



Review of De Beers February 2009

Snap Lake Project Revised Spill Contingency Plan

SLEMA April 2009

disclaimer:

It should be clearly understood that this review and/or acceptance of De Beers' spill contingency plan does not absolve De Beers Canada Inc. from their responsibilities pertaining to the proper management of the hazardous materials under their control; nor does it confer upon the reviewers, any responsibility whatsoever for any errors or omissions in the spill plan and that may have been overlooked.

General Comment

Before continuing on to a specific section by section review of the Spills Contingency Plan SLEMA would like to make the point that there is an absence within this document of contingency procedures regarding the actions to be taken upon a failure at either the water management pond or the processed kimberlite ore storage facility resulting in contaminated water flowing into Snap Lake. SLEMA would like a section in this document dealing with such an event.

Table 1- Spill Contingency Plan Distribution List

This is a minor point and is only mentioned for your information. At least one of the individuals mentioned in the list – Emery Paquin is no longer employed by the GNWT. Ron Allen of DFO may have also departed. On that note, it is probably a good idea to keep such lists current, difficult though that might be with people coming and going almost continually.

1.0 Introduction

A list of hazardous materials to which the spill plan applies, is presented on page 5.

- It is suggested that De Beers include, as an appendix, a spreadsheet of these materials and include the following information:

- § quantity, volume
- § UN #
- § TDGR hazard class
- § general location

In many cases, providing an exact volume is not at all practical. It is therefore suggested that the volumes provided represent the maximum volume that may be on the site at any given time. Small quantities of lab chemicals which are permanently stored in a secure laboratory can, for all intents and purposes, be omitted from the spill plan, however, this information may be required under WHMIS anyway.

Section 2.1 Emergency/Spill Response Contact Information

De Beers has provided a list of 24 hour contacts which is useful. As indicated in the first review:

- § De Beers should highlight the principle 24 hour contacts or at least provide an indication if the listing of individuals is based on some kind of hierarchical order; for example, is the On-Scene Coordinator the first point of contact?

Section 2.2 Mobile Environmental Response Unit (Off-Site)

The July 30, 2007 review suggested that De Beers provide the following information with respect to their third-party response unit:

- § De Beers should provide a brief description of the circumstances under which they envision the need to request outside assistance.
- § How long will it take for Petro-Canada to respond to an emergency at Snap Lake?
- § How will the men and equipment be deployed to the site?
- § De Beers should provide an overall description of the firm's experience and track record.
- § A description of the equipment available to the response team and which will be mobilized to the spill site.

This information was not provided in the revised spill plan. While it is not a “show stopper” in this reviewer’s opinion, answers to the above questions will give regulators a better idea as to how prepared De Beers is to handle a major spill event (it is assumed that if third party assistance is required, the event would be considered as “major”).

Section 2.3.1, First Responders

Each agency and company may have their own standard operational procedures for spill response. There are many “right” answers. The reviewer has been teaching spill response courses for 19 years and offers the following suggestion for a standard course of action for first responders:

Approach with Caution (upwind, uphill)
Secure the area - keep all unauthorized personnel out of the area
Identify the spilled material
Assess the Hazards
Respond:
 Stop at source; Contain; Dispose; remediate site
Report to Spill Line

Section 2.5.1, Training - Introduction

- § A list of personnel who will be conducting the annual training should be identified, by name, along with a brief description of their area of spills/emergency response expertise and training.

This was not provided in the revised spill plan. If specific names were not available at the time of the revision, De Beers should simply indicate as such. On that note, providing this kind of information on a publically-available document may be a breach of employee privacy, in which case, identifying the responder by his/her job title would be more appropriate.

Section 2.5.2, Spill Response Training

De Beers provided a general description of the overall training provided to their first responders including first aid, confined space entry, WHMIS, and TDGR. De Beers should provide some particulars with respect to actual physical spill response (the pick and shovel work) training:

- § A detailed description of the spill response training that will be delivered to their emergency responders; as minimum, De Beers should provide a copy of the course outline/topics covered during the course as well as to specify the duration of the course.
- § The qualifications and background of the instructor(s) should also be provided.

This information is useful to regulatory agencies in that it allows them to determine how well-prepared De Beers is to manage hazardous materials spills.

Section 3, Clean Up Strategies

This section makes reference to a landfarm that has been constructed on site. De Beers should provide the following additional information:

- § capacity (what volume of contaminated soil can be managed),
- § treatment capability,
- § control structures; e.g.: how runoff is controlled/treated.

De Beers indicated that petroleum-contaminated snow will be recovered and stored for later disposal, however, no details are provided as to how this will be accomplished. In the reviewer's experience, managing large volumes of contaminated snow and water can be problematic. The reviewer is aware of several case histories where the spill clean up costs reached into the hundreds of thousands of dollars, and more recently, into the millions of dollars and where these high costs were primarily driven by a lack of adequate storage/treatment facilities for managing large volumes of contaminated snow, ice and water.

In the July 2007 review, it was suggested that De Beers' seriously consider constructing containment structures to manage large volumes of contaminated snow, ice and water. This advice still holds true. In the very least, De Beers should be prepared to quickly assemble a containment structure for managing large volumes of snow, ice and water. This can be as simple as making use of de-commissioned bulk fuel storage tanks.

The reviewer refers De Beers to a document entitled *Generic Plans and Operating Procedures of a Remediation Facility for Hydrocarbon Contaminated Materials in the NWT* (August 1995) available from the GNWT-DENR.

Finally the reviewer advises De Beers to make arrangements to secure an industrial grade oil-water separator for managing large volumes of hydrocarbon-contaminated water on site. These units are costly, however, they can be rented on an as-needed basis from several firms across the country. In the reviewer's experience, these devices are very effective in treating contaminated water.

Section 4, Site Information....

This is an almost verbatim reiteration of what was suggested in the July 2007 review and which does not appear to have been incorporated into De Beers' February 2009 revision.

- § De Beers should provide the geographic coordinates (Lat-Long & UTM) for the site and the approximate area covered by the site.

The oblique air photo provided on page 20 does not provide sufficient information required for a basic spill response plan.

- The spill plan should include a site map of sufficient scale to:

- show buildings, contaminants storage areas, spill cleanup equipment locations,
- likely pathways of flow (in the event of a spill)
- significant topographic features such as bodies of water, hills and valleys, and environmentally sensitive areas.

In this case, given the large footprint of the Snap Lake mine site, it may be necessary to include, in addition to a master general map of the entire site, a series of smaller maps which cover specific sectors of the camp and mine site. It should also be kept in mind that it may be necessary to refer to these maps under less-than-ideal conditions, such as outdoors in inclement weather, therefore, they should be easy to manipulate.

Detailed maps are not only useful to reviewers and regulators but will be invaluable to De Beers in the event of a major spill. For example, during winter, the entire area would be covered in snow. Ditches, depressions, shallow runoff trenches, creeks and other pathways of flow and/or natural collection areas are not always obvious and in fact may be completely hidden. By knowing where these areas are ahead of time and having them mapped out, De Beers would be able to mount an effective and efficient spill response should a major event occur.

It is possible that the above-requested information has already been provided in other related documents submitted by De Beers, however, a spill response plan should be a stand-alone document, therefore any pertinent information relating to spills and spill cleanup operations should be included in the plan.

Table 6, Page 21 Spill Volumes that must be reported to the GNWT

It should be noted that the threshold volumes listed – as suggested by the title of the table – apply only inasmuch as the GNWT Spill Contingency Planning and Reporting Regulations are concerned. The lead regulatory agency – in this case, Indian and Northern Affairs Canada(?) – may establish lower threshold volumes for spill reporting.

§ Therefore, in addition to the GNWT requirements, it would be a good idea to list the spill reporting requirements of INAC or whatever regulatory agency oversees the operation and/or enforces the terms and conditions of whatever permit De Beers operates under.

Other regulatory agencies may have their own requirements. For example, Environment Canada has a particular interest in spills of gasoline. If a gasoline spill is of significant volume, Environment Canada may request that De Beers provide them with a report; above and beyond that which is required by the normal reporting requirements of the Spill Report Line and/or the lead regulatory agency.

Section 4.2 Fuel Storage and Transfer Systems

Much of the commentary for this section is a verbatim repeat of what was offered in the July 2007 review but which is worth reiterating in this review. *It should be noted that this information is provided as advice on pollution-spill prevention and need not necessarily be explicitly stated in the spill response plan:*

Drums

Caches of drummed fuel are particularly subject to spillage because they often become buried in snowdrifts and are thus susceptible to damage from heavy equipment; most commonly, front end loaders. Furthermore, once buried, leaking containers cannot be detected until after the snow melts, by which time, most, if not all, of the spilled material has escaped off site with the spring melt. Drum cache locations should be clearly defined and marked so that they are visible even during the winter season.

To prevent spreading in the event of a spill, fuel stored in drums should be located, whenever practical, in a natural depression a minimum distance of 30 meters from all streams, preferably in an area of low

permeability. All fuel storage drums should be situated in a manner that allows easy access and inspection as well as removal of drums in the event of leaks or spills. Large fuel caches in excess of 20 drums, should be inspected daily. Additionally, De Beers is strongly advised to keep a written log of the inspections. For long term storage (> 6 months), it is strongly recommended that drummed fuel be stored on pallets to prevent the bottoms from rusting out.

Drum caches should ideally be enclosed in a fenced-in compound to prevent unauthorized access.

The above suggestions also apply to drums of hazardous materials other than fuel.

Heating Oil Tank Installations

All heating oil tanks, connectors and associated plumbing should be installed in a manner that meets current acceptable codes for the installation of such appliances. Heating oil tanks should be situated on solid platforms, on a stable base, and should be inspected on a regular basis for leaks and movement (shifting). Flex connectors, if used, should be installed as per manufacturer's instructions and should be inspected regularly. It should be noted that many spills in the north result from improperly installed and maintained heating oil tanks and especially flex connectors. The cautionary notes on flex connectors applies to all fuel storage facilities including bulk fuel storage.

De Beers is referred to a Government of Nunavut publication entitled: *Illustrated Homeowner's Guide to Heating Oil Tank Inspections*. While the guide is directed at homeowners, much of it is also applicable to commercial/industrial operations. Copies (available in four languages – English, Inuktitut, Inuinnaqtun and French) can be obtained from the following website:

<http://www.gov.nu.ca/env/environment.shtml>

Hard copies (also in four languages) can be obtained by contacting the Government of Nunavut.

Buried Pipelines

Where possible, buried fuel and chemical distribution pipelines should be avoided for the simple reason that it is difficult to impossible to monitor the physical integrity of these installations. If burial is unavoidable and/or operationally desirable, measures should be taken eliminate or minimize corrosion, breakage due to ground shifting and any other possible insult to the integrity of the pipeline. Double-walled pipelines should have a provision for monitoring the interstitial spaces for leakage.

Fuel Storage - General

De Beers is advised that Environment Canada's newest *Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations* that came into force on June 12, 2008.

De Beers' should contact Environment Canada directly for further information on what if any, legal obligations they may have under these regulations.

Section 4.5.3, Water Management Pond

Repeat from July 2007 review:

§ A diagram/drawing and/or aerial photograph of this facility would be helpful to reviewers.

Section 4.5.4, Water Management Pond – System Failure Response Actions

This section states: *“In the event that capacity problems in the WMP are encountered, the dam crests could be raised to a safe level/elevation.”*

§ How much higher can the dam be raised and how much more capacity does this provide?

In the July 2007 review, De Beers was asked to consider what they would do in the unlikely event of a catastrophic dam failure. De Beers has indicated, somewhat obliquely, in section 2.5.2 that they would be conducting desktop exercises on “worst case” scenarios which indicates that they are at least thinking about such events. The reviewer will therefore refrain from repeating much of his earlier comments.

Nevertheless, some outstanding questions do remain and should be considered by De Beers:

- Describe the probable extent of the downstream inundation.
- Describe the local impacts of a sudden release of tailings.
- Is human health and safety at risk?
- What immediate steps would De Beers take to minimize/mitigate possible environmental damage?
- Notification of downstream users and communities (if applicable).
- Chemical and physical characterization of the released tailings.

§ Describe the follow-up sampling program that would be employed to determine the extent of the contamination.

- How would De Beers go about assessing the damage to fish and wildlife habitat?

§ Is there likely to be any wildlife (including fish and birds) fatalities as a result of an accidental tailings release?

- How would De Beers go about effecting the clean up and remediation of the impacted areas?

Section 5.1.2 (Spill Response Action Plans) Basic Procedures

Repeat from July 2007 review:

§ The following bullet should be added to this section: “Secure the area, keep all unauthorized persons away until the hazards can be assessed”.

Personal Protective Equipment

§ A section should be added to address the care and maintenance of personal protective equipment

The spill plan should include the actual quantities of personal protective equipment to be deployed at the various locations. Enough personal protective equipment should be available for at least the number of personnel expected to respond to a situation, plus a few extras for backup. While the reviewer is stating the obvious, it is nonetheless worth pointing out that the level of protection afforded by personal protective equipment should be sufficient to meet the hazards presented by the material of concern.

Personnel protective equipment should be inventoried and inspected on a regular basis to ensure that it is

in good working order, clean, and free from damage and wear. Damaged and/or worn equipment should be immediately replaced. Generally, personal protective equipment, particularly specialized equipment such as chemical suits and SCBA, should be kept in a designated storage area, such as a cabinet or locker, and should never be used for anything other than practice drills and responding to emergencies.

The reviewer may have missed it, but there appears to be no reference to photo ionization detectors and intrinsically-safe radio/communications equipment for use in potentially explosive atmospheres (such as a gasoline spill).

Decontamination

De Beers should be prepared to describe the decontamination process in greater detail, including, but not restricted to:

- § how will the wash medium – whether it be water or solvent based – be treated and/or disposed of?
- § Does De Beers have portable decontamination equipment that can be erected anywhere on site (ideally the decontamination facility would have to be as close to the incident as practicable). This would be of particular significance during the winter months.

Section 5.2, Spill Response Action Plans - General

Under the heading: “Respond Safely”, the spill plan advises the responders: *“do not contain gasoline spills as the vapours may ignite”*.

The standard operational procedure for responding to spills of hazardous materials is to contain the spilled substance to prevent it from spreading to prevent more widespread damage to the environment. This is an important consideration given the particularly toxic properties of gasoline.

On the other hand, it is recognized that managing the explosion hazard posed by gasoline spills is of paramount importance and where human safety trumps environmental concerns.

- § De Beers should expand on this statement and clarify how to reconcile the basic principle of containing a spill, against the possible need to avoid containing it given the explosion hazards associated with gasoline vapours.
- § For example, how would De Beers manage a gasoline spill of several thousand litres? Would they allow it to spread far and wide in order to lessen the explosion hazard? In doing so, they would be facing the post cleanup problem of managing very large volumes of contaminated soil/snow/water.

It is suggested that one of the safest and most effective ways to eliminate the explosion hazards posed by a gasoline spill is to knock down the explosive vapours with aqueous film-forming foam (AFFF).

Section 5.2.1 Action Plan for Liquid Spills on Land

There are several useful and innovative devices available for responding to spills of liquid materials including a squeegee device (available as a hand-crank unit or one fitted with an electric motor) that fits over top of a 45 gallon drum and which squeezes petroleum products from absorbent pads so that they can be re-used several times over. Another device converts a 45 gallon drum into a powerful wet-dry shop vacuum.

Section 5.2.3, Action Plan for Fuel Spills on Snow

It is worth repeating here what was already suggested for Section 3 of the spill plan: De Beers should seriously consider building containment structures to manage large volumes of contaminated snow, ice

and water or be prepared, on short notice, to construct a containment structure. The reviewer suggests that De Beers obtain a copy the aforementioned GNWT Department of Environment and Natural Resources' *Generic Plans and Operating Procedures of a Remediation Facility for Hydrocarbon Contaminated Materials in the NWT*.

Section 5.2.4, Action Plan for Fuel Spills on Ice

§ The heading for this section should be altered to include "on and under ice".

Spills on and under ice are difficult to manage and often times, conventional spill cleanup methods are ineffective in this medium. Environment Canada has, over the last several decades, conducted extensive research on spills management on and under ice. De Beers is advised to contact Environment Canada's Yellowknife office to take advantage of the latter's vast experience in this field.

The last bullet points discuss burning off oil spills on ice and further suggests that permission be obtained from the government. The spill line number is listed as the point of contact.

§ It should be noted that permission must be obtained from the regulatory agency that is responsible for enforcing the terms and conditions of the permit under which De Beers is operating.

Section 6, Spill Response Equipment Available On-Site

Missing from the list of equipment included in the spill kits, is hand tools, such as shovels, pick axes and the like. It is also suggested that used 45 gallon drums make very effective and inexpensive containers for contaminated materials. On that note, each kit should include a drum de-header and as many empty 45 gallon drums as is practical.

Appendices:

The July 2007 review identified several errors with respect to the physical and chemical information sheets and recommended that De Beers carefully and with greater attention to detail, review all of the data sheets to ensure that the information presented is accurate and relevant.

At the time of reviewing this revised spill plan, the Appendices were not available and therefore the reviewer is unable to determine if the deficiencies identified in the July 2007 review were corrected.

General Comments:

§ De Beers should be advised that if they intend to store hazardous waste on site for > 180 days, they are required to register with GNWT-DENR as a hazardous waste storage facility. Furthermore, they must also apply for a Hazardous Waste Generator Number if they intend to offer hazardous waste for transport. De Beers is referred to the GNWT *Guideline for the General Management of Hazardous Waste*.

Suggested Reference Material:

The following is a list of reference material which De Beers may find useful in compiling their final spill contingency plan:

- \$ Environment Canada (Tilden & Westerman). 1990. *Guidelines for the Preparation of Hazardous Material Spill Contingency Plans*.
- \$ Government of the Northwest Territories. 1995. *Generic Plans and Operating Procedures of a Remediation Facility for Hydrocarbon Contaminated Materials in the NWT*.
- \$ Government of the Northwest Territories. 1993. *Spill Contingency Planning and Reporting Regulations*
- \$ Government of the Northwest Territories. 2002. *A Guide to the Spill Contingency Planning and Reporting Regulations*
- \$ Government of the Northwest Territories. 2003. *Environmental Guideline for Contaminated Site Remediation*.
- \$ Government of the Northwest Territories. 1997. *Spill Containment and Cleanup Course*.
- \$ Government of Nunavut. 2008. *Illustrated Homeowner's Guide to Heating Oil Tank Inspections*.
- \$ Indian and Northern Affairs Canada. 2005. *DEW Line Cleanup Barrel Protocol*
- \$ Fingas, Merv. 2001. *The Basics of Oil Spill Cleanup*

Closing Comments:

Quite a few suggestions were offered in the July 2007 review of De Beer's spill plan. Many of these suggestions appear to have been overlooked in the February 2009 revision. The reviewer considers them important enough to warrant their being reiterated in this review.

These deficiencies notwithstanding, De Beers' revised spill plan as presented, appears to be reasonably complete and demonstrates that De Beers has given some thought to spill prevention, response and cleanup.

- \$ Spill plans are evolving documents therefore should be updated at least yearly and/or as changing circumstances warrant.

The reviewer has, in addition to identifying deficiencies in the plan, also provided what he believes to be constructive pollution and spill prevention advice which is intended to assist De Beers in improving upon their existing plan.

- \$ De Beers is encouraged to carefully review and consider this advice. They are further advised to communicate regularly with the relevant regulatory agencies who are only too happy to assist them in maintaining a state of compliance with the various pieces of legislation which govern industrial activities in the Northwest Territories.