Spill Emergency Contingency Plan

to be used by Tri Origin Exploration Ltd.

2.6 Emergency Spill Contingency

1) Emergency spill contingency defines the procedures and methods to be implemented in the event of a hazardous or dangerous material spill occurring during mineral exploration or project standby.
2) Assign responsibility for the development, implementation and periodic review of the Emergency Spill Contingency Plan to a team member.
3) Train and educate personnel on hazardous materials and the appropriate contingency.
4) Establish an organizational structure to quickly and efficiently direct and carry out emergency response activities.
5) Establish and define reporting and notification procedures.
6) Identify all hazardous situations that can cause environmental and health damage as a result of accidental spills, releases and system or design failures (See table 2:1, in Appendix B V, for a list of dangerous goods and their reportable quantities).
7) Purchase emergency spill response equipment to contain the maximum amount of substance that poses the greatest risk.
8) Identify hazardous waste transportation and disposal options.

If a release should occur;

1) Protect all human health and remove all non-essential personnel from the area.
2) Take immediate corrective action to eliminate the source of the release (ie shut off the pump, close the valve, plug the hole in the container, etc.)
3) If required, construct containment around the spilled material to prevent further movement of contaminants (i.e. construct earthen berms, install straw bales, cover with absorbents).
4) Deploy emergency spill response kit.
5) Notify the relevant and appropriate regulatory government agencies of the release.
6) Notify the PDG Environmental Manager and Coordinator for the area.

Examples of emergency spill contingency kits and techniques are located in appendix B VI.

Adapted from Placer Dome Inc. Environmental Policy Guidelines. Canada., November, 1994.

6.2.1.7 Spill Contingency Kits

Spill contingency kits come in varying sizes depending on the spill. It is therefore important to not only be aware of the hazardous materials used on the project but the areas most likely to be affected by a spill. For example, fuel transfer at lake docks or around drilling rigs.

Hydrocarbons are everything from solvents and gasoline, to oil. Wear breathing apparatus for all spills. Be especially cautious with solvents, aviation fuel and gasoline.

Industrial Spill Kit - example only

1) A 46 gallon 16 gauge drum which meets EPA standards.
2) Two closing rings - one for ease of entry into the drum and the other to ensure absolute containment of hazardous products for transport and temporary storage.
3) One pair of neoprene oil and chemical resistant gloves.
4) One protective suit.
5) One pair of protective goggles.
6) One neoprene drain stopper 91x91cmx2.5mm thick.
7) 12m of 12cm containment boom.
8) 25 absorbent pads – 46x46cmx8mm thick.
9) 23m of absorbent blanket - 70cmx8mm thick.
10) 2 polyethylene bags 71x46x165cm - 3mm thick.

Caution must be exercised when handling, storing or disposing of sorbets saturated with hazardous materials.

Adapted from; M.E.P. Environmental Products Ltd. S-1000 Industrial Spill Responce Kit. M.E.P., Environmental Products Ltd. Winnipeg, Canada (date unknown).

6.2.2 Spill Response Techniques

The following are generic techniques suggested for use in the majority of situations. This document understands the variations of site-specifics and as such all PDG personnel are encouraged to become familiar with their project and its logistical constraints. It is also recommended that a high level of spill response preparedness is practised.

6.2.3 Spill on Water

1) Outline an appropriate boat and motor, or other equipment as required for possible emergency spill contingency.
2) Booms come in 2 or 3 metre sections with hooks and clamps, to form continuous lengths. These sections should be clipped together and a boat should then tow the Boom to encircle the spill.
3) Absorbents should then be deployed outside of the Boom to catch the overflow.
4) A control rope on each end of the Boom should then be used to move the spill towards the shore. A blanket should be rolled out along the shore to protect the shoreline from contamination.
5) When the spill is drawn to the shoreline (but not up on it), pads and torn off roll sections (blanket) are then to be thrown into the spill to absorb the containment (These can be wrung out in proper containers and used over again).
6) Retrieving should be done by use of pitchforks or gaffs.
7) When the spill is cleaned up, place the contaminated material in plastic bags or protective drums. Lids MUST be secured.
8) Dispose of waste material in an approved manner.

Adapted from: M.E.P. Environmental Products Ltd. S-1000 Industrial Spill Responce Kit. M.E.P., Environmental Products Ltd. Winnipeg, Canada (date unknown).

6.2.4 Spill on Land

1) Hook the boom sections together and encircle spill.
2) Throw pads into the spill, wring out for re-use.
3) Dispose of waste in an approved manner.

NUNAVUT SPILL REPORT

(Oil, Gas, Hazardous Chemicals or Other Materials)

24-hr Spill Report Phone/Fax

Phone (403) 920-8130
Fax (403) 873-6924

A Report date and time	B Date and time of spill (if known)	C ☐ Original report ☐ Update no.	Spill number

D Location and map coordinates (if known) and direction (if moving)

E Party responsible for spill

F Products spilled and estimated quantities (provide metric values and volume if possible)

G Cause of spill

H Is spill contained? ☐ yes ☐ no	I If spill is continuing, give estimated rate	J Is further spillage possible? ☐ yes ☐ no	K Extent of contaminated area (if known)

L Factors affecting spill or recovery (weather conditions, terrain, snow cover, etc.)

M Containment (natural depression, dykes, etc.)

N Action, if any, taken or planned to contain, recover, clean up or dispose of product(s) and contaminated materials

O Do you require assistance? ☐ no ☐ yes, describe:	P Possible hazards to persons, property, or environment; eg: fire, drinking water, fish or wildlife

Q Comments and/or recommendations

FOR SPILL LINE USE ONLY

Lead Agency

Spill significance

Lead Agency contact and date

Is this file now closed? ☐ yes/oui ☐ no/non

Reported by	Position, Employer, Location	Telephone
Response to	Position, Employer, Location	Telephone

Site Restoration Plan

2.4 Ground Water Protection (Drill Hole Backfilling)

Any hole drilled for mineral exploration, including; geochemical, geotechnical, geological or geophysical purposes should adhere to the following guidelines for groundwater protection.

1) All holes drilled for the purpose of mineral exploration should be plugged, sealed, or capped.
2) If water is not encountered in the drill hole then plugging, sealing, or capping still will be required.
3) If static water is encountered the preferred methods are to;
   - prevent pollution, contamination or waste of the aquifer,
   - seal off zones of poor water quality which may affect zones of high water quality,
   - introduce bentonite pellets from the top to fill completely the drill hole, or
   - create a mixture of grout, concrete grout or neat cement, and seal the hole by circulating from the total depth to the surface.
4) If the driller encounters flowing water (artesian) at the surface then he should;
   - take every reasonable precaution to prevent any water from escaping around the outside of the casing or steel,
   - plug the hole to the surface with cement, or
   - if the cement plug fails, install an effective shut-off valve to prevent the waste of water.
5) At minimum, all drill holes to be permanently abandoned should be backfilled from the total depth with the cuttings drilled from the hole, bentonite pellets, or cemented.
6) Drill holes may be converted to water wells subject to the acceptability of parameters such as water quality, aquifer protection, hole stability and government permit requirements.
7) Drill holes may also be utilized as ground water wells for the purpose of monitoring the effects of subsequent operations on the quantity, quality, or pressure of ground water. Holes converted for this regard must be adequately prepared.
8) If the drill hole is to temporarily remain □active□ then the top of the casing on all holes should be at least 30 cm above ground level.

9) Where the potential for groundwater contamination exists (porus soils), drill sumps should be constructed with a suitable liner.

10) Any additive used in drilling must be safe for the environment and tend not to pollute or contaminate the ground water.

Examples of drill hole back filling techniques have been included in appendix B IV.

Adapted from USA Bureau of Land Management. Reclamation of Drilling Operations, H-3042-1 Solid Mineral Reclamation., Chpt 5, 1992. And from the Department of Conservation and Natural Resources, Nevada., USA. Drilling, Construction and Plugging of Wells. Underground Water and Wells, Chpt 534. NAC 534.370 - 534.425., 1990.

2.1 Location, Design and Extraction of Drill Water Supply

1) Exploration drill water requirements should be estimated before the drill program commences. Diamond drill rigs will have different requirements to Reverse Circulation rigs. This is dependent on the rock integrity and ground water reserves.
2) Identify 2 to 3 possible water sources that can meet peak drill water requirements during periods of minimal surface precipitation.
3) Drill holes may be converted to water wells subject to the acceptability of parameters such as water quality, aquifer water depths and hole stability.
4) Select the source that has good all-weather, year-round, access.
5) Drill water should only be extracted from non-potable sources, except where potable sources are plentiful and perennial.
6) Design drill water tanks, reservoirs and dams with capacity to meet peak demands.
7) Water supply pumps should be located above the high water line of any water course, and be adequately bermed to prevent fuel spills into that water course. Ensure a solid footing under the pump and fuel containers and place hydrocarbon absorbent pads under these pumps.
8) Obtain drill water extraction permits where required.

Adapted from Guidelines for Mineral Exploration: Environmental, Reclamation and Approval Requirements. Ministry of Energy, Mines and Petroleum Resources. British Columbia, Canada, 1992. And from the Bureau of Land Management. Reclamation of Drilling Operations. H-3042-1 Solid Mineral Reclamation., Chpt 5,USA., 1992.

2.2 Drill Water Discharge on Exploration Projects

1) Drill cuttings (drill water discharge) should not be allowed to enter any water source or flow uncontrolled.

2) An adequate closed circuit facility should be provided for drilling mud and flocculating agents, which may include;

   - a settling pool or sump a short distance down slope from the drill,
   - a series of settling tanks adjacent to the drill, or
   - a drill cuttings/water filter.

3) All drill cuttings deposited into a drill sump during the course of drilling should be buried insitu, in a timely manner, unless the cuttings are proved to interfere with flora, fauna, ground or surface waters. In this case the drill cuttings should be removed and placed in an approved land-fill.

Examples of drill water discharge options have been included in appendix B III.

2.2.1 Artesian Water

Placer Dome is committed to preventing the waste of water and cross contamination between aquifers. All drill holes that encounter artesian water must be plugged, sealed, documented and reported to the project geologist. Water flow will be contained.

Methods for containment:

1) If significant artesian flow is suspected in the area (> 1 L/s) then, prior to core drilling;

   - install surface casing around the borehole to a depth of at least 2 m below ground or to bedrock, and
   - low permeability grout material should be placed outside the casing, to ensure there is a satisfactory hydraulic seal between the casing and the surrounding rock.

2) If significant artesian flow develops then;

- if not already in place, try to install a surface casing and seal the annulus between the natural soil or bedrock outside the casing,
- install a flow control cap at ground level. This cap should have a screw thread to the bore hole casing and a welded spigot (>50 mm) to control the flow,
- ensure the flow valve is secure to prevent possible vandalism, and
- ensure the material used for capping the hole is of high quality. PVC products may be weakened by UV rays and animal activities, and mild steel products may corrode.

3) If in areas subjected to sub-zero temperatures then;

- place a thick dry insulation cover over the well cap, or
- open the valve and ensure a flow of at least 0.08 L/s (1 gpm).

4) Methods for temporarily stopping the flow whilst installing the casing include;

- mixing heavy mud in the hole (using barite additive in bentonite mud or possibly a high concentration of salt in water,
- insert a temporary plug in the hole, such as wooden plugs, inflatable rubber or plastic packers and tightly compressed rags, and
- using reverse circulation methods to flush in sand into the annulus, followed by bentonite mud.

5) If the hole is of no use left open then procedures for final abandonment include;

- fill the hole from total depth to surface with cement or other low permeability material,
- in low flow holes, seal with cement and use a fast setting cement to ensure a quick seal and bentonite to minimise shrinkage.

Examples of drill hole plugging techniques are located in appendix B II.

Adapted from Piteau Associates Engineering Ltd (Consultants to the PDI Environmental Department)., Guidelines for Control of Artesian Boreholes. Vancouver, Canada, 1996.