

## **13.0 Waste Management**

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### **13.1 WASTE MANAGEMENT GOALS AND PRACTICES**

The Company's goal for waste management is to prevent contamination of soil, groundwater and air, and reduce the quantity of waste generated throughout the lifecycle of the Expansion Project to the greatest extent possible. Waste minimization will be achieved by reducing, reusing, recycling and recovering waste materials where possible.

Waste management practices established for the Demonstration Project will be incorporated at the Expansion Project. Waste management activities will be monitored to ensure compliance with all appropriate legislation and regulatory requirements, including:

- AENV Alberta User Guide for Waste Managers
- ERCB Directive 050 Drilling Waste Management
- ERCB Directive 051 Injection and Disposal Wells
- ERCB Directive 055 Storage Requirements for the Upstream Petroleum Industry
- ERCB Directive 058 Oilfield Waste Management Requirements for the Upstream Petroleum Industry
- AENV Hazardous Waste Storage Guidelines
- ERCB Interim Directive 99-4 Deposition of Oilfield Waste into Landfills
- AENV Standards for Landfills in Alberta
- Transport Canada Transportation of Dangerous Goods Regulations
- AENV Waste Control Regulation

The National Fire Code and National Building Code of Canada will also be applicable if buildings are required for a waste management and recycling facility. Training will be a critical component of successful waste treatment. All personnel involved with waste management will be adequately trained in the areas of health and safety, waste-specific practices and procedures, and other applicable legislation and regulatory requirements. Certified operators will be required and hired for particular waste treatment technologies.

### **13.2 SPECIFIC EPEA OR ERCB APPROVAL REQUESTS**

As noted in Volume 1, Section 9.19, JACOS is considering constructing a Class II oilfield landfill. Should JACOS decide to proceed with the landfill, an application will be made in accordance with all relevant legislation and regulatory requirements. JACOS will inform the ERCB and AENV if it does not proceed with a landfill on site.

### 13.3 WASTE COMPOSITION AND QUANTITIES

Table 13-1 summarizes all of the expected wastes for the central processing facility (CPF).

### 13.4 ONSITE WASTE STORAGE AND LOCATIONS (LANDFILLS, BULK STORAGE PADS)

As discussed in Volume 1, Section 9.19 and shown in Figure 9-1, JACOS is considering constructing a Class II landfill adjacent to the CPF for drilling and process wastes that will mainly consist of lime sludge waste from the water treatment process. The landfill would be sized for a capacity of about 800 000 m<sup>3</sup> which will contain the entire volume of all solid landfillable waste produced by the Expansion Project and Demonstration Project over their life of operation.

In addition, two bulk storage pads will be constructed on the CPF site. The first is for temporary collection and holding of lime sludge waste from the hot lime softeners prior to disposition to the landfill. The pad will be located in the water treatment tank farm secondary containment area and be sized to hold a minimum of about 160 m<sup>3</sup>, which equates to three days of lime sludge waste.

The second bulk storage pad will be used for temporary collection and holding of sand removed from process vessels and tanks prior to disposition to the landfill. It will be located in the production tank farm secondary containment and be sized to hold a minimum of about 190 m<sup>3</sup> which equates to about 30 days of the expected sand production rate.

If JACOS does not construct its own Class II landfill, the above wastes would all be transported off-site to a third party Class II landfill.

### 13.5 CONSTRUCTION AND CAMP WASTES

Solid waste generated during construction will be collected, sorted and disposed or recycled by approved methods in accordance with regulatory requirements. Proper containers and bins will be used to store and separate the various classes of waste materials to prevent cross-contamination, where necessary. Waste compositions should be typical for construction of industrial facilities.

Construction wastes may include packing materials, cardboard, pallets, wood, metal, glass, paint, sand blast, insulation, welding rods, temporary forms or planking, leftover pieces of building material, lubricants and oil filters. Material will be reused or recycled whenever possible.

Camp wastes will include kitchen waste, cardboard, containers and sanitary waste. As a base case, sanitary waste from the construction camp will be trucked to a local wastewater treatment facility. However, the option of installing a temporary water treatment unit to recycle treated sanitary wastewater back into the process at the Demonstration Project has been investigated and will be evaluated further during detailed engineering. Storage, disposal methods and estimated quantities for individual waste types are shown in Table 13-1.

**Volume 1 Project Description: JACOS Hangingstone Expansion Project**

**13.0 Waste Management**

April 2010

**Table 13-1: Summary of Operational, Drilling and Construction Wastes**

Waste	Estimated Amount	Storage Method and Location(s)	Waste Characterization	Disposal Method and Location(s)
<b>OPERATIONAL WASTES</b>				
<b>Liquids</b>				
Surface runoff water - central processing facility	18,000 m <sup>3</sup> /d maximum	Pond	Recyclable	Recycle to process normally or test and pump out to environment
Surface runoff water - typical wellpad	1,650 m <sup>3</sup> /d maximum	Pond	Non-hazardous	Pump out to environment or offsite disposal
Boiler blowdown water	220 m <sup>3</sup> /d	Tanks	Hazardous	Inject to depleted SAGD steam chamber; alternate - offsite disposal; disposal well
Equipment wash	Maintenance only	Drain sumps/truck tanks	Recyclable	Recycle to process or offsite disposal
Sanitary sewage	20 m <sup>3</sup> /d	Septic tank	Recyclable	Truck solids offsite to municipal sewage treatment plant; overflow water to septic field
Engine/compressor oil	Maintenance only	Oily waste bin	Hazardous	Offsite disposal
Laboratory wastes	1 kg/d	Pails/barrels	Hazardous	Offsite disposal or recycle to process
Other chemicals		Drums, bulk totes	Hazardous	Offsite disposal
Heat medium	Maintenance only	Drums	Hazardous	Offsite disposal
Other turnaround wastes	175 m <sup>3</sup> /y	Temporary bins/ direct to trucks	Hazardous	Offsite disposal
<b>Sludges</b>				
HLS lime sludge • Expansion Project	56 m <sup>3</sup> /d	Bulk storage pad	Non-hazardous	Dewater and dispose in Class II landfill
HLS lime sludge • Demonstration Project	8 m <sup>3</sup> /d	Bulk storage pad	Non-hazardous	Dewater and dispose in Class II landfill
Tank bottoms	Maintenance only	Desand tank	Requires analysis to determine	Recycle to process or offsite disposal
Pond bottoms	Maintenance only	Process water recycle pond/HLS sump	Requires analysis to determine	Dewater to Class II landfill in sealed trailers
Septic tank	See sanitary sewage above			

**Table 13-1 Summary of Operational, Drilling and Construction Wastes (Cont'd)**

Waste	Estimated Amount	Storage Method and Location(s)	Waste Characterization	Disposal Method and Location(s)
<b>Solids</b>				
Produced sand	8 m <sup>3</sup> /d	Bulk solids pad	Non-hazardous	Landfill
Domestic garbage	1 m <sup>3</sup> /d	Bins	Non-hazardous	Truck to municipal sanitary landfill
Spent filter media	Low annual volumes	Bins	Hazardous	Offsite disposal
Spill debris	Low annual volumes	Tanks, bins	Requires analysis to determine	Recycle to process or offsite disposal, depending on nature
Drums (>20 L)		Barrel dock	Non-hazardous	Offsite disposal
Ion exchange resin	Maintenance only	Drums	Non-hazardous	Offsite disposal
<b>Other</b>				
Waste from offsite	None			
Drum wash	Low annual volumes	Open drain system	Requires analysis to determine	Recycle to system
Pond skimming	Low annual volumes	Process water recycle pond	Recyclable	Recycle to system
Contaminated oil	Low annual volumes	Tanks	Requires analysis to determine	Offsite disposal/treatment facility
<b>DRILLING WASTES</b> (Based on 175 new vertical wells, 175 SAGD well pairs)				
Non-oily cuttings	40,850 m <sup>3</sup>	Drilling sumps	Non-hazardous	Drilling sump
Oily cuttings	70,000 m <sup>3</sup>	Rig tank	Non-hazardous	Landfill
Wastewater	13,625 m <sup>3</sup>	Drilling sump	Requires analysis to determine	Test and release to ditch; alternate - offsite disposal; disposal well
Concrete	14,400 m <sup>3</sup>	Drilling sump	Non-hazardous	Drilling sump
<b>CONSTRUCTION WASTES</b>				
Sanitary sewage	140 m <sup>3</sup> /d	Holding tank	Recyclable	Truck solids offsite to municipal sewage treatment plant; recycle water at Demonstration Project if possible; otherwise offsite disposal
Construction material		Bins	Non-hazardous	Offsite disposal

### **13.6 DRILLING WASTES**

Types of drilling waste, estimated amounts, storage locations and disposal methods are shown in Table 13-1. Drilling activities that generate these wastes are described in Volume 1, Section 8.

### **13.7 OPERATIONS WASTES**

Table 13-1 lists the types of operational wastes anticipated and provides quantities for wastes that will be generated in significant amounts. Major operations and maintenance wastes are described as follows.

#### ***LIME SOFTENING SLUDGE***

Lime softening sludge will be generated in the water treatment process, as described in Volume 1, Section 9.5.2. The sludge will be dewatered, temporarily stored on a bulk pad as described in Section 13.4 and disposed of in the onsite landfill should it be constructed or transported offsite for disposal at a third-party landfill. The material will be a reportable, non-dangerous oilfield waste (N-DOW).

#### ***WEAK ACID CATION EXCHANGE REGENERATION WASTES***

Waste acid and caustic streams from the weak acid cation softeners will be combined in a waste tank, neutralized and recycled to the hot lime softener. The average daily volume will be about 130 m<sup>3</sup>/d.

#### ***SAND***

A small quantity of sand will be produced with the produced fluids. This sand component will ultimately be removed from vessel and tank bottoms during turnarounds and temporarily stored on a bulk pad, as described in Section 13.4. Disposal will be to the onsite landfill should it be constructed or an approved waste disposal facility.

#### ***LUBRICANTS***

Various rotating equipment requires change out of lubricants. These lubricants will be collected and disposed of to an approved oil recycler. The volumes are small as there are few combustion engines and used oil waste streams.

#### ***OTHER OILY WASTES***

Oily rags, filter cartridges and any other oil-contaminated solid wastes will be disposed to a dedicated oily waste bin supplied by a third-party contractor specializing in this type of service. These wastes will, in turn, be disposed as per applicable regulations.

### ***HEATING MEDIUM WASTES***

Heating medium systems (containing 50/50 mixtures of ethylene glycol and water) will be utilized on site for either cooling or heating. Under normal circumstances, these are closed loop systems that do not produce wastes other than periodic filter changes and other byproducts of routine maintenance work. The wastes are stored and disposed of in accordance with the applicable regulations.

### ***LABORATORY WASTES***

The facility will have a small wet laboratory for the purpose of analyzing various process streams. As such, small quantities of chemicals reagents will be utilized. These wastes streams will be segregated and collected in pails with lids as quantities are small. Used chemicals will be stored on a barrel rack with drip tray and disposed at an approved waste facility.

### ***SEWAGE AND GRAY WATER***

See Volume 1, Section 9.12.

### ***DOMESTIC AND DRY WASTES***

Any remaining domestic and dry wastes will be disposed of to a dumpster for removal to a sanitary landfill in Fort McMurray or elsewhere. No dry wastes will be burned on site.

## **13.8 SULPHUR BYPRODUCT WASTE**

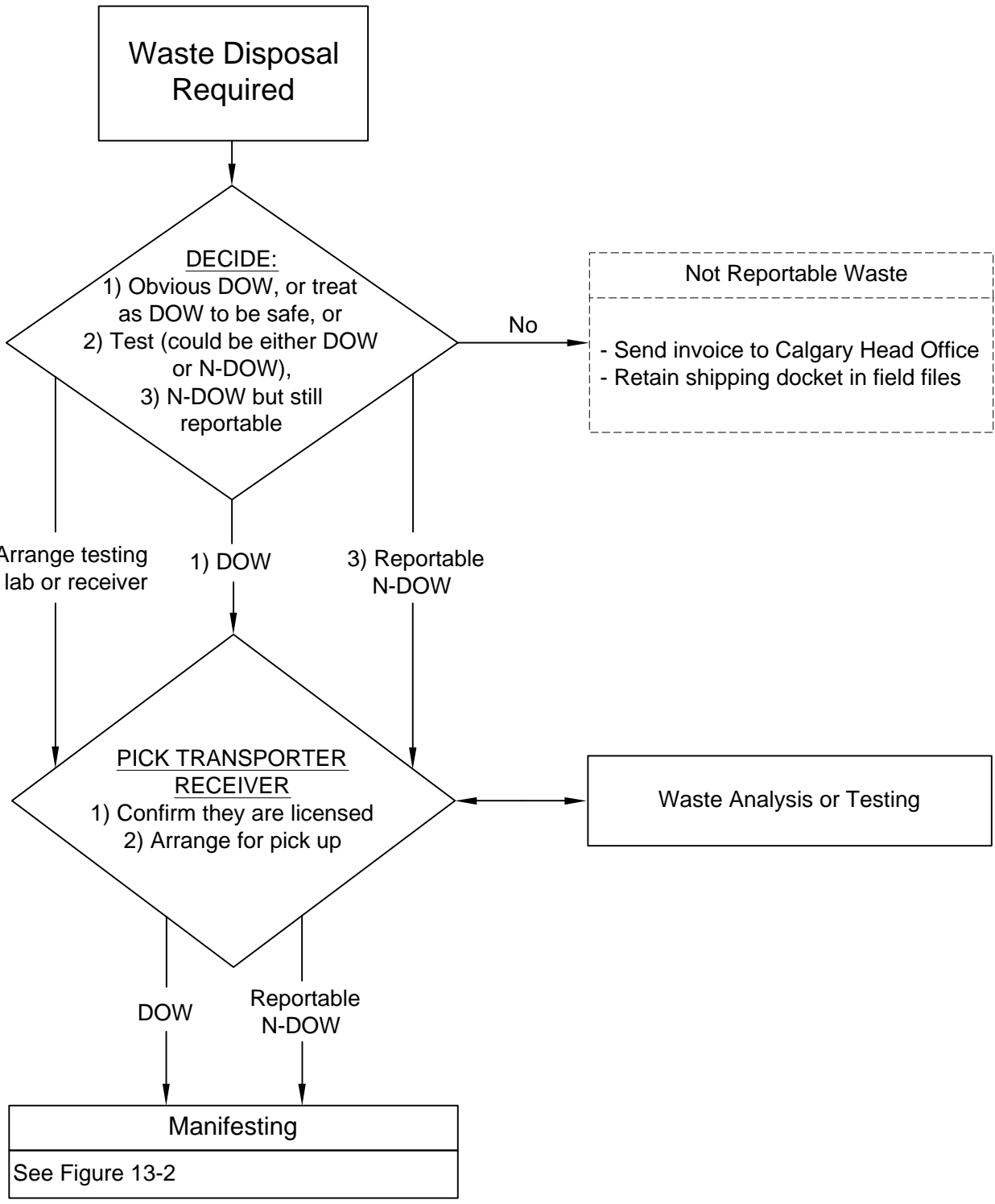
See Volume 1, Section 9.27 for a description of sulphur recovery. Since the inlet elemental sulphur rate to the CPF is expected that be less than 1 t/d, no sulphur recovery will be installed and, therefore, no sulphur byproduct waste will be generated.

## **13.9 TRACKING, MANIFESTING AND TRANSPORTATION**

Waste tracking is a requirement of ERCB Directive 058, Oilfield Waste Management Requirements for the Upstream Oil and Gas Industry. Transportation of Dangerous Goods (TDG) regulations also apply if wastes are transported outside of provincial borders.

JACOS will comply with Directive 058 and TDG requirements, as well as the following procedures listed in its Environmental Compliance Manual that provide guidance on classifying wastes (DOW (dangerous oilfield waste), N-DOW, track-able, non track-able), manifesting procedures, and appropriate selection of waste transporters and receivers, specifically:

- JACOS Waste Disposal Decision Process (see Figure 13-1)
- JACOS Waste Manifesting Process (see Figure 13-2)

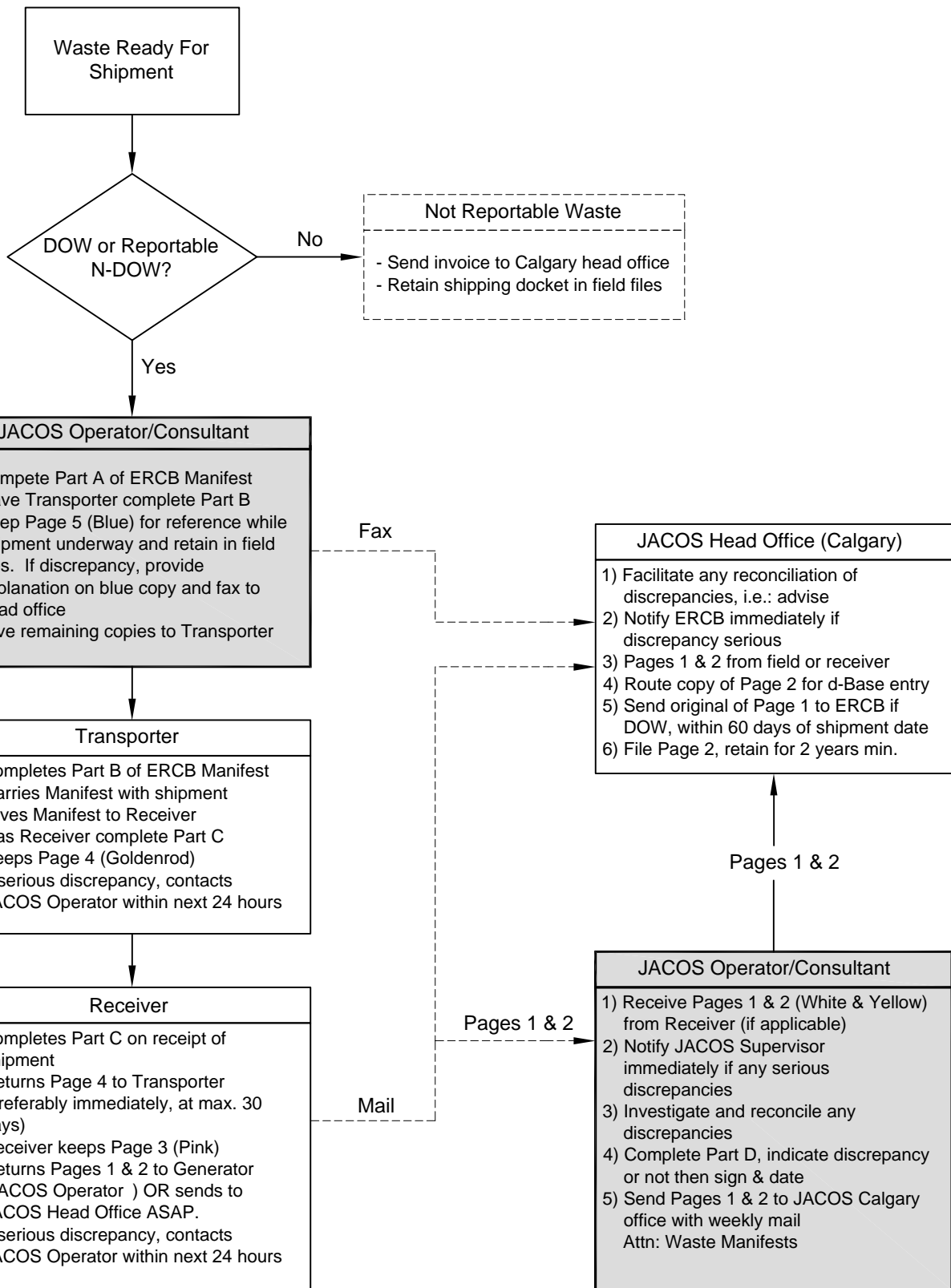


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TLI  
Date:  
2010-02-16

Legend:  
DOW dangerous oilfield waste  
N-DOW non-dangerous oilfield waste



Figure 13-1  
Waste Disposal Decision Process



Drawn By:  
TLI  
Date:  
2010-02-16

Legend:  
DOW dangerous oilfield waste  
N-DOW non-dangerous oilfield waste



Figure 13-2  
Waste Manifesting Process

### **13.10 MONITORING**

JACOS will monitor the performance of its waste tracking and manifesting procedures by conducting internal reviews and periodic audits to ensure regulatory requirements are met.

Inspection, monitoring, and record-keeping for leaks, secondary containment system integrity and interstitial leak detection will be done in accordance with ERCB Directive 055 requirements.