



March 12, 2009

INFORMATION LETTER # OGC 09-07

Subject: Storage of Fluid Returns from Hydraulic Fracturing Operations

To: Industry Clients

Effective Date: March 26, 2009

Background:

This document details the requirements for the containment, storage and disposal of returned fracture fluids to enhance protection of the environment, wildlife, and groundwater.

Requirement:

Acceptable storage vessels:

- closed top tanks,
- open top tanks, and
- lined, earthen excavations.

All types of liquid fracture fluid returns may be stored in closed top tanks. Only slickwater fracture fluid returns may be stored in open top tanks or lined, earthen excavations.

Tenure

Storage systems on Crown land may be sited in locations where the operator has long-term tenure under the *Land Act* (i.e. well sites, facilities, permanent campsites). For storage systems located in areas with temporary tenure (i.e. borrow pits, temporary campsites), long-term tenure must be established.

Registration

Registration of all lined earthen excavations is required. Registration is not required for open or closed top tanks. Registration information must be submitted to the Oil and Gas Commission (OGC) by email to the Waste Management and Reclamation Unit OGCWasteManagement@gov.bc.ca prior to use of the lined excavation and must include the following information:

- OGC Tenure file number,
- GPS coordinates of the location,
- storage volume,
- description of primary and secondary containment systems,
- description of the leak detection system, and
- design life of the liner.

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Duration of Storage

Storage of fracture fluid returns in open and closed top tanks is limited to 90 days from the last day of completion or servicing operations unless otherwise approved by the OGC Waste Management and Reclamation Unit. Liquids may be stored in lined excavations as long as tenure is maintained and the design life of the liner is not exceeded.

Requirements for Tanks

All sites containing tanks must be bermed to ensure that fracture fluids will not migrate off the site in the event of a tank failure. The berm may surround the entire site or may surround the tanks only.

Open top tanks must be maintained with at least one metre of freeboard at all times. Primary containment for open top tanks may be provided by an impermeable synthetic liner (i.e. corrugated steel ring with a synthetic liner) if the design is certified by a professional engineer licensed to practice in British Columbia.

Open top tanks must be inspected at least monthly for evidence of leakage and damage. Leaks must be reported to the OGC as soon as possible following their discovery.

Requirements for Lined Earthen Excavations

Design

All lined earthen excavations must be constructed with a primary containment device, a secondary containment device, a leak detection system between the primary and secondary containment devices, adequate fencing to prevent wildlife access and unauthorized dumping, and signage at the access point identifying the operator and location.

The design must include measures to ensure that synthetic liners are not damaged during the course of operations and must provide for the collection and containment of spills during loading and unloading. At least one metre of freeboard must be maintained at all times to prevent overflowing. The earthen excavation must be sloped, with the low point being down gradient of the directional flow of groundwater.

Mitigative measures to prevent harm to waterfowl must be included in the design. These measures may include, but are not limited to:

- installation of netting,
- removal of accumulated sheen, or
- treatment and removal of hydrocarbons.

The design of all lined earthen excavations must be certified by a professional engineer licensed to practice in British Columbia.

Primary and Secondary Containment

Primary and secondary containment devices must be constructed from impervious, synthetic liners.

Leak Detection

The leak detection system must have an engineered seepage pathway (i.e. weeping tile) leading to at least one monitoring well. The monitoring well(s) must be completed at the low end, positioned between the primary and secondary containment systems.

The leak detection system must be monitored on a monthly basis. Any collected liquids must be field tested for pH, chlorides, hydrocarbon odour and sheen. The results of monthly monitoring must be recorded and confirmatory laboratory sampling must be conducted if there is any indication of a leak.

On an annual basis, a sample of liquids collected from the leak detection system must be analyzed by a laboratory for the parameters listed below:

- pH
- EC
- Major ions (i.e. Ca, Mg, Na, K, NO₃, SO₄, CL, PO₄)
- Hydrocarbons

An annual summary of the required monthly field monitoring and the annual laboratory analysis must be submitted to the Waste Management and Reclamation Unit at:

OGCWasteManagement@gov.bc.ca.

Note:

If any parameters have changed significantly in comparison to previous results or monitoring results indicate there may be potential concern, additional analysis should be performed for verification and if necessary, followed by corrective measures.

Inspection, Monitoring and Record Keeping Requirements

- Inspect the primary containment liner annually for evidence of leaks or damage.
- Document and maintain records of issues related to inspections and corrective actions taken.
- Document and maintain records of the leak detection monitoring.
- If applicable, maintain groundwater monitoring records.
- Keep all approvals, etc. on record.
- Maintain all records on file until reclamation has been completed.

Synthetic Liners

A wide array of synthetic liners are available, many of which were developed for waste containment applications. Classes of synthetic liners include:

- coated fabrics or laminates,
- extruded film or sheet, and
- spray on coatings.

The integrity of a synthetic liner is dependent on its installation, physical strength,

resistance to aging and degradation due to environmental influence (including but not limited to temperature extremes) and resistance to the stored substance. As the secondary containment liner is not in continuous contact with the contained substances, its performance requirements may be less rigorous.

The minimum thickness of all synthetic liners is 30 mils (760 µm). Synthetic liners may be exposed to large temperature extremes from less than -40 °C in winter to near bottomhole temperatures during flowback operations. It is the responsibility of the operator to ensure that the liners are fit for purpose.

Disposal and Decommissioning

Fracture fluid returns may be disposed of or treated and re-used for subsequent fracture operations. The only suitable methods of disposal are shipment to a licensed waste treatment facility or injection to the subsurface through a licensed disposal well.

Waste liners may be recycled or disposed of at a landfill.

Decommissioning of lined earthen excavations must be reported to the Waste Management and Reclamation Unit at: OGCWasteManagement@gov.bc.ca.

All sites must be reclaimed in accordance with OGC reclamation criteria.

If you have any questions regarding the above, please contact:

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Commissioner

BC Oil and Gas Commission