7 System Abnormal Operation

7.1 Domestic Sewage and Solid Waste

Any problems in the sewage treatment plant, such as improper operation, pipeline rupture, pump/power breakdown etc., will be immediately reported to the On-Scene Coordinator/Site Supervisor. Problems encountered with the incinerator will also be reported to the On-Scene Coordinator/Site Supervisor. The On-Scene Coordinator/Site Supervisor will refer to the Operation and Maintenance Manual and take appropriate action.

In the event of a power failure, the stand-by generator will be put into operation as soon as possible. Similarly, in the case of a pump failure, the back-up pump will be put on-line. Any spillage occurring inside the sewage treatment system will be contained within the facility and if necessary reprocessed. Appropriate safety equipment and personal protective clothing will be available to site personnel.

7.2 Fuel Spill

Fuel spills, leaks at storage facilities or vehicle accidents will be handled by following these steps:

- Identify the source of the leak or spill;
- Contact the On Scene Coordinator/Site Supervisor
- Stop leaks from a tank or barrel by:
    - Turning off valves;
    - Utilizing patching kits to seal leaks;
    - Placing plastic sheeting at the foot of the tank or barrel to prevent seepage into the ground;
- Contain the spill and the source if possible;
- Take photographs of the spill site before and after clean up.

Further information on the handling of fuel spills is detailed in Section 10 of this Plan.

7.2.1 Fuel Spills on Land

Fuel spills on land (gravel, rock, soil, vegetation) can be contained by:

- Constructing temporary berms and deploying absorbents;
- Stains on rock can be soaked up with absorbent mats. The mats should be placed in empty drums for storage prior to incineration; and
- Contaminated soil and vegetation, where appropriate, be disposed of at an approved facility.

7.2.2 Fuel Spills on Snow

Snow can be an effective natural absorbent for spilled fuel;

- Temporary berms can be made from snow by compacting it and spraying with water to create an ice barrier or lining the snow-berm with plastic;
- The snow-fuel mixture can be scraped up and stored in a lined area or in drums for future disposal; and
- Mark or stake the area impacted by the spill so that the site can be revisited and re-evaluated once the snow has melted.

7.2.3 Fuel Spills on Water

It is important to immediately limit the area of the spill on water. Booms can be drawn in to encircle spilled fuel. The absorbent mats are hydrophobic (absorb hydrocarbons and repel water).

- Deploy booms to contain the spill area. Boom effectiveness will be limited by winds, waves and other factors; and
- Use absorbent mats and similar materials to capture small spills on water.

7.2.4 Fuel Spills on Ice

Where a spill occurs on ice, snow can be compacted around the edge of the spill to serve as a berm. The ice provides a good barrier to any seepage of fuel into the water, but the contaminated snow/ice must be scraped up as soon as possible.

- Permission may be given from the government to burn off fuel (contact the NWT 24 Hour Spill Line).
- Remaining contaminated snow can be placed in drums or in a lined berm (on land).

7.3 Chemical Spills

Assess the hazard of the spilled material by referring to the relevant MSDS sheet and applicable action plan:

- If the chemical is hazardous, ensure personal protective equipment is appropriately utilized (latex gloves, eye protection, etc.) before approaching the spill (refer to Section 11 of this report)
- Use absorbent mats to soak up spilled liquids;
- Plastic sheeting can be utilized to prevent solid chemicals from being blown around;
- Neutralize acids or caustics; and
- Place spilled material, absorbents, and rags in an open-top drum for storage and ultimate disposal of at an approved location.

8 Response Equipment

8.1 General Equipment

Heavy equipment used in exploration drilling operations will be available on-site for emergency use and to respond to spill incidents. Helicopters and fixed-wing aircraft could also be available if requested by the Action Director. Presently, the facilities are well equipped to respond to emergencies or spills.

8.2 Locations of Spill Kits

Complete spill kits are located in various potential high-probability spill areas as tabulated in Section 15.4. These kits will be checked on a regular basis to ensure all its contents have not been tempered with. Proper signage will be placed at respectively areas indicating the exact placement of the kit.

8.3 Spill kit House Keeping

Contents of each spill kit will be regularly checked for durability. A checklist will be placed in each kit indicating the date of the last inspection. Equipment found in undesirable condition shall be replaced immediately.

8.4 Mobile Environmental Response Unit

A Mobile Environmental Response Unit is believed to be available to MHBL from a major fuel supplier (Shell) in Yellowknife or Cambridge Bay (for phone number, see Contractors in Section 15.8). This unit can be transported to the site from Cambridge Bay in less than five hours, weather permitting.

However, to be proactive, considerations to purchase portable spill kits that would be stored at respective camps and transported to spill scene outside of property at short notice is ongoing.

9 Training and Spill Exercises

9.1 Spill Training

All members of the Spill Response Team will be trained and be familiar with the spill response equipment, including their location and access, the Spill Contingency Plan and appropriate spill response methodologies. During 2000 the onsite training program for Windy Camp personnel was initiated at the start of the field program. The training program includes the dissemination of information regarding the Spill Contingency Plan, the NT Environmental Protection and Spill Regulations, the viewing of RWED spill response videos, and the field application of suitable techniques.

All MHBL personnel will be familiar with spill reporting requirements.

Fuel handling crews will be fully trained in the safe operation of these facilities; spill prevention techniques and initial spill response. Similarly, the staff involved in wastewater treatment operations will be trained in the safe and effective operation of these facilities.

9.2 Spill Exercises

MHBL will conduct regular spill exercises to test the response of the Spill Response Team to manage fuel

and other system failure spills.

Reports will be made by the Site Supervisor or designate, noting the response time, personnel, and problems or deficiencies encountered. These reports will be used to evaluate the ability to respond to spills and determine areas necessary for improvement.

10 Action Plan for Spill of diesel fuel

10.1 Identify Hazards

- Flammable
- Slightly toxic by ingestion, highly toxic if aspirated

10.2 Initial Spill Response

- STOP the flow if possible
- CONTAIN flow of oil by dyking, barricading or blocking flow by any means available. Use earth-moving equipment if practical.
- ELIMINATE, open flame ignition sources
- If flow has reached any natural stream, mobilize team to
- Deploy river boom, and sorbent booms
- If possible, pump fuel into other appropriate containers.

10.3 Action for fire:

- Use carbon dioxide, dry chemical, foam, or water spray (fog), although water may spread the fire
- Use fog streams to protect rescue teams and trapped people
- Use water to cool surface of tanks
- Divert the diesel fuel to an open area and let it burn off under controlled conditions.
- If the fire is put out before all diesel fuel is consumed, beware of re-ignition
- Where diesel fuel is running downhill, try to contain it as quickly as possible
- Rubber tires are almost impossible to extinguish, have affected vehicles removed from the danger area.

10.4 Recovery:

- Unburned diesel fuel can be soaked up by sand and peat mass, or by chemical sorbents such as Graboil or Conwed.
- If practical, contaminated soil should be excavated.
- Diesel fuel entering the ground can be recovered by digging sumps or trenches
- Diesel fuel on a water surface should be recovered by using skimmers or sorbent booms (See Section on Recovery of Oil Spills).

10.5 Disposal:

- Incineration under controlled conditions.
- Burial at an approved site.

10.6 Properties:

- Chemical composition mixture of hydrocarbons in the range C9 to C18
- Clear, oily liquid
- Not soluble, floats on water

10.7 Environmental Impacts:

- Moderately toxic to fish and other aquatic organisms
- Harmful to waterfowl
- May create visual film on water

10.8 Containers:

- Transported by appropriate means available to available storage

11 Action for Lubricating and Hydraulic oil spills

11.1 Identify Hazards:

- Slightly toxic by ingestion
- Combustible

11.2 Initial Spill Response:

- STOP the flow is possible
- ELIMINATE, open flame ignition sources
- CONTAIN flow of oil by dyking, barricading or blocking flow by any means available.
- Use earth-moving equipment if practical if flow has reached any natural stream; mobilize the team to deploy river boom, skimmer and sorbent booms.

11.3 Action for Fire:

- (Refer to Section 10.3 of this Plan)

11.4 Recovery:

- (Refer to Section 10.4 of this Plan)

11.5 Disposal:

- (Refer to Section 10.5 of this Plan)

11.6 Properties

- Chemical composition: mixture of hydrocarbons and conventional industrial oil additives
- Generally viscous liquids, various colours
- Not soluble, floats on water

11.7 Environmental Impact:

- Moderately toxic to fish and other aquatic organisms
- Harmful to waterfowl
- May create visual film on water and shorelines.

11.8 Containers:

- Transported by appropriate methods to acceptable storage, (typically 205 litre drums.), Bulk transportation and storage as well.

12 Action plan for Ethylene Glycol (Antifreeze) spill

12.1 Identify Hazards:

- Moderately toxic by ingestion and inhalation
- Flammable

12.2 Initial Spill Response:

- STOP the flow at source if possible
- ELIMINATE open flame ignition sources
- CONTAIN flow of liquid by dyking, barricading or blocking flow by any means available
- PREVENT antifreeze from entering any flowing streams

12.3 Action for Fire:

- (Refer to Section 10.3 of this Plan).

12.4 Recovery:

- Ethylene glycol antifreeze can be soaked up by peat moss or by commercial sorbents such as Hasbro
- Access to spilled or recovered ethylene glycol by mammals should be prevented.

12.5 Disposal:

- Incineration under controlled conditions
- Burial at an approved site

13 Emergency Contract Information

Section 15.6 – 15.8 summarizes personnel that must be contacted in case of a spill, fire or injury, as well as additional resources that may be able to provide information or assistance.

14 References

Hope Bay Project Employee Handbook, Miramar Hope Bay Ltd; 2004.

Miramar Hope Bay Limited. Boston MediVac Procedure, 2004.

15 Appendixes

15.1 Boston Camp Site layout See Attached

15.2 Windy Lake Camp Layout Plan See Attached

15.3 Environmental Aspect and Impact Listing

Environmental aspects and impacts allocated by departments

Department	Aspect (MHBL Activities, Products or Services)	Impacts (Beneficiary / Adverse)	Risk Rating						Preventative Measures (Regulatory / Due Diligence)
			Probability			Consequence			
			L	M	H	H	M	L	
Exploration Geology	Waste Rock (ARD) – Metal leaching	Bioavailability of trace metals uptake via the food web/chain: • Terrestrial flora • Terrestrial fauna • Aquatic flora • Aquatic fauna • Avifauna • Water contamination – surface runoff and ground water	✓			✓			• Water quality sampling during critical periods (spring run off). • Weekly inspection for seepage.
	Waste Rock Stockpile	Displacement of: • Flora • Fauna Dust emissions: • Air quality • TSS - water quality Surface runoff: • TSS – water quality • Smoothening of flora	✓	✓	✓	✓ ✓		✓	• Better waste management strategic • Regular review of data • Monitoring and sampling • Closure Plan
	Hydrochloric Acid (HCl)	• Gaseous emissions	✓					✓	• Use proper PPE • Work procedures
	Potassium Ferro cyanide	• Gaseous emissions	✓					✓	• Use proper PPE • Work procedure
	Long-term core storage	Displacement of: • Flora • Fauna			✓			✓	• Closure Plan • Waste management
	Core Cuttings – waste	• Smoothening of flora • Bioavailability of trace metals uptake via food web/chain • Water contamination - surface runoff & ground water • Soil contamination			✓		✓		• Waste management • Work procedure
Maintenance	Sewage Sludge	Increase in nutrients: • Terrestrial flora • Terrestrial fauna • Aquatic flora • Aquatic fauna • Avifauna Aesthesia - Odour • Health issues	✓			✓			• Waste management • Planned preventive maintenance (PM) • Regular Inspections
	Sewage Grey water – leak in line	Increase in nutrients: • Terrestrial flora • Terrestrial fauna • Aquatic flora • Aquatic fauna • Avifauna Aesthesia – Odour • Health issues	✓				✓		• Waste management • Regular monitoring and sampling • Planned PM
	Fuel/Oil – Major spill during transportation	Bioavailability of trace metals uptake via the food web/chain: • Terrestrial flora • Terrestrial fauna	✓			✓			• Adhered to dangerous goods protocols • Proper inspection

		• Aquatic flora • Aquatic fauna • Avifauna • Soil contamination • Depletion of oxygen • Water concatenation – surface runoff and groundwater							• of equipment • Adhered to Standard work Procedure
	Fuel/Oil – Major spill at storage – leak or burst lines	Bioavailability of trace metals uptake via the food web/chain: • Terrestrial flora • Terrestrial fauna • Aquatic flora • Aquatic fauna • Avifauna • Soil contamination • Water contamination - surface runoff & ground water • Air contamination	✓			✓			• Regular inspection • Planned PM • Monthly Audit
	Fuel/Oil – Major spill at storage – leak or burst connector	Bioavailability of trace metals uptake via the food web/chain: • Terrestrial flora • Terrestrial fauna • Aquatic flora • Aquatic fauna • Avifauna • Soil contamination • Water contamination - surface runoff & ground water • Air contamination	✓			✓			• Regular inspection • Planned PM • Monthly Audit
	Fuel/Oil – Major spill at storage – Use of substandard materials or manufactured parts	Bioavailability of trace metals uptake via the food web/chain: • Terrestrial flora • Terrestrial fauna • Aquatic flora • Aquatic fauna • Avifauna • Soil contamination • Water contamination - surface runoff & ground water • Air contamination	✓			✓			• Planned PM • Regular inspection • Use recommended / certified parts • Identification of critical parts and stock sufficient items. • Monthly Audit
	Used Oil Filters – waste oil	Bioavailability of trace metals uptake via the food web/chain: • Terrestrial flora • Terrestrial fauna • Aquatic flora • Aquatic fauna • Avifauna		✓		✓			• Waste management • Planned PM • Monthly Audit
	Used Fuel Filers – waste fuel	Bioavailability of trace metals uptake via the food web/chain: • Terrestrial flora • Terrestrial fauna • Aquatic flora • Aquatic fauna • Avifauna		✓		✓			• Waste management • Planned PM • Monthly Audit
	Jet B	Bioavailability of trace metals uptake via the food web/chain: • Terrestrial flora • Terrestrial fauna • Aquatic flora • Aquatic fauna • Avifauna • Soil contamination • Air contamination • Water contamination – surface runoff and ground water			✓		✓		• Waste management • Monthly Audit

	Incineration of burnable refuse	Bioavailability of trace metals uptake via the food web/chain: • Terrestrial flora • Terrestrial fauna • Aquatic flora • Aquatic fauna • Avifauna			✓			✓	• Waste management • Monthly Audit • Regular Inspections
	Incinerator ash	Bioavailability of trace metals uptake via the food web/chain: • Terrestrial flora • Terrestrial fauna • Aquatic flora • Aquatic fauna • Avifauna • Soil contamination • Water contamination – surface runoff and groundwater			✓			✓	• Waste management • Regular inspection • Monthly Audit
	Used Batteries	Bioavailability of trace metals uptake via the food web/chain: • Terrestrial flora • Terrestrial fauna • Aquatic flora • Aquatic fauna • Avifauna • Soil contamination • Water contamination – surface runoff and groundwater	✓					✓	• Waste management • Planned PM • Monthly Audit
	Metal drums – Rusting causing contents to leak	Bioavailability of trace metals uptake via the food web/chain: • Terrestrial flora • Terrestrial fauna • Aquatic flora • Aquatic fauna • Avifauna • Soil contamination • Water contamination – surface runoff and ground water		✓			✓		• Waste management • Storage plan • Regular Inspection
Camp Services	Detergents	Bioavailability of trace metals uptake via the food web/chain: • Terrestrial fauna • Aquatic flora • Aquatic fauna • Increase nutrients			✓			✓	• Waste management • Use alternative products, e.g. ISO 14001 certified products
	Cooking Grease & Oil	• Soil contamination • Water contamination – surface runoff and groundwater			✓			✓	• Waste management
	Packing boxes	• Landfill – space • Air contamination • Soil contamination – ash • Water contamination - ash			✓			✓	• Waste management
	Wrapping packages	• Landfill – space • Air contamination – hydrocarbon • Soil contamination – hydrocarbon • Water contamination - hydrocarbon			✓			✓	• Waste management
Contractor Drilling	Sodium Chlorite (NaCl)	• Soil contamination • Water contamination – surface runoff and ground water • Air contamination – incinerated bags • Soil contamination – incinerated bags – ash • Water contamination – ash			✓	✓		✓	• Contract management

	Calcium Chloride (CaCl)	• Soil contamination • Water contamination – surface runoff and ground water • Air contamination – incinerated bags • Soil contamination – incinerated bags – ash • Water contamination – ash			✓	✓		✓	• Contract management
	Cement	• Soil contamination - smoothening • Water contamination – surface runoff and ground water • Air contamination – dust powder • Soil contamination – incinerated bags – ash • Water contamination – ash		✓				✓	• Contract management • Waste management
	Propane	• Air contamination • Landfill – damaged cylinders • Explosion • Fire		✓				✓	• Contract management • Monthly Audits • Waste management
	Sludge/Cuttings	Bioavailability of trace metals uptake via the food web/chain: • Terrestrial flora • Terrestrial fauna • Aquatic flora • Aquatic fauna • Soil contamination • Smoothening of flora			✓	✓			• Contract management • Waste management • Work procedure
	Fuel	Bioavailability of trace metals uptake via the food web/chain: • Terrestrial flora • Terrestrial fauna • Aquatic flora • Aquatic fauna • Avifauna			✓	✓			• Contract management • Waste management
	Oil	Bioavailability of trace metals uptake via the food web/chain: • Terrestrial flora • Terrestrial fauna • Aquatic flora • Aquatic fauna • Avifauna			✓	✓			• Contract management • Waste management
	Grease	Bioavailability of trace metals uptake via the food web/chain: • Terrestrial flora • Terrestrial fauna • Aquatic flora • Aquatic fauna • Avifauna			✓		✓		• Contract management • Waste management plan
	Used oil filters	Bioavailability of trace metals uptake via the food web/chain: • Terrestrial flora • Terrestrial fauna • Aquatic flora • Aquatic fauna • Avifauna • Landfill – space • Soil contamination • Water contamination – surface run off and ground water		✓			✓		• Waste management plan • Contract management • Planned PM
	Used fuel filters	Bioavailability of trace metals uptake via the food web/chain: • Terrestrial flora		✓			✓		• Waste management plan • Contract

		• Terrestrial fauna • Aquatic flora • Aquatic fauna • Avifauna • Landfill – space • Water contamination – surface runoff and ground water							management • Planned PM

Note: Probability of the likelihood of an accidence/incidence to occur - (L=low, M=moderate, H=high); Consequences – severity or the outcome of an incidence/incidence.

15.4 Material Data Sheets See Attached

15.5 Locations of spill kits

Camp Site	Location	Full Kit
Boston Camp	Generator shack (enviromat only)	No
	Jet-B fuel drum storage area	Yes
	Procon workshop (enviromat only)	No
	Bulk fuel storage and handling area	Yes
	Camp workshop (enviromat only)	No
Windy Lake Camp	Helicopter pad	Yes
	Generator shack	Yes
	Operational drill site caches	Yes
	Drillers workshop and equipment area (Patch Lake)	Yes
	Camp workshop (enviromat only)	No
	Operating drill rigs	Yes
	Fuel storage area	Yes

15.6 Spill kits contents

Stocked Response Equipment	Quantity
45 gal, 16-Gauge Open Top Drum, c/w Bolting Ring & Gasket	1
Short Pig Putty Epoxy Sticks	20
PVC Oil Resistant Gloves	2
Shovel (Spark Proof)	1
Universal Absorbent Mats, 161/2 " x 20", 100 Mats per Package	1 Pkg
48" x 48' x 1/1 6" Neoprene Pad (Drain Stop)	1
Splash Protection Goggles	
Polyethylene Disposable Bags (5 ml) 10 per Package	1
Case T- 1 2 3" x 1 O' Absorbent Boom, 4 Booms/Case	1 Pkg
Roll, Oil Only Absorbent Mats, 150'x 33"	1

15.7 List of MHBL personnel Emergency Contact Information

Responsible Personal /Agency	Personnel	Location	Information
On site Contacts			
Site Supervisor	Jim	Boston	Tel: 604-677-4675; Fax: 604-677-0666 Radio Channel: 4
Senior Environmental Coordinator	Matthew Kawei	Boston	Tel: 604-677-0675; Fax: 604-677-0666; Email: mkawei@miramarmining.com; Radio Channel: 4
Site Medic	Dean Constantini	Boston	Tel: 604-677-0675; Fax: 604-677-0666; Radio Channel: 4
Site Supervisor	Mike Cripp	Windy Lake	Tel: 604-677-0636; Fax: 604-677-0713 Radio Channel:
Senior Environmental Coordinator	Matthew Kawei	Boston	See above details
Site Medic	Dan Newport	Windy Lake	Tel: 604-677-0633; Fax: 604-677-0713; Email: Radio Channel: 7
Miramar Mining Corporation Head Office Contracts			
Vice President, Operation	Brian Labadie	Vancouver	Tel: (604) 985-2572; Fax: (604) 980-0731; E-mail: blabadie@miramarmining.com
Manager, Environmental Affairs	Hugh Wilson	Vancouver	Tel: (604) 985-2572; Cell: (780) 975-2550; Fax: (604) 980-0731; Fax:(780) 988-2186 (home) Email: hwilson@miramarmining.com; hugh_r_wilson@hotmail.com
Human Resources Manager	Scott Stringer	Yellowknife	Tel: (867) 766-5311

15.8 List of relevant Government department emergency contact information

Responsible Personal /Agency	Personnel	Location	Information
Government Agencies			
Northwest Territories 24-Hour Spill Report Line		Yellowknife	Tel: (867) 920-8130; Fax: (867) 873-6924
Executive Director, NWB	Philippe di Pizzo,	Nunavut	Tel: (867) 360-6338; Fax: (867) 360-3669
Water Resources Inspector		Iqaluit	Tel: (867) 975-4298
RCMP		Yellowknife	Tel: (867) 669-1111: Fax (867) 669-2224
RCMP		Cambridge Bay	Tel: (867) 983-2111; Fax: (867) 983-2498
Resource Management Officer		Cambridge Bay	Tel: (867) 983 7314
Indian & Northern Affairs Canada	(DIAND)	Iqaluit	Tel: (867) 975-4546
Environment Canada	Colette Meloche	Iqaluit	Tel: (867) 975-4639
Fisheries and Oceans	Tania Gordanier	Iqaluit	Tel: (867) 979-8007; Fax:(867) 989-8039
Resources, Wildlife & Economic Development (RWED)	Environmental Protection Services	Nunavut	Tel: (867) 873-7654
RWED Regional Superintendent	Larry Adamson	Yellowknife	Tel: (867) 920-6134
RWED	Grant Corey	Cambridge Bay	Tel: (867) 983-7315; Fax: (867) 983-2802
RWED		Kugluktuk	Tel: (867) 982-7251, Fax: (867) 982-3701
Dept Sustainable Development	Gord MacKay	Iqaluit	Tel: (867) 979-5715
Workers Compensation Board		Yellowknife	Tel: (867) 920 3888
Director Prevention Services	Sylvester Wong	Yellowknife	Tel: (867) 669-4408
Mine Safety	Peter Bengts	Yellowknife	Tel: (867) 669-4408
Kitikmeot Inuit Association (KIA), *Lands Manager*	Jack Kaniak	Kugluktuk	Tel: (867) 982-3310; Fax: (867) 982-3311
Municipal and Community Affairs, Office of Fire Marshall	Bruce Stebbing	Yellowknife	Tel: (867) 873-7030

15.9 List of relevant Additional assistance emergency contact information

Responsible Personal /Agency	Personnel	Location	Information
Additional assistance may be obtained as necessary from the following organisations			
Discovery Mining Services	Rod Brown	Yellowknife	Tel: (867) 920-4600
Shell Canada, Mobile Environmental Response	Steve Bassett		Tel: (867) 874-2562
Major Midwest Drilling	Gordon Cyr		Tel: (204) 885-7532
Kinuna	Wilf Wilcox		Tel: (867) 983-2331
Nuna Logistics Ltd	Court Smith/John Zigarlick		Tel: (604) 682-4667
Local Air Charter			
Air Tindi, Dispatch			Tel: (867) 669-8218
NWT Air (First Air), Dispatch			Tel: (867) 669-6645
First Air, Dispatch			Tel: (867) 669-6682
Nunasi Helicopters	Martin Knutsen		Tel: (867) 873-3306
Kitikmeot-Great Slave Helicopters			Tel: (867) 873-2081
Summit Air	Jamie Tate		Tel: (867) 667-7327; Cel: (867) 333-1503
Equipment and Material Supply			
Dupont (Fuel Dye)	Ray Buckland	Toronto	Tel: (905) 821-5660
Frontier Mining (Sorbents)			Tel: (867) 920-7617
Acklands (Sorbents)			Tel: (867) 873-4100