REPORT

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SPIDER LAKE INTERIM CLOSURE AND RECLAMATION PLAN

Submitted to:
Mike Byron
Merc International Minerals
130 King Street West
Suite 2120, PO Box 221
Toronto ON
M5X 1C8

Merc Reclamation Land Use Permit Application 2012

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1.0 INTRODUCTION

Merc International Minerals Inc (Merc) has acquired several mining leases in the Indin Lake area north of Yellowknife, NT. Included in these mining leases are the former Colomac Mine site and several legacy sites that were under the care of Aboriginal Affairs and Northern Development Canada (AANDC). Under a Conveyance and Reclamation Agreement signed between Merc and AANDC, Merc agreed to remediate three legacy sites up to a maximum liability of $5 million in exchange for rights to the former Colomac Mine lease sites. The three legacy sites that Merc has agreed to remediate are the Spider Lake site, the Diversified Mine site and the Chalco Lake site.

This report is the first Interim Closure and Reclamation Plan for Spider Mine site as required for the *Merc 2012 Wek'èezhìi Land and Water Board Reclamation Type A Land Use Permit Application* (the Permit application) for remediation of the three legacy sites.

2.0 INTERIM CLOSURE AND RECLAMATION PLAN REQUIREMENTS

This Interim Closure and Reclamation Plan will function as one component of the Permit application. This plan has been written in conformance with the *Draft Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories* (AANDC 2011) and includes background site information, an inventory of contamination and potential contamination at the site, and a series of remedial options that will be considered for the *Spider Lake Site Final Closure and Reclamation Plan*.

3.0 CLOSURE AND RECLAMATION PLANNING TEAM

The proponent of this project is:	Merc International Minerals Inc.
Proponent contact person:	Mike Byron Merc International Minerals Exchange Tower 130 King Street West Suite 2120, PO Box 221 Toronto, ON M5X 1C8
The site is located at:	Spider Lake 64.4931° North, -115.1292° West Northwest Territories
Acting on behalf of the proponent:	Golder Associates Ltd. 9, 4905 – 48 Street Yellowknife, Northwest Territories X1A 3S3

4.0 CONSULTATION AND ENGAGEMENT

A consultation process was undertaken with the Kwe Beh Working Group, Tłı̨chǫ and community government representatives, the North Slave Métis Alliance (NSMA), and the Wek'èezhìi Renewable Resource Board (WRRB). A full consultation record summary is included as an appendix to the Permit.

5.0 SPIDER LAKE MINE

Spider is located on the 200 ha Treasure Island on Spider Lake, approximately 230 km northwest of Yellowknife at 64˚ 29' 35" N latitude and -115˚ 07' 45" W longitude. The site was used for exploration between 1945 and 1988 and is composed of two historic campsites and three exploration zones, with a total land use area of approximately 12 ha. Spider now consists of wooden structures, core racks, trenches, metal drums, blast rock, and other debris. Treasure Island is accessible by float plane and helicopter during summer and by ski-equipped aircraft and helicopter during winter. A winter road spur may be constructed from the Wekweèti winter road to Spider, allowing road access during winter months.

6.0 SITE ASSESSMENT AND REMEDIATION BACKGROUND

In 2010, EBA Engineering Consultants Ltd. (EBA) performed Phase II and Phase III Environmental Site Assessments (ESAs) of the Spider Lake site. The ESAs created an inventory of components on site requiring remediation. This inventory included hazardous and non-hazardous waste, wood waste, metal debris, fuel drums and waste fuel. A sampling program was used to determine Potential Contaminants of Concern (PCOCs) and delineate Areas of Potential Environmental Concern (APECs). Twenty-four APECs were identified in the Phase II ESA. Soil samples were collected from the APECs and submitted for analysis of benzene, toluene, ethylbenzene, xylene (BTEX), PHC fractions F1 though F4, PAHs, VOCs, and metals. EBA estimated the volume of contaminated material to be 300 m^3 (EBA Ltd., 2010), the majority of which is waste rock and hydrocarbon contaminated soil.

Further site visits and delineation of APECs will be required prior to the completion of a final closure and reclamation plan. The information needs are detailed later in this report.

7.0 PROJECT ENVIRONMENT

The current status of Spider Lake is described in this section and includes structures, materials, contaminants, and other remnants of historical usage. A description of the natural environment, climate and ecology of the Spider Lake region is included as well.

7.1 Site Layout

The Spider Lake site is located on Treasure Island approximately 8 km north of the Colomac mine site and 233 km northwest of Yellowknife.

Historic exploration activities at Spider were conducted mainly in two camp areas and three exploration areas. These five areas were assessed and delineated in ESAs. The materials remaining on-site and the Contaminants of Concern (COCs) identified in each area are shown in Table 1.

Table 1: Assessed Areas at Spider Lake Mine (EBA Ltd., 2010)

Area	Description	Remaining Materials	Contaminants Present[1]
A	1987 Mahogany Resources Campsite	Sleeping quarters, outhouse, kitchen, core logging rooms, waste dump, grey water sump	PHC[2]s, PAH[3]s, VOC[4]s, metals, hazardous/non-hazardous materials
B	1946 Spinet Campsite	Building foundations, solid waste dump, grey water sump	PHCs, PAHs, VOCs, metals, hazardous/non-hazardous materials
C	Main Showing	Blast/waste rocks, trench openings, diamond drilling holes	ARD/ML[5], physical hazards
D	East Zone	Blast/waste rocks, trench openings, diamond drilling holes	ARD/ML, physical hazards
E	Booty Showing	Blast/waste rocks, trench openings, diamond drilling holes	ARD/ML, physical hazards

[1] Includes both Potential Contaminants of Concern (PCOCs) and Contaminants of Concern (COCs)
[2] Petroleum Hydrocarbons
[3] Polycyclic Aromatic Hydrocarbons
[4] Volatile Organic Compounds
[5] Acid Rock Drainage / Metal Leaching

Aerial photos taken for the ESA III are provided below.

Figure 1: Mahogany Campsite (Southeast View) (EBA, 2010)

Figure 2: Spinet Campsite and Main Showing (North View) (EBA, 2010)

Figure 3: East portion of Treasure Island (EBA, 2010)

7.2 Climate

The Spider site is located in the Coppermine Upland Ecological Region (eco-region) of the Taiga Shield Ecological Zone (eco-zone).

The eco-zone is defined by two dominant features: the Taiga forest, and the Canadian Shield (Ecological Stratification Working Group 1995). There are approximately 33,600 people living in the eco-zone.

The eco-region is classified as high sub-Arctic and is characterized by short summers with long daylight hours and long, very cold winters. This region has a mean annual summer temperature of 9˚C and the mean winter temperature is -24.5˚C. The mean annual precipitation ranges from 200 – 300 mm (Ecological Stratification Working Group, 1995). The eco-region is a transition zone between the tundra and boreal forest. Permafrost is discontinuous but widespread and large areas of bare rock outcrops are common. There are approximately 500 people living in the eco-region.

Long-term air temperature at the Site can be estimated from the 1949 to 1969 daily air temperatures recorded at the Snare Rapids Atmospheric Environmental Services (AES) climate station. The estimated mean monthly air temperatures in the Site range from about -30°C in January to about 16°C in July (AES 1972). The monthly air temperatures could be as low as -35°C in January and as high as 22°C in July (Golder 1998). Gartner Lee measured the average air temperature to be -5.6°C, with a maximum of 27.9°C occurring on June 28, 2007 and a minimum temperature of -47.7°C occurring on January 14, 2007 (Gartner Lee 2008).

7.3 Physical Environment

7.3.1 Geology

The Northwest Territories GeoScience Office describes the Indin Lake geological area as follows (NTGO 2012):

> *The Indin Lake area is situated in the SW portion of the Slave Structural Province and is located within the Indin Lake belt of Archean supracrustal metasedimentary and metavolcanic rocks of the Yellowknife Supergroup. The rock types and metamorphic zones form a series of broad, NNE-trending belts that extend from the south side of Truce Lake to the southern portion of the Snare River. The Indin Lake Supracrustal Belt is bounded to the west by Archean granitoid plutons and migmatites of the Slave Structural Province while gneissic complexes flank the eastern side and are thought to be basement rocks to the belt. Volcanic rocks are comprised of mafic to intermediate flows, synvolcanic intrusive dykes and sills and felsic pyroclastic units. These are overlain by sedimentary rocks, predominantly turbidite sequences that vary from sandy greywacke dominated to more mudstone rich horizons with associated iron formation. Several plutonic bodies intrude the volcanic-sedimentary rocks. Rocks are complexly folded and there is a complicated deformation history associated with the area. Evidence for four deformational events has been observed and the Indin Lake Supracrustal belt has been metamorphosed to lower greenschist facies with local amphibolitic facies. Large faults crosscut the entire region and Proterozoic diabase (to gabbro) dyke swarms cut all units throughout the Indin Lake area.*

7.3.2 Surface Water and Groundwater Quality

Surface water samples have been collected to determine the impact of past exploration activities. Samples were taken near all of the 5 historical land usage locations. The samples were analyzed for dissolved and total metals and compared against Canadian Council of Ministers of the Environment Protection of Fisheries and Aquatic Life (CCME PFAL) and Drinking Water (DW) guidelines.

Electrical conductivity is a measure of waters ionic activity and content. The lake water samples have electrical conductivities less than 30 µS/cm, which indicates high natural water quality. The pH values of the background lake water samples are in the range of 6.56 to 6.92. The concentrations of both copper and mercury in background samples were greater than CCME PFAL criteria, suggesting copper and mercury are naturally elevated in Spider Lake surface water. The high total recoverable copper concentration at Mahogany was attributed in the ESA III to suspended particles present in the sample.

Table 2: Summary of Lake Water Metal Exceedances

	Metals Exceeding CCME PFAL Criteria			
	Copper		Mercury	
Location	**DM**	**TM**	**DM**	**TM**
Background Locations	2.9X	-	1.2X	1.2X
Mahogany Campsite	3.76X	196X	-	
Spinet Campsite	-	1.9X	-	-
Main Showing	23.0X	9.2X	-	-
East Zone	-	-	2.6X	2.5X
Booty Showing	1.0X	1.6X	5.8X	5.2X

Note: "-" indicates no exceedance was detected.

The metal concentrations are higher near campsites than near showing areas. The samples taken at Spider are not elevated greatly compared to background samples. It is likely that exceedances of CCME PFAL criteria in the surface water sampling were naturally occurring. The water quality does not appear to be impacted by past exploration activities.

7.3.3 Inland Surface Water and Groundwater

Groundwater monitoring wells were installed at the Mahogany camp and the Spinet camp. Surface water samples were collected from two wetlands and one trench at the main showing.

The groundwater sampling measured metal concentrations greater than the applicable guidelines. The metal concentrations were similar to background samples. The groundwater does not appear to be impacted by the operations which occurred at Mahogany or Spinet campsites.

The inland water samples did show a number of dissolved and total metal parameters greater than the CCME PFAL guidelines. It was concluded in the ESA III that based on the background concentrations, the values could be considered within the natural conditions of the site. The inland surface water was not considered to have been impacted by the historical mining operations.

7.3.4 Sediment Quality

Background soil-sampling programs were conducted to determine the natural mineralization of Spider. The background soil samples were taken far away and up-gradient of any APECs. The Spider Lake Mine is located in a highly mineralized area (EBA Ltd., 2010). The naturally elevated metal concentrations were important in analyzing the APEC sampling results.

Background samples for the Phase II ESA were analyzed for BTEX, PHC fractions F1 though F4, VOCs, PAHS and metals. For the Phase III ESA, only metals were analyzed for the background samples. All parameters were reported to be less than PEHH criteria.

Contaminated soil was identified and characterized from each of the AECs. Hydrocarbons are the primary source of contamination. A summary of the contaminated soil report is summarized in Table 3.

Table 3: Contaminated Soil

Site	Contaminants	Average delineated area	Depth of Bedrock refusal	Estimated Contaminated Soil Volume
AEC 1 - Burn Area in Mahogany Campsite	PHCs (F2, F3), PAHs and metals	120 m^2	0.3 m	36 m^3 of hydrocarbon impacted, 10m^3 of metal and hydrocarbon
AEC 2/3 - Drums in Front of Two Former Buildings	PHCs	80 m^2	0.35 m	28 m^3 of hydrocarbon impacted
AEC 4 - On Partially Full Drum near Shoreline in Mahogany Campsite	BTEX	3 m^2	0.1 m	0.3 m^3 hydrocarbon contaminated
AEC 5 - Three Drums at Kitchen in Mahogany Campsite	PHCs (F2)	4 m^2	0.25 m	1 m^3 hydrocarbon contaminated
AEC 6 - Wooden Foundation #5 in Spinet Campsite	PHCs (F3, F4)	25 m^2	0.25 m	6.3 m^3 hydrocarbon contaminated
AEC 7 - Grey Water Sump in Spinet Campsite	PHC (F3), PAH and metals	10 m^2	0.25 m	2.5 m^3 metal and hydrocarbon contaminated
AEC 8 - Existing Outhouse in Mahogany Campsite	PHC (F3) and metals	4 m^2	0.45 m	2 m^3 metal and hydrocarbon contaminated
AEC 9 - Decayed Battery in Spinet Campsite	Metals	20 m^2	0.5 m	10 m^3 metal contaminated
Total				**71.6m^3 hydrocarbon contaminated** **10 m^3 metal contaminated**

Site	Contaminants	Average delineated area	Depth of Bedrock refusal	Estimated Contaminated Soil Volume
				24.5 m^3 contaminated by hydrocarbon and metal

7.3.5 Waste Rock / Ore

Waste rock samples were collected from the three showing areas. The Main Showing contains the largest disturbed area and volume of waste rock. The waste rock is characterized as being potentially acid generating but is not considered a significant concern for metal leaching. The metal concentrations are above crustal sample levels but most concentrations only slightly elevated above CCME PFAL guidelines. One of the waste rock samples had elevated mercury concentrations.

The East Zone waste rock is characterized as being potentially acid generating and had total sulphur concentrations from 0.28% to 2.2%. An analytical result from the ESAs showed that leachate from the sample is acidic. The East Zone waste rock also has the highest concentrations for cadmium, iron and zinc. One of the trenches is located close to the shoreline and has potential metal leaching concerns.

The Booty Showing waste rock has total sulphur concentrations ranging from 0.44% to 1.46% and is potentially acid generating. The concentrations of cadmium, copper and iron are approximately one order of magnitude above CCME PFAL guidelines. Aluminum, nickel and zinc are also above guideline concentrations. Mercury concentrations were elevated in two samples and the leaching of mercury was above CCME guidelines by a factor of 1.5. The total volume of waste rock is less than the other showings and lessens the concern of possible metal leaching.

The result of background rock sampling is that naturally elevated metal concentrations exist at Spider. The waste rock from the trenching areas had higher concentrations of arsenic and tungsten compared to background samples. Copper concentrations were also slightly higher in the waste rock samples.

7.4 Biological Environment

7.4.1 Flora

The vegetation of the eco-zone, as described by the Ecological Stratification Group, is characterized by innumerable lakes, wetlands and open forests with shrublands and meadows more typical of the arctic tundra. The northern portion of the ecozone represents the latitudinal limits of tree growth. The central portion of the zone contains open, stunted black spruce (*Picea mariana*) and jack pine (*Pinus banksiana*) with alder, willow and tamarack (*Larix laricina*) in the fens and bogs. Trembling aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*), and white birch (*Betula papyrifera*) are found on upland sites and along rivers and streams (Ecological Stratification Working Group 1995).

The vegetation baseline study completed by Golder (1998) determined ten vegetation/terrain types which were easy to map using air-photograph interpretation. They included:

- closed cover black spruce/birch;

- open cover black spruce/birch;
- recently burned black spruce/birch;
- esker complexes;
- white spruce pockets;
- treed peatlands;
- shrubby peatlands;
- open peatlands;
- marshes; and
- beaches.

7.4.2 Fauna

Mammals in the ecozone, as described by the Ecological Stratification Working Group, include barren-ground caribou (*Rangifer tarandus groenlandicus*), woodland caribou (*forest-dwelling population*), moose (*Alces alces*), wolf (*Canis lupus*), snowshoe hare (*Lepus americanus*), arctic fox (*Alopex lagopus)*, beaver (*Castor canadensis*) black (*Ursus americanus*) and grizzly bear (*Ursus arctos horribilis*) and lynx (*Lynx canadensis*). There are about 50 species of mammals that inhabit the ecozone. The abundance of water in the ecozone attracts hundreds of thousands of birds including arctic (*Gavia arctica*) and red-throated loon (*Gavia stellata*), northern phalarope (*Phalaropus fulicarius*), northern shrike (*Lanius excubitor*), tree sparrow (*Spizella arborea*), and gray-cheeked thrush (*Catharus minimus*) (Ecological Stratification Working Group 1995).

Golder (1998) identified some 125 species of birds, 50 species of mammals and one species of amphibian may occur within the region of the Site. Of these, two species of birds [peregrine falcon (*Falco peregrinus anatum* Chat *virens)*, Caspian tern (*Sterna caspia*)] and two species of mammals [wolverine (*Gulo gulo)*, grizzly bear] were ranked at the time of the study by Committee on the Status of Endangered Wildlife in Canada (COSEWIC 1997) as having special conservation status.

7.5 Social Environment

There are two principal communities in the Indin Lake area: Gamètì and Wekweètì.

Wekweètì (formerly Snare Lake) is a community of 150 people (GNWT 2006) located approximately 60 km from the Spider site. The community is located on the north shore of Snare Lake. Development in the community began in the late 1950s and today the community is serviced primarily by aircraft and, in some years, a winter road. During mining activity at the Colomac Mine, the winter road connected both the mine and the community with Behchokö and Edzo to the southwest. This road has been the joint responsibility of the Colomac Mine and the GNWT. In particular, the GNWT has undertaken the responsibility of developing and maintaining the portion of the road between the mine and the community.

Gamètì (formerly Rae Lakes) has a current population of approximately 307 (GNWT 2006), and is situated approximately 116 km southwest of the Spider site.

Behchokö has a population of 2,016 (GNWT 2006) and is situated approximately 190 km south of the Spider site. The community is connected by an all-weather road with Highway 3, which provides the community with a direct connection to the City of Yellowknife to the east and with Fort Providence and Hay River to the southwest.

Whatì is a community with a population of 523 (GNWT 2006) that is situated approximately 183 km southwest of the Spider site. The city is serviced daily with flights to Yellowknife and is accessible by a 145 km ice road from Highway 3 near Behchokö.

Mining, government and tourism are the cornerstones of the NWT economy. The population of the NWT was 41,464 at the time of the 2006 census, which is the most up-to-date information available as of February 2012. The census indicated that there were 16,774 occupied private dwellings in the NWT (Statistics Canada 2006).

The employment rate for the NWT at the time of the 2006 census was 68.6 percent and the unemployment rate was 10.4% (Statistics Canada 2006).

The median income of persons 15 years and over in 2005 was $35,006 compared to $25,615 in all of Canada (Statistics Canada 2006).

8.0 INVENTORY OF MINING RELATED MATERIALS

An inventory of the materials and items that will be remediated at the Spider site is included as **Table 1**. A detailed inventory is included as **Appendix A**.

Table 4: Summary of Remediation Components at Spider Site

Component	Inventory and Approximate Volumes
Hydrocarbon Contaminated Soil	86 m^3
Metal Contaminated Soil	10 m^3
Metal, Non-Hazardous Waste	15 m^3 Metal debris/cans 5 – 10 Casing rods 2 Stoves 1 Refrigerator 1 Fire Extinguisher
Non-Metal, Non-Hazardous Waste	50 m^3 wood waste, 10 m^3 of drilling cores, collapsed structures, building paper, roofing shingle
Drums with Fuel Residue	24 x 205 L , 3 x 45 L
Drums Containing Fuel	7 x 205L 1 x 45 L
Hazardous Waste	1 Old Battery 1 Stove Liner (contains asbestos)
Waste Rock	130 m^3 (Potentially acid generating, low risk for metal leaching)
Trenches	Approximately 150 m^3

**This volume will be subject to a more extensive study of background metals concentration*

9.0 REMEDIATION PLAN

This interim Closure and Reclamation Plan is designed to present information about the materials requiring remediation at the Spider site, and to present remediation options for consideration. Prior to and during remediation, further delineation of contaminated areas will be required. A delineation plan is included as **Appendix B**.

9.1 Remediation Objectives

The *Draft Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories* (AANDC 2011) state that the closure goal for mine sites is "to return the mine site and affected areas to viable and, wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment and with human activities". The four closure principles are:

- Physical stability.
- Chemical stability.
- No long-term active care requirements.
- Compatibility with future use (aesthetics and values).

9.2 Remedial Options Analysis Explanation

Legacy exploration and mining activities have resulted in waste materials and contamination at the Spider site. A variety of approaches could be used to clean up, or remediate, this site. A remedial options analysis will be used to determine the best approach from all options available. Each remedial option (for example, burning the unpainted and untreated wood waste) will be evaluated with a weighted selection system and assigned a numerical value. The selection system includes a wide variety of important rationale, such as effectiveness and logistical feasibility. The remedial option is assigned 1, 2 or 3 based on suitability and acceptability. The remedial options with the highest ranking will be short listed and assessed with great detail before the final plan is chosen. The ranking rationale and criteria are presented in **Table 2**.

Table 5: Ranking Rationale

	1 Low	2 Moderate	3 High
Effectiveness	Will not likely meet the Management Objectives.	Will probably meet the Management Objectives, but may have some technical challenges.	Will meet the Management Objectives over the long-term.
Ease of Implementation	Requires specialized materials, heavy equipment, large work force, and complex construction techniques.	Requires medium to heavy equipment, small to medium work force, normal construction techniques.	Requires minimal materials, light equipment, and small crew.
Duration of Work	Will require several field seasons.	Can be completed in one field season, but may require an extended period of time (weeks to months).	Can be completed within several weeks.
Logistical Feasibility	Will require a great deal of road or air transport of large equipment and material to and from staging area.	Small to medium sized equipment will be used, overland or air transport of equipment and material required.	Limited transport of equipment and materials will be required.

	1	2	3
Long-Term Liability	Requires ongoing management of Site by Merc/AANDC for at least 10 years, high potential for environmental conditions to degrade.	Requires ongoing management of Site by Merc/AANDC for at least 10 years, moderate to low potential for environmental conditions to degrade.	Probably won't require ongoing management of Site by Merc/AANDC past 5 years, unlikely for environmental conditions to degrade.
Stakeholder Acceptability	Stakeholders (regulators, communities and government) will not likely accept the option.	Stakeholders (regulators, communities and government) may accept the option with conditions.	Stakeholders (regulators, communities and government) will likely accept the option with no conditions.
Relative Cost	Upper third of costs.	Middle third of costs.	Lower third of costs.

The numerical value assigned from ranking rationale will be multiplied by the weighting rationale in **Table 3**. The weighting rationale is determined based on importance to stakeholders.

Table 6: Weighting Rationale

	1	2	3
Importance to Stakeholders	**Low**	**Moderate**	**High**

For example, consider the long term liability of removing hazardous waste and disposing of it off-site. **Table 4** illustrates the result when the option would not require long-term monitoring, and if long term liability is of moderate importance to the stakeholders:

Table 7: Example of Long Term Liability of Removing Hazardous Waste

Ranking Rational	**3**
Weighting Rational	2
Score for the long term liability of removing hazardous waste	3 x 2 = 6

A final value of 6 is assigned to the long term liability of removing hazardous waste. When all sections are added up, the most appropriate and acceptable options will have the highest score.

9.3 Remedial Options Analysis Framework for Spider Site

The framework that will be used to determine the preferred remedial options for the Spider site are include as Table 8**.**

Table 8: Preliminary Remedial Options for Spider Lake Site

Component	**Remedial Option**	**Description**
Hydrocarbon Contaminated Soil	*ex situ* biopile treatment	Construction of lined pad, excavation and placement of contaminated soil on pad, mixing of soil with nutrients and water, installation of ventilation network, installation of cover, regular monitoring to assess biodegradation, replacement of treated soil in excavations.

Component	Remedial Option	Description
	ex situ chemical oxidation	Excavation of contaminated soil, mixing of soil, water and chemical oxidant in mixing reactor, placement of mixed soil/oxidant in lined cell for complete reaction, and final placement of treated soil back in excavation.
	ex situ thermal desorption	Excavation of contaminated soil, treatment of soil in rotary kiln, placement of treated soil in excavations.
	ex situ landfarming (soil aeration and nutrient/carbon amendment)	Construction of lined pad, excavation and placement of contaminated soil on pad, mixing of soil with nutrients and water, regular tilling and aeration, regular monitoring to assess biodegradation, replacement of treated soil in excavations.
	Excavation, transport and disposal off-site	Excavate soil, place the soil into secure, durable waste containers, load and transport off-site to a suitable landfill location.
Metal Contaminated Soils	*ex situ* chemical fixation	Excavation of contaminated soil, mixing of soil, water and fixation reagents in mixing reactor, placement of mixed soil/reagent in lined cell for complete reaction, and final placement of treated soil back in excavation.
	in situ chemical fixation	Mixing of contaminated soil, water and fixation reagents in place.
	ex situ solidification/stabilization	Excavation of contaminated soil, mixing of soil, water and cement in mixing reactor, placement of mixed soil cement back in excavation.
	Excavation, transport and disposal off-site	Excavate soil, place the soil into secure, durable waste containers, load and transport off-site to a suitable landfill location.
Hazardous Waste	Leave as is, monitor	Leave site as is, monitor soil and water conditions on regular basis.
	Excavate and place in engineered on-site landfill	Construct lined, thermally stable landfill, gather buried waste, place all hazardous waste into landfill and cap with lined cover and soil fill.
	Excavation, transport and disposal off-site	Gather all hazardous waste, secure in durable waste containers, load and transport off-site to a suitable landfill location.
	Excavate and transport to Yellowknife Landfill	Gather all hazardous waste and place into secure, durable containers. Transport to Yellowknife and landfill.
Metal Debris	Leave as is, monitor	Leave site as is, monitor soil and water conditions on regular basis.
	Put into trenches and cover with fill	Gather all metal debris and place in existing trenches, cover with waste rock and then top soil for cover.
	Excavate and place in engineered on-site landfill	Construct lined, thermally stable landfill, place all metal debris, cap with lined cover and soil fill.
	Excavation, transport and disposal off-site	Excavate soil, place the soil into secure, durable waste containers, load and transport off-site to a suitable landfill location.
Waste Rock	Leave as is, monitor	Leave waste rock piles as they are, monitor potential for acid generation and metal leaching.
	Backfill waste rock into trenches	Gather rock with potential for acid generation or metal leaching, backfill into trenches on-site.
	Gather waste rock and move into nearby lake	Gather rock which has potential for acid generation or metal leaching, place into lake to prevent oxidation.
	Gather waste rock and transport off-site for	Gather rock with has potential for acid generation or metal leaching, package in sealed containers and ship for disposal off-

Component	Remedial Option	Description
	disposal in landfill	site.
	Haul to nearby communities	Gather rock and transport to nearby communities for use road/air strip construction.
Unpainted Wood Waste	Leave as is, monitor	Leave wood debris on-site, do not burn or remove.
	Controlled burn of wood waste	Gather all wood waste, burn in a controlled fire, gather ash and fire debris for disposal.
	Transport wood off-site	Gather all wood waste, package and transport off site for burning or safe disposal.
Trenches	Leave as is, monitor	Leave trenches in current state. Monitor for changes to stability.
	Backfill trenches	Backfill trenches with waste rock or inert solid waste. Cover with borrow material, where available, and match local topography.
Drums with Fuel Residue	Leave as is, monitor	Leave drums on-site, monitor soil and water conditions on a regular basis.
	On-site cleaning and disposal of drums	Steam clean drums on site, crush drums and store in on-site landfill.
	Transport of drums off-site for cleaning and disposal	Gather and transport drums off-site for subsequent cleaning, crushing and disposal.
Waste Fuel	Incinerate on-site	Following all relevant guidelines and with an appropriate incinerator, incinerate fuel on-site.
	Transport off-site for incineration	Transport waste fuel off-site for incineration, following all relevant guidelines.

9.4 Further Information Needs

The majority of the AECs were delineated in the Phase II and III ESA reports. The boundaries of two AECs, AEC 1 and AEC 9 were not fully delineated and require further investigation.

The recommendations for further investigation from the Phase III ESA reports are as follows:

- Additional geotechnical investigation should be conducted to verify and confirm potential borrow materials sources at the peninsula 500 m east of Treasure Island and the esker 2 km to the North
- For AEC 1, delineation test holes should be advanced at 1 to 2 m southeast of test hole 08BA-03 and 1 to 2 m north of 09BA-12. Soil samples should be analyzed for BTEX and PHCs Fraction F1 THROUGH F4.
- For AEC 9, additional soil samples should be collected to confirm the assumption that the metal exceedances occurred naturally. Test holes should be advanced at 5 m and 10 m north and south of AEC 9. Soil samples should be analyzed for metals. If the natural exceedances of metals surrounding AEC 9 can be confirmed, the actual battery affected area should be reduced to an area of circle with 1 m radius surrounding the battery. The resulting metal impacted area will be 3 m^2; and the volume will be 1.5 m^3.

Further investigation and delineation may be required following site visits. This information will be included in the final closure and reclamation plan.

10.0 CLOSURE

The next stage of the Closure and Reclamation process for the Spider site is to hold consultations with the Kwe Beh Working Group, Tłı̨chǫ representatives, the North Slave Métis Alliance, and the Wek'èezhìi Renewable Resources Board to determine the preferred remediation options based on the information provided in this Interim Closure and Reclamation Plan. A final Closure and Reclamation Plan will be developed after remediation options are considered and more site environmental data gathered.

Report Signature Page

GOLDER ASSOCIATES LTD.

Robin Bourke, BSc. Eng
Project Manager, Environmental Engineer

David Pritchard, P. Geol.
Principal, Senior Geoscientist

David Casson, B. Eng.
Environmental Engineer

RB/DP/DC/kl

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Africa	+ 27 11 254 4800
Asia	+ 86 21 6258 5522
Australasia	+ 61 3 8862 3500
Europe	+ 356 21 42 30 20
North America	+ 1 800 275 3281
South America	+ 55 21 3095 9500

solutions@golder.com
www.golder.com

Golder Associates Ltd.
9-4905 48th Street
Yellowknife, NT
X1A 3S3