68
PCB 41
PCB 43/52
PCB 44
PCB 45
PCB 46
PCB 47
PCB 48/49
PCB 5
PCB 50
PCB 51
PCB 53
PCB 54
PCB 55
PCB 56
PCB 57
PCB 58/67
PCB 59/42
PCB 6
PCB 60
PCB 61
PCB 63/76
PCB 64
PCB 66
PCB 69
PCB 7
PCB 70
PCB 71
PCB 72
PCB 74
PCB 75/65/62
PCB 77

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PCB 78
PCB 79
PCB 8
PCB 80
PCB 81
PCB 82
PCB 83/119
PCB 84/89
PCB 85
PCB 87
PCB 88/121
PCB 9
PCB 90/101
PCB 91
PCB 92
PCB 93
PCB 94
PCB 95
PCB 96
PCB 97
PCB 98
PCB 99

Solids (Organic)
Polycyclic Aromatic Hydrocarbons (PAH) - Soil (064)
MSOP 143; modified from EPA 8270/3540
GC/MS - EXTRACTION
1,3-Dimethylnaphthalene
1,3-Methylnaphthalene
2-Methylanthracene
2-Methylnaphthalene
3-Methylcholanthrene
Acenaphthene
Acenaphthylene
Anthracene
Benzo (a) anthracene
Benzo (a) pyrene
Benzo (b,j) fluoranthene
Benzo (g,h,i) perylene
Benzo (k) fluoranthene
Carbazole
Chrysene
Dibenzo (a,h) anthracene
Dibenzofuran
Fluoranthene
Fluorene
Indeno (1,2,3 - cd) pyrene
Naphthalene
Phenanthrene
Pyrene
Quinoline

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Solids (Organic)
Volatile Organic Compounds (VOC) - Soil (167)
MSOP 50; modified from EPA 5021/8260
GC/MS - HEADSPACE/EXTRACTION

1,1-Dichloroethane
1,1-dichloroethylene
1,1-Dichloropropene
1,1,1-Trichloroethane
1,1,1,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1,2,2-Tetrachloroethane
1,2-Dibromo-3-chloropropane
1,2-dichlorobenzene
1,2-dichloroethane
1,2-Dichloropropane
1,2,3-Trichlorobenzene
1,2,3-Trichloropropane
1,2,4-Trichlorobenzene
1,2,4-Trimethylbenzene
1,3-Dichlorobenzene
1,3-Dichloropropane
1,3,5-Trimethylbenzene
1,4-dichlorobenzene
2-Chlorotoluene
2-Hexanone
2,2-Dichloropropane
4-Chlorotoluene
Acetone (2-Propanone)
Acrylonitrile
Benzene
Bromobenzene
Bromochloromethane
Bromodichloromethane
Bromoform
Bromomethane
Carbon Disulphide
Carbon Tetrachloride
Chlorobenzene
Chlorodibromomethane
Chloroethane
Chloroform
Chloromethane
cis-1,3-Dichloropropene
cis-1,4-Dichloro-2-Butene
Dibromomethane
Dichlorodifluoromethane
Dichloromethane
Ethyl Alcohol
Ethyl Methacrylate
Ethylbenzene
Ethylene Dibromide
Hexachlorobutadiene
Isopropylbenzene

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m/p-xylene
Methyl Ethyl Ketone
Methyl Iodide
Methyl isobutyl Ketone
n-butylbenzene
n-propylbenzene
o-xylene
p-Isopropyltoluene
sec-butylbenzene
Styrene
tert-butylbenzene
Tetrachloroethylene
Toluene
trans-1,2-Dichloroethylene
trans-1,3-Dichloropropene
Trans-1,4-Dichloro-2-Butene
Trichloroethylene
Trichlorofluoromethane
Vinyl Chloride

Tissue (Inorganic)
Mercury - Biological (054)
NA-TP-2003, ISOP151, ISOP 160; modified from EPA 200.3, 245.1, 245.7
COLD VAPOR AA - DIGESTION
Mercury

Tissue (Inorganic)
Metals - Biological (060)
NA-TP-2003, ISOP 96; modified from EPA 200.3, 6020
ICP/MS - DIGEST
Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Calcium
Chromium
Cobalt
Copper
Lead
Lithium
Magnesium
Manganese
Molybdenum
Nickel
Selenium
Silver
Strontium
Thallium
Uranium
Vanadium
Zinc

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Tissue (Organic)
Dioxins/Furans (PCDD/PCDF) - Biological (086)
EX-TM-1605/EX-TM-1606; modified from EPA 1613, EPS 1/RM/19
HRGC/HRMS - EXTRACTION
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
1,2,3,4,6,7,8-Heptachlorodibenzofuran
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin
1,2,3,4,7,8-Hexachlorodibenzofuran
1,2,3,4,7,8,9-Heptachlorodibenzofuran
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin
1,2,3,6,7,8-Hexachlorodibenzofuran
1,2,3,7,8-Pentachlorodibenzofuran
1,2,3,7,8-Pentachlorodibenzo-p-dioxin
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin
1,2,3,7,8,9-Hexachlorodibenzofuran
2,3,4,6,7,8-Hexachlorodibenzofuran
2,3,4,7,8-Pentachlorodibenzofuran
2,3,7,8-Tetrachlorodibenzo-p-dioxin
2,3,7,8-Tetrachlorodibenzofuran
Heptachlorodibenzo-p-dioxins (Total)
Heptachlorodibenzofurans (Total)
Hexachlorodibenzo-p-dioxins (Total)
Hexachlorodibenzofurans (Total)
Octachlorodibenzo-p-dioxin
Octachlorodibenzofuran
Pentachlorodibenzo-p-dioxins (Total)
Pentachlorodibenzofurans (Total)
Tetrachlorodibenzo-p-dioxins (Total)
Tetrachlorodibenzofurans (Total)

Tissue (Organic)
Polychlorinated Biphenyls (PCB) - Biological (089)
EX-TM-1605/EX-TM-1607; modified from EPA 1668A
HRGC/HRMS - EXTRACTION
PCB 1
PCB 100
PCB 102
PCB 103
PCB 104
PCB 105
PCB 106
PCB 108/86/125
PCB 11
PCB 110
PCB 111/117
PCB 112
PCB 113
PCB 114
PCB 115
PCB 116
PCB 118
PCB 12
PCB 120
PCB 122

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PCB 123/107/109
PCB 124
PCB 126
PCB 127
PCB 128/162
PCB 13
PCB 130
PCB 131/142/133
PCB 132
PCB 134
PCB 135
PCB 136
PCB 137
PCB 138
PCB 139/143
PCB 14
PCB 140
PCB 141
PCB 144
PCB 145
PCB 146
PCB 147/149
PCB 148
PCB 15
PCB 150
PCB 151
PCB 152
PCB 153/168
PCB 154
PCB 155
PCB 156
PCB 157
PCB 159
PCB 16
PCB 160/163
PCB 161
PCB 164
PCB 165
PCB 166
PCB 167
PCB 169
PCB 17
PCB 170
PCB 171
PCB 172
PCB 173
PCB 174
PCB 175/182
PCB 176
PCB 177
PCB 178
PCB 179
PCB 18

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PCB 180
PCB 181
PCB 183
PCB 184
PCB 185
PCB 186
PCB 187
PCB 188
PCB 189
PCB 19
PCB 190
PCB 191
PCB 192
PCB 193
PCB 194
PCB 195
PCB 197
PCB 198
PCB 199
PCB 2
PCB 200
PCB 201/204
PCB 202
PCB 205
PCB 206
PCB 208
PCB 209
PCB 21/20/23
PCB 22
PCB 23
PCB 24
PCB 25
PCB 26
PCB 27
PCB 28
PCB 29
PCB 3
PCB 30
PCB 31
PCB 32
PCB 34
PCB 35
PCB 36
PCB 37
PCB 38
PCB 39
PCB 4/10
PCB 40/68
PCB 41
PCB 43/52
PCB 44
PCB 45
PCB 46

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PCB 47
PCB 48/49
PCB 5
PCB 50
PCB 51
PCB 52
PCB 53
PCB 54
PCB 55
PCB 56
PCB 57
PCB 58/67
PCB 59/42
PCB 6
PCB 60
PCB 61
PCB 63/76
PCB 64
PCB 66
PCB 69
PCB 7
PCB 70
PCB 71
PCB 72
PCB 73
PCB 74
PCB 75/65/62
PCB 77
PCB 78
PCB 79
PCB 8
PCB 80
PCB 81
PCB 82
PCB 83/119
PCB 84/89
PCB 85
PCB 87
PCB 88/121
PCB 9
PCB 90/101
PCB 91
PCB 92
PCB 93
PCB 94
PCB 95
PCB 96
PCB 97
PCB 98
PCB 99

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Waste
BTEX - TCLP Leachate - Waste (135)
ISOP74/MSOP173, NA-TM-1103; modified from EPA 1311, EPA 8260 B
GC/MS - TCLP
Benzene
Ethylbenzene
m/p - xylene
o-xylene
Toluene

Waste
Flashpoint - Waste (055)
ED-TM-1012; modified from ASTM 93-D
PENSKE-MARTEN CLOSED CUP
Flashpoint

Waste
Metals - TCLP Leachate - Waste (141)
ISOP 74, ISOP 96; modified from EPA 1311, EPA 6020
ICP/MS - TCLP
Antimony
Arsenic
Barium
Beryllium
Boron
Cadmium
Chromium
Cobalt
Copper
Iron
Lead
Nickel
Selenium
Silver
Thallium
Uranium
Vanadium
Zinc
Zirconium

Waste (Inorganic)
Mercury - TCLP - Waste (162)
ISOP 74/ISOP 151/160; modified from EPA 1311, 245.1, 245.7
COLD VAPOUR AA - DIGESTION - TCLP
Mercury

Waste (Inorganic)
Specific Gravity - Waste (174)
ISOP 114; modified from SM 2710 F
GRAVIMETRIC
Specific Gravity

Water (Inorganic)
Alkalinity - Water (004)
ED-TM-1026; modified from SM 2320 B
TITRIMETRIC
Alkalinity (pH 4.5)
Alkalinity (pH 8.3)

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Water (Inorganic)
Ammonia - Water (178)
ED-TM-1016; modified from SM 4500 NH3
COLORIMETRIC
Ammonia

Water (Inorganic)
Anions - Water (005)
NATM 1001; modified from SM 4110 B
ION CHROMATOGRAPHY
Bromide
Chloride
Fluoride
Nitrate
Nitrite
Sulfate

Water (Inorganic)
Biochemical Oxygen Demand (BOD) - Water (013)
ED-TM-1007/ISOP135; modified from SM 5210B
D.O. METER
BOD (5 day)
BODu (ultimate)
CBOD (5 day)

Water (Inorganic)
Carbon - Water (118)
ED-TM-1002; modified from SM 5310 B
IR - COMBUSTION
Inorganic Carbon
Organic Carbon
Total Carbon (TC)

Water (Inorganic)
Chemical Oxygen Demand (COD) - Water (051)
ED-TM-1009; modified from SM 5220 D
COLORIMETRIC - DIGESTION
COD

Water (Inorganic)
Chlorine - Water (123)
ISOP134; modified from SM 4500 CL-A,F,G
COLORIMETRIC
Free Chlorine
Total Chlorine

Water (Inorganic)
Colour - Water (152)
ED-TM-1038; modified from SM 2120 A, C
SPECTROPHOTOMETRIC
True Colour

Water (Inorganic)
Conductivity - Water (006)
ED-TM-1026; modified from SM 2510 B
CONDUCTIVITY METER
Conductivity (25°C)

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Water (Inorganic)
Disinfection By-Products - Water (056)
ED-TM-1006; modified from EPA 300.B
ION CHROMATOGRAPHY
Bromate
Chlorate
Chlorite

Water (Inorganic)
Dissolved Metals - Water (007)
ISOP 96; modified from EPA 6020
ICP/MS
Aluminum
Antimony
Arsenic
Barium
Beryllium
Bismuth
Boron
Cadmium
Chromium
Cobalt
Copper
Lead
Lithium
Molybdenum
Nickel
Selenium
Silver
Strontium
Thallium
Tin
Titanium
Uranium
Vanadium
Zinc

Water (Inorganic)
Dissolved Metals - Water (083)
ISOP 100, NA-TP-2002; modified from SM 3120B
ICP
Calcium
Iron
Magnesium
Manganese
Potassium
Silicon
Sodium
Sulfur

Water (Inorganic)
Hexavalent Chromium- Water (035)
ISOP 108; modified from SM 3500-CR,C
ION CHROMATOGRAPHY
Chromium (Hexavalent)

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Water (Inorganic)
Mercury - Water (149)
ISOP 151, ISOP 160; modified from EPA 245.7, EPA 245.1

COLD VAPOUR AA, COLD OXIDATION

Mercury

Water (Inorganic)
Metals (Ultra Trace) - Water (061)
ISOP 96, NA-TP-2002; modified from EPA 6020

ICP/MS

Calcium
Dissolved Aluminum
Dissolved Barium
Dissolved Beryllium
Dissolved Boron
Dissolved Cadmium
Dissolved Chromium
Dissolved Cobalt
Dissolved Copper
Dissolved Lead
Dissolved Manganese
Dissolved Molybdenum
Dissolved Nickel
Dissolved Silver
Dissolved Thallium
Dissolved Tin
Dissolved Vanadium
Dissolved Zinc
Magnesium
Potassium
Sodium
Strontium
Total Antimony
Total Arsenic
Total Selenium
Uranium

Water (Inorganic)
Microtox - Water (161)
ISOP 157; modified from WCMUC (1991)

BIOLUMINESCENCE

Microtox IC50 (15 min)

Water (Inorganic)
Nitrate/Nitrite - Water (057)
ISOP 80; modified from SM 4500-NO2,B / SM 4500-NO3,H

COLORIMETRIC

Nitrate plus Nitrite
Nitrite

Water (Inorganic)
Oil and Grease - Water (038)
MSOP177; modified from SM 5520 A,B,F

GRAVIMETRIC

Total Oil and Grease

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Water (Inorganic)
Oil and Grease - Water (159)
MSOP178; modified from SM 5520 C, F
INFRA-RED
Hydrocarbon Oil and Grease
Total Oil and Grease

Water (Inorganic)
pH - Water (015)
ED-TM-1026; modified from SM 4500-A,B
pH METER
pH

Water (Inorganic)
Phenols - Water (146)
ISOP149; modified from ALBERTA ENVIRONMENT 154
COLORIMETRIC
Total Phenolics

Water (Inorganic)
Phosphate - Water (084)
ED-TM-1031; modified from SM 4500-P
COLORIMETRIC
Phosphate

Water (Inorganic)
Phosphates (Low) - Water (183)
ISOP 80; modified from SM 4500-P
COLORIMETRIC - TECHNICON
Phosphate

Water (Inorganic)
Phosphorus - Water (011)
ED-TM-1031; modified from SM 4500-P,B,E
COLORIMETRIC - DIGESTION
Total Dissolved Phosphorus
Total Phosphorus

Water (Inorganic)
Phosphorus - Water (119)
ED-TM-1031; modified from SM 4500-A B, E
COLORIMETRIC
Inorganic Phosphorus

Water (Inorganic)
Phosphorus - Water (184)
ISOP 85; modified from SM 4500, P, B, E
COLORIMETRIC - TECHNICON
Total Dissolved Phosphorus
Total Phosphorus

Water (Inorganic)
Solids - Water (012)
ED-TM-1005; modified from SM 2540 A,B,C,D,E
GRAVIMETRIC
Fixed Suspended Solids
Total Dissolved Solids
Total Suspended Solids
Volatile Suspended Solids

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Water (Inorganic)
Sulfide - Water (033)
ED-TM-1001; modified from SM 4500-S2 A, D,E
COLORIMETRIC
Sulfide

Water (Inorganic)
Total Kjeldahl Nitrogen (TKN) - Water (010)
ED-TM-1017; modified from AB ENVIR. 235
COLORIMETRIC - DIGESTION
Dissolved Kjeldahl Nitrogen
Total Kjeldahl Nitrogen

Water (Inorganic)
Total Metals - Water (081)
NA-TP-2001/ISOP 100; modified from APHA 3030 E/3120 B
ICP - DIGESTION
Calcium
Iron
Magnesium
Manganese
Potassium
Silicon
Sodium
Sulfur

Water (Inorganic)
Total Metals - Water (082)
NA-TP-2001, ISOP 96; modified from EPA 6020, APHA 3030 E
ICP/MS - DIGESTION
Aluminum
Antimony
Arsenic
Barium
Beryllium
Bismuth
Boron
Cadmium
Chromium
Cobalt
Copper
Lead
Lithium
Molybdenum
Nickel
Selenium
Silver
Strontium
Thallium
Tin
Titanium
Uranium
Vanadium
Zinc

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Water (Inorganic)
Total Nitrogen - Water (195)
ED-TM-1002; modified from EN12260
IR - COMBUSTION
Total Nitrogen

Water (Inorganic)
Turbidity - Water (078)
ED-TM-1011; modified from SM 2130 A,B
TURBIDIMETRIC
Turbidity

Water (Organic)
Alkylated & Nitro PAHs - Water (181)
ED-TM-1135; modified from EPA 3570/8270
GC/MS
Acridine
C2 Alkyl subst'd Carbazoles
C2 Alkyl subst'd Quinolines
C3 Alkyl subst'd Quinolines
Carbazole
Methyl Acridine
Methyl Carbazoles
Methyl Quinolines
Phenanthridine
Quinoline

Water (Organic)
Base Neutral Extractables - Water (117)
MSOP 161; modified from EPA 3510/8270
GC/MS - EXTRACTION
1,2,3-Trichlorobenzene
1,2,4-Trichlorobenzene
2-Chloronaphthalene
2,4-Dinitrotoluene
2,6-Dinitrotoluene
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene
Hexachloroethane
Pentachlorobenzene

Water (Organic)
Chlorophenols - Water (019)
MSOP 42; modified from EPA 1653 AND ALBERTA ENVIRONMENT 130.0
GC/MS - EXTRACTION
2-Chlorophenol
2-Chlorosyringaldehyde
2,4,5-Trichlorophenol
2,6-Dichlorophenol
2,6-Dichlorosyringaldehyde
3,4-Dichlorocatechol
3,4-Dichloroguaiacol
3,4,5-Trichlorocatechol
3,4,5-Trichloroguaiacol
3,4,5-Trichloroveratrole
3,4,6-Trichlorocatechol

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3,4,6-Trichloroguaiacol
3,5-Dichlorocatechol
3,6-Dichlorocatechol
4-Chlorocatechol
4-Chloroguaiacol
4-Chlorophenol
4,5-Dichlorocatechol
4,5-Dichloroguaiacol
4,5-Dichloroveratrole
4,5,6-Trichloroguaiacol
4,5,6-Trichlorosyringol
4,6-Dichloroguaiacol
5-Chlorovanillin
5,6-Dichlorovanillin
6-Chlorovanillin
Tetrachlorocatechol
Tetrachloroguaiacol
Tetrachloroveratrole
Trichlorotrimethoxybenzene

Water (Organic)
Dioxins and Furans (PCDD/PCDF) - Water (049)
EX-TM-1604/EX-TM-1606; modified from EPA 1613, EPS 1/RM/19
GC/HRMS - EXTRACTION
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
1,2,3,4,6,7,8-Heptachlorodibenzofuran
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin
1,2,3,4,7,8-Hexachlorodibenzofuran
1,2,3,4,7,8,9-Heptachlorodibenzofuran
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin
1,2,3,6,7,8-Hexachlorodibenzofuran
1,2,3,7,8-Pentachlorodibenzo-p-dioxin
1,2,3,7,8-Pentachlorodibenzofuran
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin
1,2,3,7,8,9-Hexachlorodibenzofuran
2,3,4,6,7,8-Hexachlorodibenzofuran
2,3,4,7,8-Pentachlorodibenzofuran
2,3,7,8-Tetrachlorodibenzo-p-dioxin
2,3,7,8-Tetrachlorodibenzofuran
Heptachlorodibenzo-p-dioxins (Total)
Heptachlorodibenzofurans (Total)
Hexachlorodibenzo-p-dioxins (Total)
Hexachlorodibenzofurans (Total)
Octachlorodibenzo-p-dioxin
Octachlorodibenzofuran
Pentachlorodibenzo-p-dioxins (Total)
Pentachlorodibenzofurans (Total)
Tetrachlorodibenzo-p-dioxins (Total)
Tetrachlorodibenzofurans (Total)

Water (Organic)
Extractable Petroleum Hydrocarbons (EPH) - Water (108)
MSOP 125; modified from BC MELP EPH IN WATER BY GC/FID
GC/FID - EXTRACTION
EPH 10-19

† "OSDWA" indicates the appendix is used for the analysis of Ontario drinking water samples, which is subject to the rules and related regulations under the Ontario "Safe Drinking Water Act" (2002).

EPH 19-32

Water (Organic)
Formaldehyde - Water (116)
MSOP47; modified from ENVIRONMENTAL SCIENCE AND TECHNOLOGY, 1989, 23:838-847
GC/MS - EXTRACTION
Formaldehyde

Water (Organic)
Low Level PAHs and Alkylated PAHs - Water (185)
EX-TM-1600; modified from EPA 3510/8270
GC/MS
1-Methylnaphthalene
2-Methylnaphthalene
Acenaphthene
Acenaphthylene
Acridine
Anthracene
Benzo (a) anthracene
Benzo (a) pyrene
Benzo(b&j)fluoranthene
Benzo(e)pyrene
Benzo (g,h,i) perylene
Benzo (k) fluoranthene
Biphenyl
C1 Acenapthenes
C1 Benz(a)Anthracenes/Chrysenes
C1 Benzofluoranthenes/Benzopyrenes
C1 Biphenyls
C1 Dibenzothiophenes
C1 Fluoranthenes/Pyrenes
C1 Fluorenes
C1 Phenanthrenes/Anthracenes
C2 Benzofluoranthenes/Benzopyrenes
C2 Biphenyls
C2 Bnz(a)Anthracenes/Chrysenes
C2 Dibenzothiophenes
C2 Fluoranthenes/Pyrenes
C2 Fluorenes
C2 Naphthalenes
C2 Phenanthrenes/Anthracenes
C3 Benzanthracenes/Chrysenes
C3 Dibenzothiophenes
C3 Naphthalenes
C3 Phenanthrenes/Anthracenes
C4 Benzanthracenes/Chrysenes
C4 Dibenzothiophenes
C4 Naphthalenes
C4 Phenanthrenes/Anthracenes
Chrysene
Dibenzo (a,h) anthracene
Dibenzothiophene
Fluoranthene
Fluorene
Indeno (1,2,3 - cd) pyrene

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The list of tests and measurement capabilities for which a laboratory is accredited can change at any time due to circumstances such as scope extensions, voluntary withdrawal of tests by the laboratory and suspension. Scopes are published by the CALA via the Internet at http://www.cala.ca/cala_directories.html

Naphthalene
Perylene
Phenanthrene
Pyrene
Quinoline
Retene

Water (Organic)
Petroleum Hydrocarbons (PHC) - Water (075)
NA-TM-1104; modified from EPA 3510/8015
GC/FID - EXTRACTION
F2: C10-C16
F3: C16-C34
F4: C34-C50

Water (Organic)
Petroleum Hydrocarbons (PHC) - Water (165)
NA-TM-1103; modified from EPA 5021/8260
GC/FID - HEADSPACE
F1: C6-C10
VH: C6-C10

Water (Organic)
Phenols - Water (076)
MSOP71; modified from EPA 8270/3510
GC/MS - EXTRACTION
2-Chlorophenol
2-Methylphenol (o-Cresol)
2-Nitrophenol
2,3-Dichlorophenol
2,3,4-Trichlorophenol
2,3,4,5-Tetrachlorophenol
2,3,4,6-tetrachlorophenol
2,3,5-Trichlorophenol
2,3,5,6-Tetrachlorophenol
2,3,6-Trichlorophenol
2,4 & 2,5-Dichlorophenol
2,4-Dimethylphenol
2,4-Dinitrophenol
2,4,5-Trichlorophenol
2,4,6-trichlorophenol
2,6-Dichlorophenol
3-Chlorophenol
3-Methylphenol (m-Cresol)
3,4-Dichlorophenol
3,4,5-Trichlorophenol
3,5-Dichlorophenol
4-Chloro-3-methylphenol
4-Chlorophenol
4-Methylphenol (p-Cresol)
4-Nitrophenol
4,6-Dinitro-2-methylphenol
Pentachlorophenol
Phenol

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Water (Organic)
Polychlorinated Biphenyls (PCB) - Water (087)
EX-TM-1604/EX-TM-1607; modified from EPA 1668 A

HRGC/HRMS - EXTRACTION

PCB 1
PCB 100
PCB 102
PCB 103
PCB 104
PCB 105
PCB 106
PCB 108/86/125
PCB 11
PCB 110
PCB 111/117
PCB 112
PCB 113
PCB 114
PCB 115
PCB 116
PCB 118
PCB 12
PCB 120
PCB 122
PCB 123/107/109
PCB 124
PCB 126
PCB 127
PCB 128/162
PCB 13
PCB 130
PCB 131/142/133
PCB 132
PCB 134
PCB 135
PCB 136
PCB 137
PCB 138
PCB 139/143
PCB 14
PCB 140
PCB 141
PCB 144
PCB 145
PCB 146
PCB 147/149
PCB 148
PCB 15
PCB 150
PCB 151
PCB 152
PCB 153/168
PCB 154

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PCB 155
PCB 156
PCB 157
PCB 158/129
PCB 159
PCB 16
PCB 160/163
PCB 161
PCB 164
PCB 165
PCB 166
PCB 167
PCB 168
PCB 169
PCB 17
PCB 170
PCB 171
PCB 172
PCB 173
PCB 174
PCB 175/182
PCB 176
PCB 177
PCB 178
PCB 179
PCB 18
PCB 180
PCB 181
PCB 183
PCB 184
PCB 185
PCB 186
PCB 187
PCB 188
PCB 189
PCB 19
PCB 190
PCB 191
PCB 192
PCB 193
PCB 194
PCB 195
PCB 197
PCB 198
PCB 199
PCB 2
PCB 200
PCB 201/204
PCB 202
PCB 203/196
PCB 205
PCB 206
PCB 207

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PCB 208
PCB 209
PCB 21/20/23
PCB 22
PCB 23
PCB 24
PCB 25
PCB 26
PCB 27
PCB 28
PCB 29
PCB 3
PCB 30
PCB 31
PCB 32
PCB 34
PCB 35
PCB 36
PCB 37
PCB 38
PCB 39
PCB 4/10
PCB 40/68
PCB 41
PCB 43/52
PCB 44
PCB 45
PCB 46
PCB 47
PCB 48/49
PCB 5
PCB 50
PCB 51
PCB 53
PCB 54
PCB 55
PCB 56
PCB 57
PCB 58/67
PCB 59/42
PCB 6
PCB 60
PCB 61
PCB 63/76
PCB 64
PCB 66
PCB 69
PCB 7
PCB 70
PCB 71
PCB 72
PCB 73
PCB 74

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PCB 75/65/62
PCB 77
PCB 78
PCB 79
PCB 8
PCB 80
PCB 81
PCB 82
PCB 83/119
PCB 84/89
PCB 85
PCB 87
PCB 88/121
PCB 9
PCB 90/101
PCB 91
PCB 92
PCB 93
PCB 94
PCB 95
PCB 96
PCB 97
PCB 98
PCB 99

Water (Organic)
Polychlorinated Biphenyls (PCB) - Water (096)
MSOP4; modified from EPA 3510/8082
GC/ECD - EXTRACTION
Aroclor 1016
Aroclor 1221
Aroclor 1232
Aroclor 1242
Aroclor 1248
Aroclor 1254
Aroclor 1260
Aroclor 1262
Aroclor 1268
Total PCB

Water (Organic)
Polycyclic Aromatic Hydrocarbons (PAH) - Water (003)
MSOP 5; modified from EPA 8270/3510
GC/MS - EXTRACTION
1-Methylnaphthalene
1,3-Dimethylnaphthalene
2-Methylanthracene
2-Methylnaphthalene
3-Methylcholanthrene
Acenaphthene
Acenaphthylene
Anthracene
Benzo (a) anthracene
Benzo (a) pyrene
Benzo(b&j)fluoranthene

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The list of tests and measurement capabilities for which a laboratory is accredited can change at any time due to circumstances such as scope extensions, voluntary withdrawal of tests by the laboratory and suspension. Scopes are published by the CALA via the Internet at http://www.cala.ca/cala_directories.html

Benzo (g,h,i) perylene
Benzo (k) fluoranthene
Carbazole
Chrysene
Dibenzo (a,h) anthracene
Dibenzofuran
Fluoranthene
Fluorene
Indeno (1,2,3 - cd) pyrene
Naphthalene
Phenanthrene
Pyrene
Quinoline

Water (Organic)
Resin and Fatty Acids - Water (020)
MSOP 26; modified from ALBERTA ENVIRONMENT 129.0
GC/MS - EXTRACTION
12-Chlorodehydroabietic Acid
12,14-Dichlorodehydroabietic Acid
14-Chlorodehydroabietic Acid
9,10-Dichlorostearic Acid
Abietic Acid
Arachidic Acid
Dehydroabietic Acid
Isopimaric Acid
Levopimaric Acid
Linoleic Acid
Linolenic Acid
Myristic Acid
Neoabietic Acid
Oleic Acid
Palmitic Acid
Palustric Acid
Pimaric Acid
Sandaracopimaric Acid
Stearic Acid

Water (Organic)
Resin and Fatty Acids - Water (132)
ED-TM-1106; modified from ALBERTA ENVIRONMENT 129.0
GC/MS - EXTRACTION (RFA-Low ED)
12-Chlorodehydroabietic acid
12,14-Dichlorodehydroabietic acid
14-Chlorodehydroabietic acid
9,10-Dichlorostearic acid
Abietic acid
Arachidic acid
Dehydroabietic Acid
Isopimaric acid
Levopimaric acid
Linoleic Acid
Linolenic Acid
Myristic acid
Neoabietic acid

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Oleic Acid
Palmitic Acid
Palustric acid
Pimaric acid
Sandaracopimaric acid
Stearic Acid

Water (Organic)
Volatile Organic Compounds (VOC) - Water (166)
MSOP 50; modified from EPA 5021/8260
GC/MS - HEADSPACE
1,1-Dichloroethane
1,1-dichloroethylene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
1,1,2,2-Tetrachloroethane
1,2-dichlorobenzene
1,2-dichloroethane
1,2-Dichloropropane
1,2,3-Trichloropropane
1,3-Dichlorobenzene
1,4-dichlorobenzene
2-Hexanone
Acetone (2-Propanone)
Acrylonitrile
Benzene
Bromodichloromethane
Bromoform
Bromomethane
Carbon Disulphide
Carbon Tetrachloride
Chlorobenzene
Chlorodibromomethane
Chloroethane
Chloroform
Chloromethane
cis-1,3-Dichloropropene
cis-1,4-Dichloro-2-Butene
Dibromomethane
Dichlorodifluoromethane
Dichloromethane
Ethyl Alcohol
Ethyl Methacrylate
Ethylbenzene
Ethylene Dibromide
m/p-xylene
Methyl Ethyl Ketone
Methyl Iodide
Methyl isobutyl Ketone
o-xylene
Styrene
Tetrachloroethylene
Toluene
trans-1,2-Dichloroethylene

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trans-1,3-Dichloropropene
Trans-1,4-Dichloro-2-Butene
Trichloroethylene
Trichlorofluoromethane
Vinyl Chloride

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CALA
Canadian Association for
Laboratory Accreditation Inc.

CALA Directory of Laboratories

Membership Number: 3525
Laboratory Name: Nautilus Environmental Inc.
Parent Institution:
Address: 8664 Commerce Court Burnaby BC V5A 4N7
Contact: Ms. Julianna Kalocai
Phone: (604) 420-8773
Fax: (604) 357-1361
Email: julianna@nautilusenvironmental.com

Standard: Conforms with requirements of ISO/IEC 17025
Clients Served: All Interested Parties
Revised On: September 13, 2011
Valid To: March 13, 2014

Scope of Accreditation

Water (Toxicology)
Ceriodaphnia dubia - Water (003)
209; EPS 1/RM/21
SURVIVAL AND REPRODUCTION
Cerodaphnia dubia (7d)

Water (Toxicology)
Daphnia magna - Water (002)
205; EPS 1/RM/11, EPS 1/RM/14
ACUTE LETHALITY (SURVIVAL)
Daphnia LC50 (48 h)

Water (Toxicology)
Fathead Minnow - Water (007)
220; EPS 1/RM/22
SURVIVAL AND GROWTH
Fathead Minnow (7d)

Water (Toxicology)
Lemna minor - Water (005)
215; EPS 1/RM/37
GROWTH INHIBITION
Lemna minor (7d)

Water (Toxicology)
Pseudokirchneriella subcapitata - Water (006)
213; EPS 1/RM/25
GROWTH INHIBITION
Pseudokirchneriella subcapitata (72h)

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Water (Toxicology)
Rainbow Trout - Water (001)
201; EPS 1/RM/9, EPS 1/RM/13
ACUTE LETHALITY (SURVIVAL)
Trout LC50 (96 h)

Water (Toxicology)
Salmonid - Water (004)
203; EPS 1/RM/28
EARLY LIFE STAGE
Salmonid embryo (7d)

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The list of tests and measurement capabilities for which a laboratory is accredited can change at any time due to circumstances such as scope extensions, voluntary withdrawal of tests by the laboratory and suspension. Scopes are published by the CALA via the Internet at http://www.cala.ca/cala_directories.html

CALA
Canadian Association for
Laboratory Accreditation Inc.

CALA Directory of Laboratories

Membership Number: 2800
Laboratory Name: HydroQual Laboratories Ltd.
Parent Institution: Golder Associates Ltd.
Address: #4, 6125 12th St. S.E. Calgary AB T2H 2K1
Contact: Mrs. Tamara McClure
Phone: (403) 253-7121
Fax: (403) 252-9363
Email: tmcclure@golder.com; tanya_harvey@golder.com

Standard: Conforms with requirements of ISO/IEC 17025
Clients Served: All Interested Parties
Revised On: September 28, 2012
Valid To: March 24, 2014

Scope of Accreditation

Air (Mycology)
Mould - Air (043)
AIR-ME-002; POWERS, E.M. 1995. APPL. & ENV. MICRO 61(10): 3756-3758
CULTURABLE AIR MICROBES
fungal genus
fungal species

Air (Mycology)
Mould - Air (047)
AIR-ME-001; ZEFON ANALYTICAL ACCESSORIES/ ASTM D7391-09
DIRECT MICROSCOPE IDENTIFICATION (AIR-O-CELL)
fungal genus

Solids (Toxicology)
Chironomids - Sediment (013)
WTR-ME-026; EPS 1/RM/32
SURVIVAL AND GROWTH
Chironomus

Solids (Toxicology)
Earthworm - Soil (022)
SOIL-ME-017; EPS 1/RM/43
SURVIVAL
Eisenia andrei
Eisenia fetida

Solids (Toxicology)
Earthworm - Soil (049)
SOIL-ME-009; EPS 1/RM/43
SURVIVAL AND REPRODUCTION
Eisenia andrei

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Solids (Toxicology)
Hyalella azteca - Sediment (014)
WTR-ME-021; EPS 1/RM/33
SURVIVAL AND GROWTH
Hyalella azteca

Solids (Toxicology)
Plant Growth - Soil (050)
SOIL-ME-023; EPS 1/RM/45
EMERGENCE
Lettuce
Northern wheatgrass

Water (Microbiology)
Cryptosporidium and Giardia - Water (025)
WTQR-ME-014; EPA 815-R-05-002.METHOD 1623
FILTRATION/IMS/FA
Cryptosporidium
Giardia

Water (Microbiology)
Escherichia coli (E. coli) - Water (027)
WTRQ-ME-009; modified from SM 9223 B
MOST PROBABLE NUMBER
Escherichia coli (E. coli)

Water (Microbiology)
Microcystins - Water (037)
WTRQ-ME-005; AN AND CARMICHAEL (1994) TOXICON, 32, 1495-1507.
PROTEIN PHOSPHATASE INHIBITION
Microcystins

Water (Microbiology)
Total Coliforms - Water (052)
WTRQ-ME-009; modified from SM 9223 B
MOST PROBABLE NUMBER
Total Coliforms

Water (Toxicology)
Ceriodaphnia dubia - Water (006)
WTR-ME-018; EPS 1/RM/21
SURVIVAL AND REPRODUCTION
Ceriodaphnia dubia

Water (Toxicology)
Daphnia magna - Water (002)
WTR-ME-015; EPS 1/RM/11, EPS 1/RM/14
ACUTE LETHALITY (SURVIVAL)
Daphnia LC50 (48 h)

Water (Toxicology)
Fathead Minnow - Water (007)
WTR-ME-046; EPS 1/RM/22
GROWTH AND SURVIVAL
Fathead minnow

Water (Toxicology)
Lemna minor - Water (017)
WTR-ME-030; EPS 1/RM/37
GROWTH INHIBITION
Lemna minor

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Water (Toxicology)
Microtox - Liquid Phase - Water (003)
SOIL-ME-001; EPS 1/RM/24
BIOLUMINESCENCE
Microtox IC50 (15 min)

Water (Toxicology)
Pseudokirchneriella subcapitata - Water (008)
WTR-ME-034; EPS 1/RM/25
GROWTH INHIBITION
Pseudokirchneriella subcapitata

Water (Toxicology)
Rainbow Trout - Water (001)
WTR-ME-041; EPS 1/RM/9, EPS 1/RM/13
ACUTE LETHALITY (SURVIVAL)
Trout LC50 (96 h)

Water (Toxicology)
Salmonid - Water (026)
WTR-ME-044; EPS 1/RM/28
EARLY LIFE STAGE
Salmonid eggs
Salmonid embryo

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State of Utah

Department of Health

Environmental Laboratory Certification Program

Certification is hereby granted to

ALS Laboratory Group, Environmental Division (Fort Collins, CO)

225 Commerce Drive
Fort Collins, CO 80524

Has conformed with the
2009 TNI Standard
Scope of accreditiation is limited to the
State of Utah Accredited Fields of Accreditiation
Which accompanies this Certificate

EPA Number:	CO00078
Expiration Date:	11/30/2013
Certificate Number:	CO000782013-7

Robyn M. Atkinson, Ph.D, HCLD
Director, Unified State Laboratories: Public Health

Continued accredited status depends on successful ongoing particitpation in the program.

Utah Department of Health
W. David Patton Ph.D
Executive Director

Disease Control and Prevention
Robyn M. Atkinson, Ph.D, HCLD
Director, Unified State Laboratories: Public Health

Bureau of Laboratory Improvement
David B Mendenhall, MPA, MT (ASCP)
Bureau Director

State of Utah
Gary R Herbert
Governor
Gregory S Bell
Lieutenant Governor

EPA Number: *CO00078* **Attachment to Certificate Number: CO000782013-7**

ALS Laboratory Group, Environmental Division (Fort Collins, CO)

Program/Matrix: *CWA (Non Potable Water)*

	Start Date	Expires	AB
Method EPA 120.1			
Conductivity	7/1/2012	11/30/2013	UT
Method EPA 150.1			
pH	7/1/2012	11/30/2013	UT
Method EPA 160.1			
Residue-filterable (TDS)	7/1/2012	11/30/2013	UT
Method EPA 160.2			
Residue-nonfilterable (TSS)	7/1/2012	11/30/2013	UT
Method EPA 160.3			
Residue-total	7/1/2012	11/30/2013	UT
Method EPA 1664A (HEM)			
Oil & Grease	7/1/2012	11/30/2013	UT
Method EPA 200.7			
Aluminum	7/1/2012	11/30/2013	UT
Antimony	7/1/2012	11/30/2013	UT
Arsenic	7/1/2012	11/30/2013	UT
Barium	7/1/2012	11/30/2013	UT
Beryllium	7/1/2012	11/30/2013	UT
Boron	7/1/2012	11/30/2013	UT
Cadmium	7/1/2012	11/30/2013	UT
Calcium	7/1/2012	11/30/2013	UT
Chromium	7/1/2012	11/30/2013	UT
Cobalt	7/1/2012	11/30/2013	UT
Copper	7/1/2012	11/30/2013	UT
Iron	7/1/2012	11/30/2013	UT
Lead	7/1/2012	11/30/2013	UT
Lithium	7/1/2012	11/30/2013	UT
Magnesium	7/1/2012	11/30/2013	UT
Manganese	7/1/2012	11/30/2013	UT
Molybdenum	7/1/2012	11/30/2013	UT
Nickel	7/1/2012	11/30/2013	UT
Potassium	7/1/2012	11/30/2013	UT
Selenium	7/1/2012	11/30/2013	UT
Silica as SiO2	7/1/2012	11/30/2013	UT
Silver	7/1/2012	11/30/2013	UT

	Start Date	Expires	AB
Program/Matrix: *CWA (Non Potable Water)*			
Sodium	7/1/2012	11/30/2013	UT
Strontium	7/1/2012	11/30/2013	UT
Thallium	7/1/2012	11/30/2013	UT
Tin	7/1/2012	11/30/2013	UT
Titanium	7/1/2012	11/30/2013	UT
Total hardness as CaCO3	7/1/2012	11/30/2013	UT
Vanadium	7/1/2012	11/30/2013	UT
Zinc	7/1/2012	11/30/2013	UT
Method EPA 200.8			
Aluminum	7/1/2012	11/30/2013	UT
Antimony	7/1/2012	11/30/2013	UT
Arsenic	7/1/2012	11/30/2013	UT
Barium	7/1/2012	11/30/2013	UT
Beryllium	7/1/2012	11/30/2013	UT
Cadmium	7/1/2012	11/30/2013	UT
Calcium	7/1/2012	11/30/2013	UT
Chromium	7/1/2012	11/30/2013	UT
Cobalt	7/1/2012	11/30/2013	UT
Copper	7/1/2012	11/30/2013	UT
Iron	7/1/2012	11/30/2013	UT
Lead	7/1/2012	11/30/2013	UT
Magnesium	7/1/2012	11/30/2013	UT
Manganese	7/1/2012	11/30/2013	UT
Molybdenum	7/1/2012	11/30/2013	UT
Nickel	7/1/2012	11/30/2013	UT
Potassium	7/1/2012	11/30/2013	UT
Selenium	7/1/2012	11/30/2013	UT
Silver	7/1/2012	11/30/2013	UT
Sodium	7/1/2012	11/30/2013	UT
Strontium	7/1/2012	11/30/2013	UT
Thallium	7/1/2012	11/30/2013	UT
Thorium	7/1/2012	11/30/2013	UT
Tin	7/1/2012	11/30/2013	UT
Uranium	7/1/2012	11/30/2013	UT
Vanadium	7/1/2012	11/30/2013	UT
Zinc	7/1/2012	11/30/2013	UT
Method EPA 245.1			
Mercury	7/1/2012	11/30/2013	UT
Method EPA 300.0			
Bromide	7/1/2012	11/30/2013	UT
Chloride	7/1/2012	11/30/2013	UT
Fluoride	7/1/2012	11/30/2013	UT
Nitrate as N	7/1/2012	11/30/2013	UT
Nitrite as N	7/1/2012	11/30/2013	UT
Orthophosphate as P	7/1/2012	11/30/2013	UT
Sulfate	7/1/2012	11/30/2013	UT
Method EPA 310.1			
Alkalinity as CaCO3	7/1/2012	11/30/2013	UT

Program/Matrix: *CWA (Non Potable Water)*

	Start Date	Expires	AB
Method EPA 335.2			
Cyanide	7/1/2012	11/30/2013	UT
Method EPA 340.2			
Fluoride	7/1/2012	11/30/2013	UT
Method EPA 350.1			
Ammonia as N	7/1/2012	11/30/2013	UT
Method EPA 353.2			
Nitrate-nitrite	7/1/2012	11/30/2013	UT
Method EPA 354.1			
Nitrite as N	7/1/2012	11/30/2013	UT
Method EPA 365.2			
Orthophosphate as P	7/1/2012	11/30/2013	UT
Phosphorus, total	7/1/2012	11/30/2013	UT
Method EPA 376.1			
Sulfide	7/1/2012	11/30/2013	UT
Method EPA 415.1			
Total organic carbon	7/1/2012	11/30/2013	UT
Method EPA 608			
4,4'-DDD	7/1/2012	11/30/2013	UT
4,4'-DDE	7/1/2012	11/30/2013	UT
4,4'-DDT	7/1/2012	11/30/2013	UT
Aldrin	7/1/2012	11/30/2013	UT
alpha-BHC (alpha-Hexachlorocyclohexane)	7/1/2012	11/30/2013	UT
Aroclor-1016 (PCB-1016)	7/1/2012	11/30/2013	UT
Aroclor-1221 (PCB-1221)	7/1/2012	11/30/2013	UT
Aroclor-1232 (PCB-1232)	7/1/2012	11/30/2013	UT
Aroclor-1242 (PCB-1242)	7/1/2012	11/30/2013	UT
Aroclor-1248 (PCB-1248)	7/1/2012	11/30/2013	UT
Aroclor-1254 (PCB-1254)	7/1/2012	11/30/2013	UT
Aroclor-1260 (PCB-1260)	7/1/2012	11/30/2013	UT
beta-BHC (beta-Hexachlorocyclohexane)	7/1/2012	11/30/2013	UT
Chlordane (tech.)	7/1/2012	11/30/2013	UT
delta-BHC	7/1/2012	11/30/2013	UT
Dieldrin	7/1/2012	11/30/2013	UT
Endosulfan I	7/1/2012	11/30/2013	UT
Endosulfan II	7/1/2012	11/30/2013	UT
Endosulfan sulfate	7/1/2012	11/30/2013	UT
Endrin	7/1/2012	11/30/2013	UT
Endrin aldehyde	7/1/2012	11/30/2013	UT
Endrin ketone	7/1/2012	11/30/2013	UT
gamma-BHC (Lindane, gamma-HexachlorocyclohexanE)	7/1/2012	11/30/2013	UT
Heptachlor	7/1/2012	11/30/2013	UT
Heptachlor epoxide	7/1/2012	11/30/2013	UT
Methoxychlor	7/1/2012	11/30/2013	UT
Toxaphene (Chlorinated camphene)	7/1/2012	11/30/2013	UT
Method EPA 615			

	Start Date	Expires	AB
Program/Matrix: ***CWA (Non Potable Water)***			
2,4,5-T	7/1/2012	11/30/2013	UT
2,4-D	7/1/2012	11/30/2013	UT
2,4-DB	7/1/2012	11/30/2013	UT
Dalapon	7/1/2012	11/30/2013	UT
Dicamba	7/1/2012	11/30/2013	UT
Dichloroprop (Dichlorprop)	7/1/2012	11/30/2013	UT
MCPA	7/1/2012	11/30/2013	UT
MCPP	7/1/2012	11/30/2013	UT
Silvex (2,4,5-TP)	7/1/2012	11/30/2013	UT
Method EPA 900			
Gross-alpha	7/1/2012	11/30/2013	UT
Gross-beta	7/1/2012	11/30/2013	UT
Method EPA 901.1			
Gamma Emitters	7/1/2012	11/30/2013	UT
Method EPA 903			
Radium-226	7/1/2012	11/30/2013	UT
Total radium	7/1/2012	11/30/2013	UT
Method EPA 903.1			
Radium-226	7/1/2012	11/30/2013	UT
Method EPA 904			
Radium-228	7/1/2012	11/30/2013	UT
Method EPA 906.0			
Tritium	7/1/2012	11/30/2013	UT
Method HASL 300 U-02-RC			
Uranium	7/1/2012	11/30/2013	UT
Method SM 2320 B			
Alkalinity as CaCO3	7/1/2012	11/30/2013	UT
Method SM 2340 B			
Total hardness as CaCO3	7/1/2012	11/30/2013	UT
Method SM 2510 B			
Conductivity	7/1/2012	11/30/2013	UT
Method SM 2540 B			
Residue-total	7/1/2012	11/30/2013	UT
Method SM 2540 C			
Residue-filterable (TDS)	7/1/2012	11/30/2013	UT
Method SM 2540 D			
Residue-nonfilterable (TSS)	7/1/2012	11/30/2013	UT
Method SM 3500-Cr D			
Chromium VI	7/1/2012	11/30/2013	UT
Method SM 4500-CN⁻ C			
Cyanide	7/1/2012	11/30/2013	UT
Method SM 4500-CN⁻ E			
Cyanide	7/1/2012	11/30/2013	UT
Method SM 4500-CN⁻ G			
Cyanide	7/1/2012	11/30/2013	UT

	Start Date	Expires	AB
Program/Matrix: ***CWA (Non Potable Water)***			
Method SM 4500-F$^-$ C			
Fluoride	7/1/2012	11/30/2013	UT
Method SM 4500-H+ B			
pH	7/1/2012	11/30/2013	UT
Method SM 4500-NH3 H			
Ammonia as N	7/1/2012	11/30/2013	UT
Method SM 4500-NO2$^-$ B			
Nitrite as N	7/1/2012	11/30/2013	UT
Method SM 4500-P E			
Orthophosphate as P	7/1/2012	11/30/2013	UT
Phosphorus, total	7/1/2012	11/30/2013	UT
Method SM 4500-S2$^-$ F			
Sulfide	7/1/2012	11/30/2013	UT
Method SM 5310 C			
Total organic carbon	7/1/2012	11/30/2013	UT
Method SM 7500-3H B			
Tritium	7/1/2012	11/30/2013	UT
Method SM 7500-Rn B			
Radon-222	7/1/2012	11/30/2013	UT

Program/Matrix: ***RCRA (Non Potable Water)***

	Start Date	Expires	AB
Method ASTM D3972-90			
Thorium-228	7/1/2012	11/30/2013	UT
Thorium-230	7/1/2012	11/30/2013	UT
Thorium-232	7/1/2012	11/30/2013	UT
Method EPA 053917 p. 33 EMSL LV			
Thorium-228	7/1/2012	11/30/2013	UT
Thorium-230	7/1/2012	11/30/2013	UT
Thorium-232	7/1/2012	11/30/2013	UT
Method EPA 1010A			
Ignitability	7/1/2012	11/30/2013	UT
Method EPA 1110A			
Corrosivity toward steel	7/1/2012	11/30/2013	UT
Method EPA 1311			
Toxicity Characteristic Leaching Procedure Metals	7/1/2012	11/30/2013	UT
Toxicity Characteristic Leaching Procedure Semi-Volatiles	7/1/2012	11/30/2013	UT
Toxicity Characteristic Leaching Procedure Volatiles	7/1/2012	11/30/2013	UT
Method EPA 1312			
Preparation/Extraction	7/1/2012	11/30/2013	UT
Method EPA 1664A			
Total recoverable petroleum hydrocarbons (TRPH)	7/1/2012	11/30/2013	UT
Method EPA 1664A (HEM)			
Oil & Grease	7/1/2012	11/30/2013	UT
Method EPA 3005A			
Preparation/Extraction	7/1/2012	11/30/2013	UT
Method EPA 3010A			
Preparation/Extraction	7/1/2012	11/30/2013	UT
Method EPA 3510C			
Preparation/Extraction	7/1/2012	11/30/2013	UT
Method EPA 3520C			
Preparation/Extraction	7/1/2012	11/30/2013	UT
Method EPA 3620B			
Preparation/Extraction	7/1/2012	11/30/2013	UT
Method EPA 3630C			
Preparation/Extraction	7/1/2012	11/30/2013	UT
Method EPA 3640A			
Preparation/Extraction	7/1/2012	11/30/2013	UT
Method EPA 3660A			
Preparation/Extraction	7/1/2012	11/30/2013	UT
Method EPA 5030C			
Preparation/Extraction	7/1/2012	11/30/2013	UT
Method EPA 6010B			
Aluminum	7/1/2012	11/30/2013	UT
Antimony	7/1/2012	11/30/2013	UT
Arsenic	7/1/2012	11/30/2013	UT

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Program/Matrix: *RCRA (Non Potable Water)*

	Start Date	Expires	AB
Barium	7/1/2012	11/30/2013	UT
Beryllium	7/1/2012	11/30/2013	UT
Boron	7/1/2012	11/30/2013	UT
Cadmium	7/1/2012	11/30/2013	UT
Calcium	7/1/2012	11/30/2013	UT
Chromium	7/1/2012	11/30/2013	UT
Cobalt	7/1/2012	11/30/2013	UT
Copper	7/1/2012	11/30/2013	UT
Iron	7/1/2012	11/30/2013	UT
Lead	7/1/2012	11/30/2013	UT
Lithium	7/1/2012	11/30/2013	UT
Magnesium	7/1/2012	11/30/2013	UT
Manganese	7/1/2012	11/30/2013	UT
Molybdenum	7/1/2012	11/30/2013	UT
Nickel	7/1/2012	11/30/2013	UT
Phosphorus, total	7/1/2012	11/30/2013	UT
Potassium	7/1/2012	11/30/2013	UT
Selenium	7/1/2012	11/30/2013	UT
Silica as SiO2	7/1/2012	11/30/2013	UT
Silicon	7/1/2012	11/30/2013	UT
Silver	7/1/2012	11/30/2013	UT
Sodium	7/1/2012	11/30/2013	UT
Strontium	7/1/2012	11/30/2013	UT
Thallium	7/1/2012	11/30/2013	UT
Tin	7/1/2012	11/30/2013	UT
Titanium	7/1/2012	11/30/2013	UT
Vanadium	7/1/2012	11/30/2013	UT
Zinc	7/1/2012	11/30/2013	UT
Method EPA 6020A			
Aluminum	7/1/2012	11/30/2013	UT
Antimony	7/1/2012	11/30/2013	UT
Arsenic	7/1/2012	11/30/2013	UT
Cadmium	7/1/2012	11/30/2013	UT
Calcium	7/1/2012	11/30/2013	UT
Copper	7/1/2012	11/30/2013	UT
Iron	7/1/2012	11/30/2013	UT
Lead	7/1/2012	11/30/2013	UT
Magnesium	7/1/2012	11/30/2013	UT
Molybdenum	7/1/2012	11/30/2013	UT
Nickel	7/1/2012	11/30/2013	UT
Potassium	7/1/2012	11/30/2013	UT
Selenium	7/1/2012	11/30/2013	UT
Silver	7/1/2012	11/30/2013	UT
Strontium	7/1/2012	11/30/2013	UT
Thallium	7/1/2012	11/30/2013	UT
Thorium	7/1/2012	11/30/2013	UT
Uranium	7/1/2012	11/30/2013	UT
Vanadium	7/1/2012	11/30/2013	UT

Program/Matrix: ***RCRA (Non Potable Water)***

	Start Date	Expires	AB
Method EPA 7196A			
Chromium VI	7/1/2012	11/30/2013	UT
Method EPA 7470A			
Mercury	7/1/2012	11/30/2013	UT
Method EPA 8015D			
Diesel range organics (DRO)	7/1/2012	11/30/2013	UT
Ethylene glycol	7/1/2012	11/30/2013	UT
Gasoline range organics (GRO)	7/1/2012	11/30/2013	UT
Method EPA 8081A			
4,4'-DDD	7/1/2012	11/30/2013	UT
4,4'-DDE	7/1/2012	11/30/2013	UT
4,4'-DDT	7/1/2012	11/30/2013	UT
Aldrin	7/1/2012	11/30/2013	UT
alpha-BHC (alpha-Hexachlorocyclohexane)	7/1/2012	11/30/2013	UT
alpha-Chlordane	7/1/2012	11/30/2013	UT
beta-BHC (beta-Hexachlorocyclohexane)	7/1/2012	11/30/2013	UT
Chlordane (tech.)	7/1/2012	11/30/2013	UT
delta-BHC	7/1/2012	11/30/2013	UT
Dieldrin	7/1/2012	11/30/2013	UT
Endosulfan I	7/1/2012	11/30/2013	UT
Endosulfan II	7/1/2012	11/30/2013	UT
Endosulfan sulfate	7/1/2012	11/30/2013	UT
Endrin	7/1/2012	11/30/2013	UT
Endrin aldehyde	7/1/2012	11/30/2013	UT
Endrin ketone	7/1/2012	11/30/2013	UT
gamma-BHC (Lindane, gamma-HexachlorocyclohexanE)	7/1/2012	11/30/2013	UT
gamma-Chlordane	7/1/2012	11/30/2013	UT
Heptachlor	7/1/2012	11/30/2013	UT
Heptachlor epoxide	7/1/2012	11/30/2013	UT
Methoxychlor	7/1/2012	11/30/2013	UT
Toxaphene (Chlorinated camphene)	7/1/2012	11/30/2013	UT
Method EPA 8082			
Aroclor-1016 (PCB-1016)	7/1/2012	11/30/2013	UT
Aroclor-1221 (PCB-1221)	7/1/2012	11/30/2013	UT
Aroclor-1232 (PCB-1232)	7/1/2012	11/30/2013	UT
Aroclor-1242 (PCB-1242)	7/1/2012	11/30/2013	UT
Aroclor-1248 (PCB-1248)	7/1/2012	11/30/2013	UT
Aroclor-1254 (PCB-1254)	7/1/2012	11/30/2013	UT
Aroclor-1260 (PCB-1260)	7/1/2012	11/30/2013	UT
Aroclor-1268 (PCB-1268)	7/1/2012	11/30/2013	UT
PCBs	7/1/2012	11/30/2013	UT
Method EPA 8141A			
Azinphos-methyl (Guthion)	7/1/2012	11/30/2013	UT
Bolstar (Sulprofos)	7/1/2012	11/30/2013	UT
Chlorpyrifos	7/1/2012	11/30/2013	UT
Coumaphos	7/1/2012	11/30/2013	UT
Demeton-o	7/1/2012	11/30/2013	UT

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	Start Date	Expires	AB
Program/Matrix: *RCRA (Non Potable Water)*			
Demeton-s	7/1/2012	11/30/2013	UT
Diazinon	7/1/2012	11/30/2013	UT
Dichlorovos (DDVP, Dichlorvos)	7/1/2012	11/30/2013	UT
Disulfoton	7/1/2012	11/30/2013	UT
Ethoprop	7/1/2012	11/30/2013	UT
Fensulfothion	7/1/2012	11/30/2013	UT
Fenthion	7/1/2012	11/30/2013	UT
Malathion	7/1/2012	11/30/2013	UT
Merphos	7/1/2012	11/30/2013	UT
Methyl parathion (Parathion, methyl)	7/1/2012	11/30/2013	UT
Mevinphos	7/1/2012	11/30/2013	UT
Naled	7/1/2012	11/30/2013	UT
Phorate	7/1/2012	11/30/2013	UT
Ronnel	7/1/2012	11/30/2013	UT
Tetrachlorvinphos (Stirophos, Gardona) Z-isomer	7/1/2012	11/30/2013	UT
Tokuthion (Prothiophos)	7/1/2012	11/30/2013	UT
Trichloronate	7/1/2012	11/30/2013	UT
Method EPA 8151A			
2,4,5-T	7/1/2012	11/30/2013	UT
2,4-D	7/1/2012	11/30/2013	UT
2,4-DB	7/1/2012	11/30/2013	UT
Dalapon	7/1/2012	11/30/2013	UT
Dicamba	7/1/2012	11/30/2013	UT
Dichloroprop (Dichlorprop)	7/1/2012	11/30/2013	UT
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	7/1/2012	11/30/2013	UT
MCPA	7/1/2012	11/30/2013	UT
MCPP	7/1/2012	11/30/2013	UT
Silvex (2,4,5-TP)	7/1/2012	11/30/2013	UT
Method EPA 8260C			
1,1,1,2-Tetrachloroethane	7/1/2012	11/30/2013	UT
1,1,1-Trichloroethane	7/1/2012	11/30/2013	UT
1,1,2,2-Tetrachloroethane	7/1/2012	11/30/2013	UT
1,1,2-Trichloroethane	7/1/2012	11/30/2013	UT
1,1-Dichloroethane	7/1/2012	11/30/2013	UT
1,1-Dichloroethylene	7/1/2012	11/30/2013	UT
1,2,3-Trichlorobenzene	7/1/2012	11/30/2013	UT
1,2,3-Trichloropropane	7/1/2012	11/30/2013	UT
1,2,3-Trimethylbenzene	7/1/2012	11/30/2013	UT
1,2,4-Trichlorobenzene	7/1/2012	11/30/2013	UT
1,2-Dibromo-3-chloropropane (DBCP)	7/1/2012	11/30/2013	UT
1,2-Dibromoethane (EDB, Ethylene dibromide)	7/1/2012	11/30/2013	UT
1,2-Dichlorobenzene (o-Dichlorobenzene)	7/1/2012	11/30/2013	UT
1,2-Dichloroethane (Ethylene dichloride)	7/1/2012	11/30/2013	UT
1,2-Dichloropropane	7/1/2012	11/30/2013	UT
1,3,5-Trimethylbenzene	7/1/2012	11/30/2013	UT
1,3-Dichlorobenzene	7/1/2012	11/30/2013	UT
1,3-Dichloropropane	7/1/2012	11/30/2013	UT
1,4-Dichlorobenzene	7/1/2012	11/30/2013	UT

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Program/Matrix: ***RCRA (Non Potable Water)***

	Start Date	Expires	AB
1,4-Dioxane (1,4- Diethyleneoxide)	7/1/2012	11/30/2013	UT
1-Chlorobutane	1/23/2013	11/30/2013	UT
1-Chlorohexane	7/1/2012	11/30/2013	UT
2,2-Dichloropropane	7/1/2012	11/30/2013	UT
2-Butanone (Methyl ethyl ketone, MEK)	7/1/2012	11/30/2013	UT
2-Chloroethyl vinyl ether	7/1/2012	11/30/2013	UT
2-Chlorotoluene	7/1/2012	11/30/2013	UT
2-Hexanone	7/1/2012	11/30/2013	UT
4-Chlorotoluene	7/1/2012	11/30/2013	UT
4-Isopropyltoluene (p-Cymene,p-Isopropyltoluene)	7/1/2012	11/30/2013	UT
4-Methyl-2-pentanone (MIBK)	7/1/2012	11/30/2013	UT
Acetone	7/1/2012	11/30/2013	UT
Acetonitrile	7/1/2012	11/30/2013	UT
Acrolein (Propenal)	7/1/2012	11/30/2013	UT
Acrylonitrile	7/1/2012	11/30/2013	UT
Allyl chloride (3-Chloropropene)	7/1/2012	11/30/2013	UT
Benzene	7/1/2012	11/30/2013	UT
Bromobenzene	7/1/2012	11/30/2013	UT
Bromochloromethane	7/1/2012	11/30/2013	UT
Bromodichloromethane	7/1/2012	11/30/2013	UT
Bromoform	7/1/2012	11/30/2013	UT
Carbon disulfide	7/1/2012	11/30/2013	UT
Carbon tetrachloride	7/1/2012	11/30/2013	UT
Chloroacetonitrile	1/23/2013	11/30/2013	UT
Chlorobenzene	7/1/2012	11/30/2013	UT
Chlorodibromomethane	7/1/2012	11/30/2013	UT
Chloroethane (Ethyl chloride)	7/1/2012	11/30/2013	UT
Chloroform	7/1/2012	11/30/2013	UT
Chloroprene (2-Chloro-1,3-butadiene)	7/1/2012	11/30/2013	UT
cis-1,2-Dichloroethylene	7/1/2012	11/30/2013	UT
cis-1,3-Dichloropropene	7/1/2012	11/30/2013	UT
Dibromomethane (Methylene bromide)	7/1/2012	11/30/2013	UT
Dichlorodifluoromethane (Freon-12)	7/1/2012	11/30/2013	UT
Diethyl ether	7/1/2012	11/30/2013	UT
Ethanol	7/1/2012	11/30/2013	UT
Ethyl methacrylate	7/1/2012	11/30/2013	UT
Ethylbenzene	7/1/2012	11/30/2013	UT
Hexachlorobutadiene	7/1/2012	11/30/2013	UT
Hexachloroethane	7/1/2012	11/30/2013	UT
Iodomethane (Methyl iodide)	7/1/2012	11/30/2013	UT
Isobutyl alcohol (2-Methyl-1-propanol)	7/1/2012	11/30/2013	UT
Isopropylbenzene	7/1/2012	11/30/2013	UT
Methacrylonitrile	7/1/2012	11/30/2013	UT
Methyl acrylate	1/23/2013	11/30/2013	UT
Methyl bromide (Bromomethane)	7/1/2012	11/30/2013	UT
Methyl chloride (Chloromethane)	7/1/2012	11/30/2013	UT
Methyl methacrylate	7/1/2012	11/30/2013	UT
Methyl tert-butyl ether (MTBE)	7/1/2012	11/30/2013	UT
Methylene chloride (Dichloromethane)	7/1/2012	11/30/2013	UT

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Program/Matrix: *RCRA (Non Potable Water)*

	Start Date	Expires	AB
m-Xylene	7/1/2012	11/30/2013	UT
Naphthalene	7/1/2012	11/30/2013	UT
n-Butyl alcohol (1-Butanol, n-Butanol)	7/1/2012	11/30/2013	UT
n-Butylbenzene	7/1/2012	11/30/2013	UT
n-Propylbenzene	7/1/2012	11/30/2013	UT
o-Xylene	7/1/2012	11/30/2013	UT
Pentafluorobenzene	1/23/2013	11/30/2013	UT
Propionitrile (Ethyl cyanide)	7/1/2012	11/30/2013	UT
p-Xylene	7/1/2012	11/30/2013	UT
sec-Butylbenzene	7/1/2012	11/30/2013	UT
Styrene	7/1/2012	11/30/2013	UT
Tetrachloroethylene (Perchloroethylene)	7/1/2012	11/30/2013	UT
Toluene	7/1/2012	11/30/2013	UT
trans-1,2-Dichloroethylene	7/1/2012	11/30/2013	UT
trans-1,3-Dichloropropylene	7/1/2012	11/30/2013	UT
trans-1,4-Dichloro-2-butene	7/1/2012	11/30/2013	UT
Trichloroethene (Trichloroethylene)	7/1/2012	11/30/2013	UT
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	7/1/2012	11/30/2013	UT
Vinyl acetate	7/1/2012	11/30/2013	UT
Vinyl chloride	7/1/2012	11/30/2013	UT
Xylene (total)	7/1/2012	11/30/2013	UT
Method EPA 8270D			
1,2,4,5-Tetrachlorobenzene	7/1/2012	11/30/2013	UT
1,2,4-Trichlorobenzene	7/1/2012	11/30/2013	UT
1,2-Dichlorobenzene (o-Dichlorobenzene)	7/1/2012	11/30/2013	UT
1,2-Dinitrobenzene	7/1/2012	11/30/2013	UT
1,3,5-Trinitrobenzene (1,3,5-TNB)	7/1/2012	11/30/2013	UT
1,3-Dichlorobenzene	7/1/2012	11/30/2013	UT
1,3-Dinitrobenzene (1,3-DNB)	7/1/2012	11/30/2013	UT
1,4-Dichlorobenzene	7/1/2012	11/30/2013	UT
1,4-Dinitrobenzene	7/1/2012	11/30/2013	UT
1-Methylnaphthalene	7/1/2012	11/30/2013	UT
1-Naphthylamine	7/1/2012	11/30/2013	UT
2,3,4,6-Tetrachlorophenol	7/1/2012	11/30/2013	UT
2,4,5-Trichlorophenol	7/1/2012	11/30/2013	UT
2,4,6-Trichlorophenol	7/1/2012	11/30/2013	UT
2,4-Dichlorophenol	7/1/2012	11/30/2013	UT
2,4-Dimethylphenol	7/1/2012	11/30/2013	UT
2,4-Dinitrophenol	7/1/2012	11/30/2013	UT
2,4-Dinitrotoluene (2,4-DNT)	7/1/2012	11/30/2013	UT
2,6-Dichlorophenol	7/1/2012	11/30/2013	UT
2,6-Dinitrotoluene (2,6-DNT)	7/1/2012	11/30/2013	UT
2-Acetylaminofluorene	7/1/2012	11/30/2013	UT
2-Chloronaphthalene	7/1/2012	11/30/2013	UT
2-Chlorophenol	7/1/2012	11/30/2013	UT
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	7/1/2012	11/30/2013	UT
2-Methylnaphthalene	7/1/2012	11/30/2013	UT
2-Methylphenol (o-Cresol)	7/1/2012	11/30/2013	UT

ALS Laboratory Group, Environmental Division (Fort Collins, CO)

Program/Matrix: ***RCRA (Non Potable Water)***

	Start Date	Expires	AB
2-Naphthylamine	7/1/2012	11/30/2013	UT
2-Nitroaniline	7/1/2012	11/30/2013	UT
2-Nitrophenol	7/1/2012	11/30/2013	UT
3,3'-Dichlorobenzidine	7/1/2012	11/30/2013	UT
3-Methylcholanthrene	7/1/2012	11/30/2013	UT
3-Methylphenol (m-Cresol)	7/1/2012	11/30/2013	UT
3-Nitroaniline	7/1/2012	11/30/2013	UT
4-Bromophenyl phenyl ether	7/1/2012	11/30/2013	UT
4-Chloro-3-methylphenol	7/1/2012	11/30/2013	UT
4-Chloroaniline	7/1/2012	11/30/2013	UT
4-Chlorophenyl phenylether	7/1/2012	11/30/2013	UT
4-Methylphenol (p-Cresol)	7/1/2012	11/30/2013	UT
4-Nitroaniline	7/1/2012	11/30/2013	UT
4-Nitrophenol	7/1/2012	11/30/2013	UT
5-Nitro-o-toluidine	7/1/2012	11/30/2013	UT
7,12-Dimethylbenz(a) anthracene	7/1/2012	11/30/2013	UT
Acenaphthene	7/1/2012	11/30/2013	UT
Acenaphthylene	7/1/2012	11/30/2013	UT
Acetophenone	7/1/2012	11/30/2013	UT
Aniline	7/1/2012	11/30/2013	UT
Anthracene	7/1/2012	11/30/2013	UT
Azobenzene (1,2-Diphenylhydrazine)	7/1/2012	11/30/2013	UT
Benzidine	7/1/2012	11/30/2013	UT
Benzo(a)anthracene	7/1/2012	11/30/2013	UT
Benzo(a)pyrene	7/1/2012	11/30/2013	UT
Benzo(b)fluoranthene	7/1/2012	11/30/2013	UT
Benzo(g,h,i)perylene	7/1/2012	11/30/2013	UT
Benzo(k)fluoranthene	7/1/2012	11/30/2013	UT
Benzoic acid	7/1/2012	11/30/2013	UT
Benzyl alcohol	7/1/2012	11/30/2013	UT
bis(2-Chloroethoxy)methane	7/1/2012	11/30/2013	UT
bis(2-Chloroethyl) ether	7/1/2012	11/30/2013	UT
bis(2-Chloroisopropyl) ether	7/1/2012	11/30/2013	UT
bis(2-Ethylhexyl) phthalate (DEHP)	7/1/2012	11/30/2013	UT
Butyl benzyl phthalate	7/1/2012	11/30/2013	UT
Carbazole	7/1/2012	11/30/2013	UT
Chrysene	7/1/2012	11/30/2013	UT
Dibenz(a,h) anthracene	7/1/2012	11/30/2013	UT
Dibenzofuran	7/1/2012	11/30/2013	UT
Diethyl phthalate	7/1/2012	11/30/2013	UT
Dimethyl phthalate	7/1/2012	11/30/2013	UT
Di-n-butyl phthalate	7/1/2012	11/30/2013	UT
Di-n-octyl phthalate	7/1/2012	11/30/2013	UT
Ethyl methanesulfonate	7/1/2012	11/30/2013	UT
Fluoranthene	7/1/2012	11/30/2013	UT
Fluorene	7/1/2012	11/30/2013	UT
Hexachlorobenzene	7/1/2012	11/30/2013	UT
Hexachlorobutadiene	7/1/2012	11/30/2013	UT
Hexachlorocyclopentadiene	7/1/2012	11/30/2013	UT

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	Start Date	Expires	AB
Program/Matrix: *RCRA (Non Potable Water)*			
Hexachloroethane	7/1/2012	11/30/2013	UT
Hexachloropropene	7/1/2012	11/30/2013	UT
Indeno(1,2,3-cd) pyrene	7/1/2012	11/30/2013	UT
Isophorone	7/1/2012	11/30/2013	UT
Isosafrole	7/1/2012	11/30/2013	UT
Methyl methanesulfonate	7/1/2012	11/30/2013	UT
Naphthalene	7/1/2012	11/30/2013	UT
Nitrobenzene	7/1/2012	11/30/2013	UT
n-Nitrosodiethylamine	7/1/2012	11/30/2013	UT
n-Nitrosodimethylamine	7/1/2012	11/30/2013	UT
n-Nitroso-di-n-butylamine	7/1/2012	11/30/2013	UT
n-Nitrosodi-n-propylamine	7/1/2012	11/30/2013	UT
n-Nitrosodiphenylamine	7/1/2012	11/30/2013	UT
n-Nitrosomethylethalamine	7/1/2012	11/30/2013	UT
n-Nitrosomorpholine	7/1/2012	11/30/2013	UT
n-Nitrosopiperidine	7/1/2012	11/30/2013	UT
n-Nitrosopyrrolidine	7/1/2012	11/30/2013	UT
Pentachlorobenzene	7/1/2012	11/30/2013	UT
Pentachloronitrobenzene	7/1/2012	11/30/2013	UT
Pentachlorophenol	7/1/2012	11/30/2013	UT
Phenacetin	7/1/2012	11/30/2013	UT
Phenanthrene	7/1/2012	11/30/2013	UT
Phenol	7/1/2012	11/30/2013	UT
Pyrene	7/1/2012	11/30/2013	UT
Pyridine	7/1/2012	11/30/2013	UT
Safrole	7/1/2012	11/30/2013	UT
Method EPA 901.1			
Cesium-134	7/1/2012	11/30/2013	UT
Cesium-137	7/1/2012	11/30/2013	UT
Cobalt-60	7/1/2012	11/30/2013	UT
Method EPA 9010C			
Cyanide	7/1/2012	11/30/2013	UT
Method EPA 9013A			
Preparation/Extraction	7/1/2012	11/30/2013	UT
Method EPA 9014			
Cyanide	7/1/2012	11/30/2013	UT
Method EPA 9034			
Total sulfides	7/1/2012	11/30/2013	UT
Method EPA 9040C			
pH	7/1/2012	11/30/2013	UT
Method EPA 9050A			
Conductivity	7/1/2012	11/30/2013	UT
Method EPA 9056A			
Bromide	7/1/2012	11/30/2013	UT
Chloride	7/1/2012	11/30/2013	UT
Fluoride	7/1/2012	11/30/2013	UT
Nitrate as N	7/1/2012	11/30/2013	UT

	Start Date	Expires	AB
Program/Matrix: ***RCRA (Non Potable Water)***			
Nitrite as N	7/1/2012	11/30/2013	UT
Orthophosphate as P	7/1/2012	11/30/2013	UT
Sulfate	7/1/2012	11/30/2013	UT
Method EPA 906.0			
Tritium	7/1/2012	11/30/2013	UT
Method EPA 9060A			
Total organic carbon	7/1/2012	11/30/2013	UT
Method EPA 9214			
Fluoride	7/1/2012	11/30/2013	UT
Method EPA 9310			
Gross alpha-beta	7/1/2012	11/30/2013	UT
Method EPA 9315			
Total alpha radium	7/1/2012	11/30/2013	UT
Method EPA 9320			
Radium-228	7/1/2012	11/30/2013	UT
Method EPA RSK-175 (GC/FID)			
Ethane	7/1/2012	11/30/2013	UT
Ethene	7/1/2012	11/30/2013	UT
Methane	7/1/2012	11/30/2013	UT
n-Propane	7/1/2012	11/30/2013	UT
Method HASL 300 Ga-01-R sec 4.5.2.3			
Cesium-134	7/1/2012	11/30/2013	UT
Cesium-137	7/1/2012	11/30/2013	UT
Cobalt-60	7/1/2012	11/30/2013	UT
Method HASL 300 Sr-01-RC (GPC)			
Strontium-89, 90	7/1/2012	11/30/2013	UT
Method HASL 300 U-02-RC			
Americium-241	7/1/2012	11/30/2013	UT
Plutonium	7/1/2012	11/30/2013	UT
Thorium-228	7/1/2012	11/30/2013	UT
Thorium-230	7/1/2012	11/30/2013	UT
Thorium-232	7/1/2012	11/30/2013	UT
Method SM 7500-Ra C (SC)			
Radium-226	7/1/2012	11/30/2013	UT

Program/Matrix: ***RCRA (Solid & Hazardous Material)***

	Start Date	Expires	AB
Method ASTM D3972-90			
Thorium-228	7/1/2012	11/30/2013	UT
Thorium-230	7/1/2012	11/30/2013	UT
Thorium-232	7/1/2012	11/30/2013	UT
Method EPA 053917 p. 33 EMSL LV			
Thorium-228	7/1/2012	11/30/2013	UT
Thorium-230	7/1/2012	11/30/2013	UT
Thorium-232	7/1/2012	11/30/2013	UT
Method EPA 1010A			
Ignitability	7/1/2012	11/30/2013	UT
Method EPA 1110A			
Corrosivity toward steel	7/1/2012	11/30/2013	UT
Method EPA 1311			
Toxicity Characteristic Leaching Procedure Metals	7/1/2012	11/30/2013	UT
Toxicity Characteristic Leaching Procedure Semi-Volatiles	7/1/2012	11/30/2013	UT
Toxicity Characteristic Leaching Procedure Volatiles	7/1/2012	11/30/2013	UT
Method EPA 1312			
Preparation/Extraction	7/1/2012	11/30/2013	UT
Method EPA 3050B			
Preparation/Extraction	7/1/2012	11/30/2013	UT
Method EPA 3060A			
Preparation/Extraction	7/1/2012	11/30/2013	UT
Method EPA 3540C			
Preparation/Extraction	7/1/2012	11/30/2013	UT
Method EPA 3580A			
Preparation/Extraction	7/1/2012	11/30/2013	UT
Method EPA 3620B			
Preparation/Extraction	7/1/2012	11/30/2013	UT
Method EPA 3630C			
Preparation/Extraction	7/1/2012	11/30/2013	UT
Method EPA 3640A			
Preparation/Extraction	7/1/2012	11/30/2013	UT
Method EPA 3660A			
Preparation/Extraction	7/1/2012	11/30/2013	UT
Method EPA 5035A			
Preparation/Extraction	1/23/2013	11/30/2013	UT
Method EPA 6010B			
Aluminum	7/1/2012	11/30/2013	UT
Antimony	7/1/2012	11/30/2013	UT
Arsenic	7/1/2012	11/30/2013	UT
Barium	7/1/2012	11/30/2013	UT
Beryllium	7/1/2012	11/30/2013	UT
Boron	7/1/2012	11/30/2013	UT
Cadmium	7/1/2012	11/30/2013	UT
Calcium	7/1/2012	11/30/2013	UT

	Start Date	Expires	AB
Program/Matrix: *RCRA (Solid & Hazardous Material)*			
Chromium	7/1/2012	11/30/2013	UT
Cobalt	7/1/2012	11/30/2013	UT
Copper	7/1/2012	11/30/2013	UT
Iron	7/1/2012	11/30/2013	UT
Lead	7/1/2012	11/30/2013	UT
Lithium	7/1/2012	11/30/2013	UT
Magnesium	7/1/2012	11/30/2013	UT
Manganese	7/1/2012	11/30/2013	UT
Molybdenum	7/1/2012	11/30/2013	UT
Nickel	7/1/2012	11/30/2013	UT
Phosphorus, total	7/1/2012	11/30/2013	UT
Potassium	7/1/2012	11/30/2013	UT
Selenium	7/1/2012	11/30/2013	UT
Silica as SiO2	7/1/2012	11/30/2013	UT
Silicon	7/1/2012	11/30/2013	UT
Silver	7/1/2012	11/30/2013	UT
Sodium	7/1/2012	11/30/2013	UT
Strontium	7/1/2012	11/30/2013	UT
Thallium	7/1/2012	11/30/2013	UT
Tin	7/1/2012	11/30/2013	UT
Titanium	7/1/2012	11/30/2013	UT
Vanadium	7/1/2012	11/30/2013	UT
Zinc	7/1/2012	11/30/2013	UT
Method EPA 6020A			
Aluminum	7/1/2012	11/30/2013	UT
Antimony	7/1/2012	11/30/2013	UT
Arsenic	7/1/2012	11/30/2013	UT
Cadmium	7/1/2012	11/30/2013	UT
Calcium	7/1/2012	11/30/2013	UT
Copper	7/1/2012	11/30/2013	UT
Iron	7/1/2012	11/30/2013	UT
Lead	7/1/2012	11/30/2013	UT
Magnesium	7/1/2012	11/30/2013	UT
Molybdenum	7/1/2012	11/30/2013	UT
Nickel	7/1/2012	11/30/2013	UT
Potassium	7/1/2012	11/30/2013	UT
Selenium	7/1/2012	11/30/2013	UT
Silver	7/1/2012	11/30/2013	UT
Strontium	7/1/2012	11/30/2013	UT
Thallium	7/1/2012	11/30/2013	UT
Thorium	7/1/2012	11/30/2013	UT
Uranium	7/1/2012	11/30/2013	UT
Vanadium	7/1/2012	11/30/2013	UT
Method EPA 7196A			
Chromium VI	7/1/2012	11/30/2013	UT
Method EPA 7471A			
Mercury	7/1/2012	11/30/2013	UT
Method EPA 8015D			

	Start Date	Expires	AB
Program/Matrix: *RCRA (Solid & Hazardous Material)*			
Diesel range organics (DRO)	7/1/2012	11/30/2013	UT
Ethylene glycol	7/1/2012	11/30/2013	UT
Gasoline range organics (GRO)	7/1/2012	11/30/2013	UT
Method EPA 8081A			
4,4'-DDD	7/1/2012	11/30/2013	UT
4,4'-DDE	7/1/2012	11/30/2013	UT
4,4'-DDT	7/1/2012	11/30/2013	UT
Aldrin	7/1/2012	11/30/2013	UT
alpha-BHC (alpha-Hexachlorocyclohexane)	7/1/2012	11/30/2013	UT
alpha-Chlordane	7/1/2012	11/30/2013	UT
beta-BHC (beta-Hexachlorocyclohexane)	7/1/2012	11/30/2013	UT
Chlordane (tech.)	7/1/2012	11/30/2013	UT
delta-BHC	7/1/2012	11/30/2013	UT
Dieldrin	7/1/2012	11/30/2013	UT
Endosulfan I	7/1/2012	11/30/2013	UT
Endosulfan II	7/1/2012	11/30/2013	UT
Endosulfan sulfate	7/1/2012	11/30/2013	UT
Endrin	7/1/2012	11/30/2013	UT
Endrin aldehyde	7/1/2012	11/30/2013	UT
Endrin ketone	7/1/2012	11/30/2013	UT
gamma-BHC (Lindane, gamma-HexachlorocyclohexanE)	7/1/2012	11/30/2013	UT
gamma-Chlordane	7/1/2012	11/30/2013	UT
Heptachlor	7/1/2012	11/30/2013	UT
Heptachlor epoxide	7/1/2012	11/30/2013	UT
Methoxychlor	7/1/2012	11/30/2013	UT
Toxaphene (Chlorinated camphene)	7/1/2012	11/30/2013	UT
Method EPA 8082			
Aroclor-1016 (PCB-1016)	7/1/2012	11/30/2013	UT
Aroclor-1221 (PCB-1221)	7/1/2012	11/30/2013	UT
Aroclor-1232 (PCB-1232)	7/1/2012	11/30/2013	UT
Aroclor-1242 (PCB-1242)	7/1/2012	11/30/2013	UT
Aroclor-1248 (PCB-1248)	7/1/2012	11/30/2013	UT
Aroclor-1254 (PCB-1254)	7/1/2012	11/30/2013	UT
Aroclor-1260 (PCB-1260)	7/1/2012	11/30/2013	UT
Aroclor-1268 (PCB-1268)	7/1/2012	11/30/2013	UT
PCBs	7/1/2012	11/30/2013	UT
Method EPA 8141A			
Azinphos-methyl (Guthion)	7/1/2012	11/30/2013	UT
Bolstar (Sulprofos)	7/1/2012	11/30/2013	UT
Chlorpyrifos	7/1/2012	11/30/2013	UT
Coumaphos	7/1/2012	11/30/2013	UT
Demeton-o	7/1/2012	11/30/2013	UT
Demeton-s	7/1/2012	11/30/2013	UT
Diazinon	7/1/2012	11/30/2013	UT
Dichlorovos (DDVP, Dichlorvos)	7/1/2012	11/30/2013	UT
Disulfoton	7/1/2012	11/30/2013	UT
Ethoprop	7/1/2012	11/30/2013	UT
Fensulfothion	7/1/2012	11/30/2013	UT

	Start Date	Expires	AB
Program/Matrix: ***RCRA (Solid & Hazardous Material)***			
Fenthion	7/1/2012	11/30/2013	UT
Malathion	7/1/2012	11/30/2013	UT
Merphos	7/1/2012	11/30/2013	UT
Methyl parathion (Parathion, methyl)	7/1/2012	11/30/2013	UT
Mevinphos	7/1/2012	11/30/2013	UT
Naled	7/1/2012	11/30/2013	UT
Phorate	7/1/2012	11/30/2013	UT
Ronnel	7/1/2012	11/30/2013	UT
Tetrachlorvinphos (Stirophos, Gardona) Z-isomer	7/1/2012	11/30/2013	UT
Tokuthion (Prothiophos)	7/1/2012	11/30/2013	UT
Trichloronate	7/1/2012	11/30/2013	UT
Method EPA 8151A			
2,4,5-T	7/1/2012	11/30/2013	UT
2,4-D	7/1/2012	11/30/2013	UT
2,4-DB	7/1/2012	11/30/2013	UT
Dalapon	7/1/2012	11/30/2013	UT
Dicamba	7/1/2012	11/30/2013	UT
Dichloroprop (Dichlorprop)	7/1/2012	11/30/2013	UT
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	7/1/2012	11/30/2013	UT
MCPA	7/1/2012	11/30/2013	UT
MCPP	7/1/2012	11/30/2013	UT
Silvex (2,4,5-TP)	7/1/2012	11/30/2013	UT
Method EPA 8260C			
1,1,1,2-Tetrachloroethane	7/1/2012	11/30/2013	UT
1,1,1-Trichloroethane	7/1/2012	11/30/2013	UT
1,1,2,2-Tetrachloroethane	7/1/2012	11/30/2013	UT
1,1,2-Trichloroethane	7/1/2012	11/30/2013	UT
1,1-Dichloroethane	7/1/2012	11/30/2013	UT
1,1-Dichloroethylene	7/1/2012	11/30/2013	UT
1,2,3-Trichlorobenzene	7/1/2012	11/30/2013	UT
1,2,3-Trichloropropane	7/1/2012	11/30/2013	UT
1,2,3-Trimethylbenzene	7/1/2012	11/30/2013	UT
1,2,4-Trichlorobenzene	7/1/2012	11/30/2013	UT
1,2-Dibromo-3-chloropropane (DBCP)	7/1/2012	11/30/2013	UT
1,2-Dibromoethane (EDB, Ethylene dibromide)	7/1/2012	11/30/2013	UT
1,2-Dichlorobenzene (o-Dichlorobenzene)	7/1/2012	11/30/2013	UT
1,2-Dichloroethane (Ethylene dichloride)	7/1/2012	11/30/2013	UT
1,2-Dichloropropane	7/1/2012	11/30/2013	UT
1,3,5-Trimethylbenzene	7/1/2012	11/30/2013	UT
1,3-Dichlorobenzene	7/1/2012	11/30/2013	UT
1,3-Dichloropropene	7/1/2012	11/30/2013	UT
1,4-Dichlorobenzene	7/1/2012	11/30/2013	UT
1,4-Dioxane (1,4- Diethyleneoxide)	7/1/2012	11/30/2013	UT
1-Chlorobutane	1/23/2013	11/30/2013	UT
1-Chlorohexane	7/1/2012	11/30/2013	UT
2,2-Dichloropropane	7/1/2012	11/30/2013	UT
2-Butanone (Methyl ethyl ketone, MEK)	7/1/2012	11/30/2013	UT
2-Chloroethyl vinyl ether	7/1/2012	11/30/2013	UT

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Program/Matrix: *RCRA (Solid & Hazardous Material)*

	Start Date	Expires	AB
2-Chlorotoluene	7/1/2012	11/30/2013	UT
2-Hexanone	7/1/2012	11/30/2013	UT
4-Chlorotoluene	7/1/2012	11/30/2013	UT
4-Isopropyltoluene (p-Cymene,p-Isopropyltoluene)	7/1/2012	11/30/2013	UT
4-Methyl-2-pentanone (MIBK)	7/1/2012	11/30/2013	UT
Acetone	7/1/2012	11/30/2013	UT
Acetonitrile	7/1/2012	11/30/2013	UT
Acrolein (Propenal)	7/1/2012	11/30/2013	UT
Acrylonitrile	7/1/2012	11/30/2013	UT
Allyl chloride (3-Chloropropene)	7/1/2012	11/30/2013	UT
Benzene	7/1/2012	11/30/2013	UT
Bromobenzene	7/1/2012	11/30/2013	UT
Bromochloromethane	7/1/2012	11/30/2013	UT
Bromodichloromethane	7/1/2012	11/30/2013	UT
Bromoform	7/1/2012	11/30/2013	UT
Carbon disulfide	7/1/2012	11/30/2013	UT
Carbon tetrachloride	7/1/2012	11/30/2013	UT
Chloroacetonitrile	1/23/2013	11/30/2013	UT
Chlorobenzene	7/1/2012	11/30/2013	UT
Chlorodibromomethane	7/1/2012	11/30/2013	UT
Chloroethane (Ethyl chloride)	7/1/2012	11/30/2013	UT
Chloroform	7/1/2012	11/30/2013	UT
Chloroprene (2-Chloro-1,3-butadiene)	7/1/2012	11/30/2013	UT
cis-1,2-Dichloroethylene	7/1/2012	11/30/2013	UT
cis-1,3-Dichloropropene	7/1/2012	11/30/2013	UT
Dibromomethane (Methylene bromide)	7/1/2012	11/30/2013	UT
Dichlorodifluoromethane (Freon-12)	7/1/2012	11/30/2013	UT
Diethyl ether	7/1/2012	11/30/2013	UT
Ethanol	7/1/2012	11/30/2013	UT
Ethyl methacrylate	7/1/2012	11/30/2013	UT
Ethylbenzene	7/1/2012	11/30/2013	UT
Hexachlorobutadiene	7/1/2012	11/30/2013	UT
Hexachloroethane	7/1/2012	11/30/2013	UT
Iodomethane (Methyl iodide)	7/1/2012	11/30/2013	UT
Isobutyl alcohol (2-Methyl-1-propanol)	7/1/2012	11/30/2013	UT
Isopropylbenzene	7/1/2012	11/30/2013	UT
Methacrylonitrile	7/1/2012	11/30/2013	UT
Methyl acrylate	1/23/2013	11/30/2013	UT
Methyl bromide (Bromomethane)	7/1/2012	11/30/2013	UT
Methyl chloride (Chloromethane)	7/1/2012	11/30/2013	UT
Methyl methacrylate	7/1/2012	11/30/2013	UT
Methyl tert-butyl ether (MTBE)	7/1/2012	11/30/2013	UT
Methylene chloride (Dichloromethane)	7/1/2012	11/30/2013	UT
m-Xylene	7/1/2012	11/30/2013	UT
Naphthalene	7/1/2012	11/30/2013	UT
n-Butyl alcohol (1-Butanol, n-Butanol)	7/1/2012	11/30/2013	UT
n-Butylbenzene	7/1/2012	11/30/2013	UT
n-Propylbenzene	7/1/2012	11/30/2013	UT
o-Xylene	7/1/2012	11/30/2013	UT

ALS Laboratory Group, Environmental Division (Fort Collins, CO)

Program/Matrix: *RCRA (Solid & Hazardous Material)*

	Start Date	Expires	AB
Pentafluorobenzene	1/23/2013	11/30/2013	UT
Propionitrile (Ethyl cyanide)	7/1/2012	11/30/2013	UT
p-Xylene	7/1/2012	11/30/2013	UT
sec-Butylbenzene	7/1/2012	11/30/2013	UT
Styrene	7/1/2012	11/30/2013	UT
Tetrachloroethylene (Perchloroethylene)	7/1/2012	11/30/2013	UT
Toluene	7/1/2012	11/30/2013	UT
trans-1,2-Dichloroethylene	7/1/2012	11/30/2013	UT
trans-1,3-Dichloropropylene	7/1/2012	11/30/2013	UT
trans-1,4-Dichloro-2-butene	7/1/2012	11/30/2013	UT
Trichloroethene (Trichloroethylene)	7/1/2012	11/30/2013	UT
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	7/1/2012	11/30/2013	UT
Vinyl acetate	7/1/2012	11/30/2013	UT
Vinyl chloride	7/1/2012	11/30/2013	UT
Xylene (total)	7/1/2012	11/30/2013	UT
Method EPA 8270D			
1,2,4,5-Tetrachlorobenzene	7/1/2012	11/30/2013	UT
1,2,4-Trichlorobenzene	7/1/2012	11/30/2013	UT
1,2-Dichlorobenzene (o-Dichlorobenzene)	7/1/2012	11/30/2013	UT
1,2-Dinitrobenzene	7/1/2012	11/30/2013	UT
1,3,5-Trinitrobenzene (1,3,5-TNB)	7/1/2012	11/30/2013	UT
1,3-Dichlorobenzene	7/1/2012	11/30/2013	UT
1,3-Dinitrobenzene (1,3-DNB)	7/1/2012	11/30/2013	UT
1,4-Dichlorobenzene	7/1/2012	11/30/2013	UT
1,4-Dinitrobenzene	7/1/2012	11/30/2013	UT
1-Methylnaphthalene	7/1/2012	11/30/2013	UT
1-Naphthylamine	7/1/2012	11/30/2013	UT
2,3,4,6-Tetrachlorophenol	7/1/2012	11/30/2013	UT
2,4,5-Trichlorophenol	7/1/2012	11/30/2013	UT
2,4,6-Trichlorophenol	7/1/2012	11/30/2013	UT
2,4-Dichlorophenol	7/1/2012	11/30/2013	UT
2,4-Dimethylphenol	7/1/2012	11/30/2013	UT
2,4-Dinitrophenol	7/1/2012	11/30/2013	UT
2,4-Dinitrotoluene (2,4-DNT)	7/1/2012	11/30/2013	UT
2,6-Dichlorophenol	7/1/2012	11/30/2013	UT
2,6-Dinitrotoluene (2,6-DNT)	7/1/2012	11/30/2013	UT
2-Acetylaminofluorene	7/1/2012	11/30/2013	UT
2-Chloronaphthalene	7/1/2012	11/30/2013	UT
2-Chlorophenol	7/1/2012	11/30/2013	UT
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	7/1/2012	11/30/2013	UT
2-Methylnaphthalene	7/1/2012	11/30/2013	UT
2-Methylphenol (o-Cresol)	7/1/2012	11/30/2013	UT
2-Naphthylamine	7/1/2012	11/30/2013	UT
2-Nitroaniline	7/1/2012	11/30/2013	UT
2-Nitrophenol	7/1/2012	11/30/2013	UT
3,3'-Dichlorobenzidine	7/1/2012	11/30/2013	UT
3-Methylcholanthrene	7/1/2012	11/30/2013	UT
3-Methylphenol (m-Cresol)	7/1/2012	11/30/2013	UT

ALS Laboratory Group, Environmental Division (Fort Collins, CO)

Program/Matrix: *RCRA (Solid & Hazardous Material)*

	Start Date	Expires	AB
3-Nitroaniline	7/1/2012	11/30/2013	UT
4-Bromophenyl phenyl ether	7/1/2012	11/30/2013	UT
4-Chloro-3-methylphenol	7/1/2012	11/30/2013	UT
4-Chloroaniline	7/1/2012	11/30/2013	UT
4-Chlorophenyl phenylether	7/1/2012	11/30/2013	UT
4-Methylphenol (p-Cresol)	7/1/2012	11/30/2013	UT
4-Nitroaniline	7/1/2012	11/30/2013	UT
4-Nitrophenol	7/1/2012	11/30/2013	UT
5-Nitro-o-toluidine	7/1/2012	11/30/2013	UT
7,12-Dimethylbenz(a) anthracene	7/1/2012	11/30/2013	UT
Acenaphthene	7/1/2012	11/30/2013	UT
Acenaphthylene	7/1/2012	11/30/2013	UT
Acetophenone	7/1/2012	11/30/2013	UT
Aniline	7/1/2012	11/30/2013	UT
Anthracene	7/1/2012	11/30/2013	UT
Azobenzene (1,2-Diphenylhydrazine)	7/1/2012	11/30/2013	UT
Benzidine	7/1/2012	11/30/2013	UT
Benzo(a)anthracene	7/1/2012	11/30/2013	UT
Benzo(a)pyrene	7/1/2012	11/30/2013	UT
Benzo(b)fluoranthene	7/1/2012	11/30/2013	UT
Benzo(g,h,i)perylene	7/1/2012	11/30/2013	UT
Benzo(k)fluoranthene	7/1/2012	11/30/2013	UT
Benzoic acid	7/1/2012	11/30/2013	UT
Benzyl alcohol	7/1/2012	11/30/2013	UT
bis(2-Chloroethoxy)methane	7/1/2012	11/30/2013	UT
bis(2-Chloroethyl) ether	7/1/2012	11/30/2013	UT
bis(2-Chloroisopropyl) ether	7/1/2012	11/30/2013	UT
bis(2-Ethylhexyl) phthalate (DEHP)	7/1/2012	11/30/2013	UT
Butyl benzyl phthalate	7/1/2012	11/30/2013	UT
Carbazole	7/1/2012	11/30/2013	UT
Chrysene	7/1/2012	11/30/2013	UT
Dibenz(a,h) anthracene	7/1/2012	11/30/2013	UT
Dibenzofuran	7/1/2012	11/30/2013	UT
Diethyl phthalate	7/1/2012	11/30/2013	UT
Dimethyl phthalate	7/1/2012	11/30/2013	UT
Di-n-butyl phthalate	7/1/2012	11/30/2013	UT
Di-n-octyl phthalate	7/1/2012	11/30/2013	UT
Ethyl methanesulfonate	7/1/2012	11/30/2013	UT
Fluoranthene	7/1/2012	11/30/2013	UT
Fluorene	7/1/2012	11/30/2013	UT
Hexachlorobenzene	7/1/2012	11/30/2013	UT
Hexachlorobutadiene	7/1/2012	11/30/2013	UT
Hexachlorocyclopentadiene	7/1/2012	11/30/2013	UT
Hexachloroethane	7/1/2012	11/30/2013	UT
Hexachloropropene	7/1/2012	11/30/2013	UT
Indeno(1,2,3-cd) pyrene	7/1/2012	11/30/2013	UT
Isophorone	7/1/2012	11/30/2013	UT
Isosafrole	7/1/2012	11/30/2013	UT
Methyl methanesulfonate	7/1/2012	11/30/2013	UT

ALS Laboratory Group, Environmental Division (Fort Collins, CO)

	Start Date	Expires	AB
Program/Matrix: *RCRA (Solid & Hazardous Material)*			
Naphthalene	7/1/2012	11/30/2013	UT
Nitrobenzene	7/1/2012	11/30/2013	UT
n-Nitrosodiethylamine	7/1/2012	11/30/2013	UT
n-Nitrosodimethylamine	7/1/2012	11/30/2013	UT
n-Nitroso-di-n-butylamine	7/1/2012	11/30/2013	UT
n-Nitrosodi-n-propylamine	7/1/2012	11/30/2013	UT
n-Nitrosodiphenylamine	7/1/2012	11/30/2013	UT
n-Nitrosomethylethalamine	7/1/2012	11/30/2013	UT
n-Nitrosomorpholine	7/1/2012	11/30/2013	UT
n-Nitrosopiperidine	7/1/2012	11/30/2013	UT
n-Nitrosopyrrolidine	7/1/2012	11/30/2013	UT
Pentachlorobenzene	7/1/2012	11/30/2013	UT
Pentachloronitrobenzene	7/1/2012	11/30/2013	UT
Pentachlorophenol	7/1/2012	11/30/2013	UT
Phenacetin	7/1/2012	11/30/2013	UT
Phenanthrene	7/1/2012	11/30/2013	UT
Phenol	7/1/2012	11/30/2013	UT
Pyrene	7/1/2012	11/30/2013	UT
Pyridine	7/1/2012	11/30/2013	UT
Safrole	7/1/2012	11/30/2013	UT
Method EPA 901.1			
Cesium-134	7/1/2012	11/30/2013	UT
Cesium-137	7/1/2012	11/30/2013	UT
Cobalt-60	7/1/2012	11/30/2013	UT
Method EPA 9010C			
Cyanide	7/1/2012	11/30/2013	UT
Method EPA 9014			
Cyanide	7/1/2012	11/30/2013	UT
Method EPA 903.1			
Radium-226	1/23/2013	11/30/2013	UT
Method EPA 9034			
Total sulfides	7/1/2012	11/30/2013	UT
Method EPA 9045C			
pH	7/1/2012	11/30/2013	UT
Method EPA 9056A			
Bromide	7/1/2012	11/30/2013	UT
Chloride	7/1/2012	11/30/2013	UT
Fluoride	7/1/2012	11/30/2013	UT
Nitrate as N	7/1/2012	11/30/2013	UT
Nitrite as N	7/1/2012	11/30/2013	UT
Orthophosphate as P	7/1/2012	11/30/2013	UT
Sulfate	7/1/2012	11/30/2013	UT
Method EPA 9071B			
Oil & Grease	7/1/2012	11/30/2013	UT
Method EPA 9095B			
Free liquid	7/1/2012	11/30/2013	UT

ALS Laboratory Group, Environmental Division (Fort Collins, CO)

	Start Date	Expires	AB
Program/Matrix: ***RCRA (Solid & Hazardous Material)***			
Method EPA 9310			
Gross alpha-beta	7/1/2012	11/30/2013	UT
Method EPA 9315			
Total alpha radium	7/1/2012	11/30/2013	UT
Method EPA 9320			
Radium-228	7/1/2012	11/30/2013	UT
Method EPA H2S Test Method			
Reactive sulfide	7/1/2012	11/30/2013	UT
Method EPA HCN Test Method			
Reactive Cyanide	7/1/2012	11/30/2013	UT
Method HASL 300 Ga-01-R sec 4.5.2.3			
Cesium-134	7/1/2012	11/30/2013	UT
Cesium-137	7/1/2012	11/30/2013	UT
Cobalt-60	7/1/2012	11/30/2013	UT
Method HASL 300 Sr-01-RC (GPC)			
Strontium-89, 90	7/1/2012	11/30/2013	UT
Method HASL 300 U-02-RC			
Americium-241	7/1/2012	11/30/2013	UT
Plutonium	7/1/2012	11/30/2013	UT
Thorium-228	7/1/2012	11/30/2013	UT
Thorium-230	7/1/2012	11/30/2013	UT
Thorium-232	7/1/2012	11/30/2013	UT
Method SM 7500-Ra C (SC)			
Radium-226	7/1/2012	11/30/2013	UT

ALS Laboratory Group, Environmental Division (Fort Collins, CO)

Program/Matrix: ***SDWA (Potable Water)***

	Start Date	Expires	AB
Method ASTM D3972-90			
Uranium	7/1/2012	11/30/2013	UT
Method ASTM D5811-00			
Strontium-90	7/1/2012	11/30/2013	UT
Method EPA 120.1			
Conductivity	7/1/2012	11/30/2013	UT
Method EPA 150.1			
pH	7/1/2012	11/30/2013	UT
Method EPA 160.1			
Residue-filterable (TDS)	7/1/2012	11/30/2013	UT
Method EPA 200.7			
Aluminum	7/1/2012	11/30/2013	UT
Antimony	7/1/2012	11/30/2013	UT
Arsenic	7/1/2012	11/30/2013	UT
Barium	7/1/2012	11/30/2013	UT
Beryllium	7/1/2012	11/30/2013	UT
Boron	7/1/2012	11/30/2013	UT
Cadmium	7/1/2012	11/30/2013	UT
Calcium	7/1/2012	11/30/2013	UT
Chromium	7/1/2012	11/30/2013	UT
Cobalt	7/1/2012	11/30/2013	UT
Copper	7/1/2012	11/30/2013	UT
Iron	7/1/2012	11/30/2013	UT
Lead	7/1/2012	11/30/2013	UT
Lithium	7/1/2012	11/30/2013	UT
Magnesium	7/1/2012	11/30/2013	UT
Manganese	7/1/2012	11/30/2013	UT
Molybdenum	7/1/2012	11/30/2013	UT
Nickel	7/1/2012	11/30/2013	UT
Potassium	7/1/2012	11/30/2013	UT
Selenium	7/1/2012	11/30/2013	UT
Silica as SiO2	7/1/2012	11/30/2013	UT
Silver	7/1/2012	11/30/2013	UT
Sodium	7/1/2012	11/30/2013	UT
Strontium	7/1/2012	11/30/2013	UT
Thallium	7/1/2012	11/30/2013	UT
Tin	7/1/2012	11/30/2013	UT
Titanium	7/1/2012	11/30/2013	UT
Vanadium	7/1/2012	11/30/2013	UT
Zinc	7/1/2012	11/30/2013	UT
Method EPA 200.8			
Aluminum	7/1/2012	11/30/2013	UT
Antimony	7/1/2012	11/30/2013	UT
Arsenic	7/1/2012	11/30/2013	UT
Barium	7/1/2012	11/30/2013	UT
Beryllium	7/1/2012	11/30/2013	UT
Cadmium	7/1/2012	11/30/2013	UT

	Start Date	Expires	AB
Program/Matrix: *SDWA (Potable Water)*			
Calcium	7/1/2012	11/30/2013	UT
Chromium	7/1/2012	11/30/2013	UT
Copper	7/1/2012	11/30/2013	UT
Iron	7/1/2012	11/30/2013	UT
Lead	7/1/2012	11/30/2013	UT
Magnesium	7/1/2012	11/30/2013	UT
Manganese	7/1/2012	11/30/2013	UT
Molybdenum	7/1/2012	11/30/2013	UT
Nickel	7/1/2012	11/30/2013	UT
Potassium	7/1/2012	11/30/2013	UT
Selenium	7/1/2012	11/30/2013	UT
Silver	7/1/2012	11/30/2013	UT
Sodium	7/1/2012	11/30/2013	UT
Strontium	7/1/2012	11/30/2013	UT
Thallium	7/1/2012	11/30/2013	UT
Thorium	7/1/2012	11/30/2013	UT
Tin	7/1/2012	11/30/2013	UT
Uranium	7/1/2012	11/30/2013	UT
Vanadium	7/1/2012	11/30/2013	UT
Zinc	7/1/2012	11/30/2013	UT
Method EPA 245.1			
Mercury	7/1/2012	11/30/2013	UT
Method EPA 300.0			
Bromide	7/1/2012	11/30/2013	UT
Chloride	7/1/2012	11/30/2013	UT
Fluoride	7/1/2012	11/30/2013	UT
Nitrate as N	7/1/2012	11/30/2013	UT
Nitrite as N	7/1/2012	11/30/2013	UT
Orthophosphate as P	7/1/2012	11/30/2013	UT
Sulfate	7/1/2012	11/30/2013	UT
Method EPA 310.1			
Alkalinity as CaCO3	7/1/2012	11/30/2013	UT
Method EPA 314			
Perchlorate	7/1/2012	11/30/2013	UT
Method EPA 335.2			
Cyanide	7/1/2012	11/30/2013	UT
Method EPA 524.2			
1,1,1-Trichloroethane	7/1/2012	11/30/2013	UT
1,1,2-Trichloroethane	7/1/2012	11/30/2013	UT
1,1-Dichloroethylene	7/1/2012	11/30/2013	UT
1,2,4-Trichlorobenzene	7/1/2012	11/30/2013	UT
1,2-Dichlorobenzene (o-Dichlorobenzene)	7/1/2012	11/30/2013	UT
1,2-Dichloroethane (Ethylene dichloride)	7/1/2012	11/30/2013	UT
1,2-Dichloropropane	7/1/2012	11/30/2013	UT
1,4-Dichlorobenzene	7/1/2012	11/30/2013	UT
Benzene	7/1/2012	11/30/2013	UT
Carbon tetrachloride	7/1/2012	11/30/2013	UT

	Start Date	Expires	AB
Program/Matrix: *SDWA (Potable Water)*			
Chlorobenzene	7/1/2012	11/30/2013	UT
cis-1,2-Dichloroethylene	7/1/2012	11/30/2013	UT
Ethylbenzene	7/1/2012	11/30/2013	UT
Methylene chloride (Dichloromethane)	7/1/2012	11/30/2013	UT
m-Xylene	7/1/2012	11/30/2013	UT
o-Xylene	7/1/2012	11/30/2013	UT
p-Xylene	7/1/2012	11/30/2013	UT
Styrene	7/1/2012	11/30/2013	UT
Tetrachloroethylene (Perchloroethylene)	7/1/2012	11/30/2013	UT
Toluene	7/1/2012	11/30/2013	UT
trans-1,2-Dichloroethylene	7/1/2012	11/30/2013	UT
Trichloroethene (Trichloroethylene)	7/1/2012	11/30/2013	UT
Vinyl chloride	7/1/2012	11/30/2013	UT
Xylene (total)	7/1/2012	11/30/2013	UT
Method EPA 900.0			
Gross-alpha	7/1/2012	11/30/2013	UT
Gross-beta	7/1/2012	11/30/2013	UT
Method EPA 901.1			
Cesium-134	7/1/2012	11/30/2013	UT
Cesium-137	7/1/2012	11/30/2013	UT
Cobalt-60	7/1/2012	11/30/2013	UT
Gamma Emitters	7/1/2012	11/30/2013	UT
Method EPA 903			
Radium-226	7/1/2012	11/30/2013	UT
Total radium	7/1/2012	11/30/2013	UT
Method EPA 903.1			
Radium-226	7/1/2012	11/30/2013	UT
Method EPA 904			
Radium-228	7/1/2012	11/30/2013	UT
Method EPA 906			
Tritium	7/1/2012	11/30/2013	UT
Method HASL 300 Ga-01-R sec 4.5.2.3			
Cesium-134	7/1/2012	11/30/2013	UT
Cesium-137	7/1/2012	11/30/2013	UT
Cobalt-60	7/1/2012	11/30/2013	UT
Gamma Emitters	7/1/2012	11/30/2013	UT
Method HASL 300 Sr-01-RC (GPC)			
Strontium-89, 90	7/1/2012	11/30/2013	UT
Method HASL 300 Sr-02-RC (GPC)			
Strontium-89, 90	7/1/2012	11/30/2013	UT
Method HASL 300 U-02-RC			
Americium-241	7/1/2012	11/30/2013	UT
Isotopic uranium	7/1/2012	11/30/2013	UT
Plutonium	7/1/2012	11/30/2013	UT
Uranium	7/1/2012	11/30/2013	UT
Method SM 2320 B			

	Start Date	Expires	AB
Program/Matrix: ***SDWA (Potable Water)***			
Alkalinity as CaCO3	7/1/2012	11/30/2013	UT
Method SM 2340 B			
Total hardness as CaCO3	7/1/2012	11/30/2013	UT
Method SM 2510 B			
Conductivity	7/1/2012	11/30/2013	UT
Method SM 2540 B			
Residue-total	7/1/2012	11/30/2013	UT
Method SM 2540 C			
Residue-filterable (TDS)	7/1/2012	11/30/2013	UT
Method SM 2540 D			
Residue-nonfilterable (TSS)	7/1/2012	11/30/2013	UT
Method SM 4500-H+ B			
pH	7/1/2012	11/30/2013	UT
Method SM 5310 C			
Total organic carbon	7/1/2012	11/30/2013	UT
Method SM 7500-3H B			
Tritium	7/1/2012	11/30/2013	UT
Method SM 7500-Ra C (SC)			
Radium-226	7/1/2012	11/30/2013	UT
Method SM 7500-Rn B			
Radon-222	7/1/2012	11/30/2013	UT

The Utah Environmental Laboratory Certification Program (ELCP) encourages clients and data users to verify the most current certification letter for the authorized method.

The analytes by method which a laboratory is authorized to perform at any given time will be those indicated in the most recent certificate letter. The most recent certification letter supersedes all previous certification or authorization letters. It is the certified laboratory's responsibility to review this letter for discrepancies. The certified laboratory must document any discrepancies in this letter and send notice to this bureau within 15 days of receipt. This certificate letter will be recalled in the event your laboratory's certification is revoked.