

Directive 058

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Oilfield Waste Management Requirements for the Upstream Petroleum Industry

Contents

1	Introduction	3
1.1	Purpose of This Directive.....	3
1.2	Waste Management Jurisdictional Overview.....	4
1.3	AER Requirements	4
1.4	Reporting a Release of an Oilfield Waste.....	4
1.5	What's New in This Edition	5
2	Waste Characterization and Classification.....	6
3	Documentation for Transport.....	7
3.1	When to Use Shipping Documents.....	7
3.1.1	Exemption from Using the AER's Waste Form	8
3.2	Serious Discrepancies	8
3.3	Waste Tracking and Document Retention.....	9
3.4	Oilfield Waste Disposition Reports	9
4	Oilfield Waste Management Activities That Do Not Require Approval.....	10
4.1	One-Time On-Site Biodegradation	10
4.1.1	Land Treatment	11
4.1.2	Biocell or Biopile	13
4.2	Mobile Thermal Treatment of Oilfield Wastes	15
4.2.1	Notification of Operations	15
4.3	Movement of Oilfield Waste From Remediation or Reclamation Activities	16
4.4	Control and Disposal of Returned Radioactive Fracturing Sand	16
4.5	Management of Naturally Occurring Radioactive Materials	16

4.6	Management of Drilling Waste.....	17
4.7	Landfilling.....	17
4.7.1	AER-Approved Oilfield Landfills	17
4.7.2	AEP-Regulated Landfills	17
4.8	Waste Minimization.....	18
5	Alternative Waste Management Activity.....	19
6	Oilfield Waste Management Facilities and Oilfield Waste Management Components	21
6.1	Participant Involvement	23
6.2	Siting Criteria	23
6.3	Site Assessment	23
6.3.1	Regional Assessment.....	24
6.3.2	Site-Specific Investigation	24
6.4	Groundwater Monitoring and Reporting	26
6.5	Soils Monitoring	28
6.6	General Operational Requirements	29
6.7	Financial Security.....	30
6.8	End of Operations – Closure	30
7	Oilfield Waste Management Activities That Require Approval.....	31
7.1	Waste Processing.....	31
7.2	Waste Storage and Waste Transfer	31
7.3	Surface Facility Associated with Disposal Wells (Class Ia or Ib).....	32
7.4	Biodegradation.....	33
7.5	Oilfield Landfill.....	34
7.6	Thermal Treatment	35
7.6.1	Fixed Thermal Treatment Unit.....	35
7.6.2	Small Incinerator.....	37
7.7	Drilling Fluid Management.....	38
7.8	Reporting and Document Retention	38
8	Applications for New Oilfield Waste Management Facilities and Oilfield Waste Management Components	40
8.1	General Application Requirements	40
8.2	Waste Processing.....	42
8.3	Waste Storage and Transfer Stations.....	42
8.4	Surface Facility Associated with Disposal Wells	42
8.5	Biodegradation (Permanent Biocells or Biopiles)	42
8.6	Oilfield Landfill.....	43

8.7	Thermal Treatment	44
8.8	Other Oilfield Waste Management Activity	45
9	Applications to Modify Existing Oilfield Waste Management Facilities or Oilfield Waste Management Components	46
9.1	General Application and Notification Requirements	46
9.2	Modifying a Storage Device	47
9.3	Adding a New Cavern or Disposal Well	48
9.4	Adding or Removing Waste	48
9.5	Changing a Soil or Groundwater Monitoring Program	49
9.6	Adding a New Waste Management Activity	50
9.7	Changing Status of an Oilfield Waste Management Facility or Oilfield Waste Management Component	50
9.8	Changing Ownership of an Oilfield Waste Management Facility or Oilfield Waste Management Component	52
9.9	Adding, Expanding, or Closing a Landfill Cell or Closing a Landfill	52
9.10	Adding or Expanding an Engineered Containment Pond	53
9.11	Expanding Lease Boundaries	53
9.12	Disposing of Residual Wastes by an Alternative Method Not Authorized by the Approval	53
Appendix 1	Glossary	55
Appendix 2	Waste Names, Codes, and Common Waste Classification	57
Appendix 3	Treatment and Disposal Method Descriptors for the Oilfield Waste Disposition Report ..	66
Appendix 4	Examples of Minimizing Waste	67
Table 1	Total petroleum hydrocarbon (TPH) and chloride limits for accepting non-dangerous oilfield waste at Class II landfills	18
Table 2	Notification and consultation for an oilfield waste management facility	23

1 Introduction

1.1 Purpose of This Directive

The purpose of this directive is to identify the requirements for the handling, **treatment**, reuse, and disposal of **oilfield waste** produced by the upstream petroleum industry.

This directive establishes requirements that address waste management responsibilities, activities, methods, and documentation.

Definitions applicable to *Directive 058* are included in appendix 1, and defined terms are set in **bold face** at first use, as seen above.

1.2 Waste Management Jurisdictional Overview

Both the Alberta Energy Regulator (AER) and Alberta Environment and Parks (AEP) have jurisdiction over waste.

Generally, the AER is responsible for oilfield waste, and AEP is responsible for most other waste generated in Alberta. Each agency's requirements provide an equivalent level of environmental protection and public safety; however, their regulatory processes may differ.

The AER and AEP have divided regulatory responsibilities based on the type of waste management **facility** or activity.

1.3 AER Requirements

Following AER requirements is mandatory for the responsible duty holder as specified in legislation (e.g., licensee, operator, company, applicant, approval holder, or permit holder). The term "must" indicate a requirement, while terms such as "should," "recommends," and "expects" indicate a recommended practice.

For clarity, the duty holder has been identified when a requirement is specific to the **oilfield waste generator** or **oilfield waste generator receiver**.

Each AER requirement is numbered.

Information on compliance and enforcement can be found on the AER website.

- 1) All documentation required under this directive must be provided to the AER upon request to confirm compliance.

1.4 Reporting a Release of an Oilfield Waste

- 2) The duty holder must immediately report any release of oilfield waste to the AER through the Energy and Environmental Emergency 24-Hour Response Line if the release
 - a) is greater than 2 cubic metres (m³) on lease,
 - b) is off lease, or
 - c) regardless of size or location, is causing or has caused an **adverse effect**.

Refer to the AER website for more on release reporting requirements.

1.5 What's New in This Edition

The directive has been extensively restructured and rewritten and now incorporates

- *Directive 058—Addendum 2015-04-14*, which has been rescinded;
- relevant sections of [Report 2009-A: Updates to Storage Requirements for the Upstream Petroleum Industry; Discussion Document on Directive 055](#) and [Interim Directive \(ID\) 2000-03: Harmonization of Waste Management and Memorandum of Understanding Between the Alberta Energy and Utilities Board and Alberta Environment](#); and
- the following documents, which have also been rescinded:
 - *ID 99-04: Deposition of Oilfield Waste into Landfills*,
 - *ID 2000-04: An Update to the Requirements for the Appropriate Management of Oilfield Wastes*,
 - *Informational Letter (IL) 98-01: A Memorandum of Understanding Between Alberta Environmental Protection and the Alberta Energy and Utilities Board Regarding Coordination of Release Notification Requirements and Subsequent Regulatory Response*, and
 - *IL 98-02: Suspension, Abandonment, Decontamination, and Surface Land Reclamation of Upstream Oil and Gas Facilities*.

Below are additional changes made to this edition:

- Waste storage has been expanded to include storage of **water for reuse** in hydraulic fracturing operations.
- Rarely used waste management methods “disposal by pipeline” and “spreading oily by-products on roads” have been removed. Duty holders may still apply for an approval.
- Obsolete requirements have been removed and duplicated requirements removed or clarified.

2 Waste Characterization and Classification

Waste characterization is the assessment of the physical, chemical, and toxicological characteristics (i.e., properties) of a waste and is needed in order to classify the waste. The classification determines the dangers relating to transporting the waste on public roads and the appropriate management option.

The AER uses different terminology than AEP to classify waste, but the different terms have the same meaning.

AER term	AEP term
non-dangerous oilfield waste (non-DOW)	= non-hazardous waste
dangerous oilfield waste (DOW)	= hazardous waste

The duty holder should therefore be mindful of this terminology when referring to AEP documents such as the [Waste Control Regulation \(WCR\)](#) or the [Alberta User Guide for Waste Managers](#).

- 3) To classify oilfield waste, the oilfield waste generator and the oilfield waste receiver must follow
 - a) the *WCR*, Schedule 1, sections 1 and 2; and
 - b) appendix 2 of this directive, which provides common waste classifications for waste with historical data (pre-1996).
- 4) A container or collection of containers with an aggregate internal volume greater than 5 litres (L) must be classified as a DOW if it contains a DOW and it is not “empty,” as defined in the *WCR*.

The oilfield waste generator may manage wastes other than those substances listed in table 4b of the *Alberta User Guide for Waste Managers*, referred to in the *WCR*, as non-DOW if

- the amount of waste produced at a single site is less than 5 kilograms (kg) per month if solid or less than 5 L per month if liquid, and
 - the total quantity accumulated over a 30-day period does not exceed 5 kg or 5 L.
- 5) The duty holder must not dilute oilfield waste by adding any solid or liquid.
 - 6) The duty holder must characterize and classify the waste prior to adding any amendment (e.g., waste must meet landfill acceptance criteria prior to any amendment) and prior to adding any sorbent materials to facilitate transportation (e.g., to absorb displaced interstitial fluid).

3 Documentation for Transport

Tracking and classification requirements for the movement of hazardous wastes and hazardous recyclables between Alberta and other provinces and territories follow the [Interprovincial Movement of Hazardous Waste Regulations](#) under the [Canadian Environmental Protection Act](#).

Dangerous oilfield waste shipments follow the [Transportation of Dangerous Goods \(TDG\) Act and Regulations](#), which promote public safety when dangerous goods are being handled or transported by road, rail, air, or water. The safe transportation of hazardous wastes and hazardous recyclables in Alberta is regulated under the [Environmental Protection and Enhancement Act \(EPEA\)](#) and the *WCR*.

- 7) The oilfield waste generator and oilfield waste receiver must use shipping documents (e.g., recycle docket, movement documentation, waste form, manifest, truck ticket) to ensure that oilfield wastes are safely transported and received at the intended point of treatment or disposal facility.
- 8) The oilfield waste generator must provide detailed information on the shipping documents for first responders to use in the event of an accident, including the waste code, the waste source, and the waste generator's contact information.

3.1 When to Use Shipping Documents

- 9) The oilfield waste generator and the waste receiver must complete their respective parts of the AER's Alberta Oilfield Waste Form when DOWs are being transported entirely within Alberta. If more space is needed, additional pages may be attached to the form. Waste volumes may be recorded in tonnes, kilograms, cubic metres, or litres.
- 10) The AER's waste form must be filled out for each load of DOW being transported unless the same oilfield waste is being transported by one or more trucks. If the same waste is being transported, one form may be used; however, the following information must be attached for each load:
 - form number
 - truck unit number
 - waste code
 - UN number
 - TDG shipping name
 - waste classification
 - packing group

- quantity shipped
- **composition** (oil, water, solids)
- handling code

The AER's waste form cannot be used when transporting DOWs across provincial, territorial, or international borders, which falls under federal jurisdiction.

- 11) When a shipment contains multiple types of oilfield waste, each of unknown quantity, the oilfield waste generator must document the shipment based on the most dangerous waste and identify each waste code, source site locations, and the total combined volume.
- 12) If the oilfield waste generator uses the AER's waste form as a tracking document for non-DOWs, they must clearly identify on the form that the waste is non-dangerous and include the waste code.

3.1.1 Exemption from Using the AER's Waste Form

The oilfield waste generator is not required to complete the AER's waste form if

- the quantity of DOW being transported does not exceed 5 kg or 5 L, or
- the DOW is being transported to an AEP-authorized recycling facility and has an AEP recycle docket.

3.2 Serious Discrepancies

- 13) The oilfield waste receiver must notify the waste generator and the **transporter** within 24 hours of finding a serious discrepancy. A serious discrepancy is one that may have resulted in an impact to the environment (e.g., spills, leakage, oilfield waste that did not arrive at the intended receiver) or one where the waste has been incorrectly classified as a non-DOW.
- 14) Upon being notified or becoming aware of a serious discrepancy, the oilfield waste generator must notify the AER of the event, investigate the discrepancy, and take corrective action, including maintaining documentation.
- 15) If the discrepancy has not been reconciled within 60 days from the date of the shipment, the oilfield waste generator must notify the AER at Directive058@aer.ca.
- 16) In cases where a serious discrepancy is the result of an activity by the transporter (e.g., truck spill), the oilfield waste generator must have procedures in place for the transporter to contact them within 24 hours of the occurrence.

3.3 Waste Tracking and Document Retention

- 17) The oilfield waste generator must track, using a system of their choice, the handling, movement, treatment, and disposal of wastes from the initial point of generation through to final **disposition**, including the quantities and characteristics of both DOW and non-DOW.
- 18) If the oilfield waste is shipped to a facility (e.g., storage or transfer station) prior to final disposition, the oilfield waste generator must obtain the details of the final disposition from the waste receiver.
- 19) The oilfield waste generator must retain the shipping documents (e.g., the waste form) and tracking information for a minimum of two years.
- 20) The oilfield waste receiver must retain copies of all dockets for materials received and shipped for a minimum of two years on site or at the local field office *unless* the activity has to be reported through Petrinex, in which case the copies must be retained for a minimum of five years as per [Directive 047: Waste Reporting Requirements for Oilfield Waste Management Facilities](#).

3.4 Oilfield Waste Disposition Reports

The oilfield waste disposition (OWD) report is an annual summary of the types and quantities of oilfield wastes, the points of generation or consolidation, and the specific disposal or treatment methods used.

The AER may request the annual OWD report, or portions of it, at any time during the current year for the previous two calendar years.

- 21) The oilfield waste generator must electronically submit the OWD report through the designated information submission system within 30 calendar days of a request from the AER. Refer to [Directive 030: Digital Data Submission of the Annual Oilfield Waste Disposition Report](#) for what to include and how to submit the report.
- 22) Within the OWD report, the oilfield waste generator must include
 - a) all DOWs, and
 - b) any non-DOWs requested by the AER.
- 23) For the OWD report, the oilfield waste generator must use the waste codes from appendix 2 and the descriptors for the disposal or treatment methods in appendix 3 of this directive.
- 24) The oilfield waste generator must report solid oilfield waste in tonnes and liquid oilfield waste in cubic metres in the OWD report and therefore may need to convert the volumes recorded in the waste form. The actual density of the oilfield waste if known should be used for the conversion.

4 Oilfield Waste Management Activities That Do Not Require Approval

4.1 One-Time On-Site Biodegradation

Duty holders may biodegrade their oilfield waste on site via one-time land treatment and biopiles or biocells.

The duty holder has five years (from commencement of treatment) to successfully treat the waste.

- 25) The duty holder must not use treatment techniques that will prevent the site from meeting reclamation certificate requirements.
- 26) The duty holder must remove unsuccessfully treated waste (i.e., waste not treated within five years) and send it to an approved waste management facility for further management.
- 27) The duty holder must only send hydrocarbon-contaminated soils that are suitable for biodegradation to AEP-regulated land treatment facilities.
- 28) The treatment area must be located in an area that is not subject to seasonal flooding and that is at least 100 m from a body of water and a domestic use well, and the treatment area's base must be at least 1 m above the seasonal high groundwater table.

The AER expects that the soils beneath the treatment area will have a hydraulic conductivity of 10^{-5} cm/s or less as measured in situ.

- 29) The duty holder must only treat oilfield wastes that
 - a) are biodegradable in the soil,
 - b) are soils or **sludges** contaminated by unrefined hydrocarbons from spills and leaks or from pits and ponds, and
 - c) create no off-site odour.
- 30) The duty holder must not aerate the waste as a means to reduce contaminate levels.
- 31) The duty holder must treat the waste
 - a) on the site it was generated, or
 - b) on another site within the same production system. In situations where a contaminant plume is migrating off a well or facility site or the contamination is from a pipeline release, it is acceptable to dig up the off-site contaminated soil and land treat it on the site from which the spill originated.
- 32) If the waste is being treated at another site within the same production system, the duty holder must notify the AER at Directive058@aer.ca no later than 10 business days before the start of biodegradation at the site.

- 33) The notification must include biodegradation in the subject line and the company name, locations of the source site and treatment site, and the biodegradation start date in the body of the email.

4.1.1 Land Treatment

On-site land treatment is the planned and controlled mixing of oilfield wastes with a receiving soil in which the inherent soil processes are used to biodegrade, transform, and assimilate the waste constituents.

- 34) If the duty holder chooses to land treat oilfield waste, the maximum predicted time to successfully reduce the hydrocarbon concentrations in the treatment zone must not exceed five years.
- 35) The duty holder must obtain landowner and occupant consent if the waste is being treated on a different site than where it was generated.
- 36) Land treatment must occur only within the shallow subsoils of the site.
- 37) The land treatment area must not exceed a 5 per cent slope.
- 38) The waste volume must not exceed the amount that can be treated in a single application.
- 39) The duty holder must not apply oilfield waste to a land treatment area from October 15 to April 30, during rainfall periods, or when the soil is saturated with water, is ice- or snow-covered, or is frozen.
- 40) The duty holder must analyze a representative sample of the waste and the receiving soil for the following parameters to determine whether the waste and soil are suitable for land treatment:
- pH
 - electrical conductivity (EC)
 - sodium absorption ratio (SAR)
 - total metals (as per [*Alberta Tier 1 Soil and Groundwater Remediation Guidelines*](#))
 - hydrocarbons (i.e., benzene, toluene, ethylbenzene, xylene [BTEX] and F1 to F4 hydrocarbon fractions) (waste only)
 - bulk density (waste only)
 - major ions (e.g., calcium [Ca], magnesium [Mg], sodium [Na], and chloride [Cl])
 - extractable organic halogen (waste only)
 - soil particle size (e.g., fine or coarse grained) (receiving soil only)

- 41) The receiving soil (0 to 15 cm depth) before the waste is mixed in must not exceed Tier 1 soil remediation guidelines for EC, SAR, metals, and pH for the applicable land use.
- 42) The duty holder must not land treat waste that contains more than two parts per million (ppm) organic halogen.
- 43) The waste must not be mixed deeper than 15 cm into the receiving soils.
- 44) The maximum spread rate must not exceed 75 kg waste per square metre (750 tonnes per hectare) or a waste to soil mix ratio of 1:4 by volume.
- 45) The duty holder must manage any leachate generated as an oilfield waste.
- 46) The duty holder must analyze the treatment zone to confirm that the waste was successfully treated. Land treatment of the waste is considered a success when the treatment zone (i.e., soil/waste mix) meets all of the following:
 - a) Tier 1 guidelines for the applicable soil particle size and land use, including those for metals, EC, and SAR
 - b) total petroleum hydrocarbon concentration (e.g., sum of BTEX and F1 to F4 hydrocarbon fractions) less than 2 per cent by mass
 - c) pH between 6.5 and 8.5
- 47) The duty holder must document the following information and retain the documentation until a reclamation certificate for the site has been issued:
 - a) soil horizon used for the treatment zone
 - b) soil classification of the treatment site to the subgroup level (*The Canadian System of Soil Classification*)
 - c) number, location, and depth of samples taken to characterize the treatment area
 - d) analytical results from the samples (i.e., background soil conditions)
 - e) sketch of the site identifying the treatment area and other key features such as slope topography, and drainage features
 - f) area of land used for land treatment
 - g) volume of waste land treated (cubic metres)
 - h) oilfield waste spread rate
 - i) date of initial placement of waste
 - j) photo of the treatment area
 - k) estimated biodegradation period (years)

- l) description of application method and depth of application
- m) amendments added to the treatment area (types, rates, and frequency)
- n) the volume of any collected leachate and the method used to manage it
- o) treatment zone analyses (pH, EC, SAR, total metals, and hydrocarbons) confirming that land treatment was a success

4.1.2 Biocell or Biopile

Waste biodegradation is the reduction of organic constituents by an aerobic microbial process. Optimal conditions for microbial activity (e.g., temperature, pH, moisture, nutrient, and oxygen levels) and a degradable, non-toxic organic constituent are needed for successful waste biodegradation. Carbon dioxide, water, and non-toxic residue compounds are the expected by-products of the microbiological process.

The duty holder may biodegrade hydrocarbons in oilfield waste using a one-time on-site biocell or a biopile. If the biocell or biopile will be used more than once or for longer than five years, see section 7.4.

One-time biocells and biopiles are constructed on an **impervious liner** or base pad on the ground surface with the waste material placed in windrows or in a pile. A biocell also includes a walled containment system.

Moisture and nutrients (e.g., nitrogen, phosphorus, and potassium) can be applied topically or, along with air to sustain the microorganisms, through perforated pipes laid within the piled waste material. Some designs involve covering the pile to collect off-gases such as highly volatile organics or carbon dioxide. Carbon dioxide monitoring can aid in determining the activity levels of the microorganisms responsible for biodegradation; the need for additional nutrients, air, or moisture; or the status (e.g., completion) of biodegradation.

48) Biopiles and biocells must include a containment device and a leachate collection system that collects any leachate from the treatment activities and any precipitation that enters the containment area.

49) The containment device must

- a) have a minimum 15 cm high curbed impervious liner (primary containment) as per [Directive 055: Storage Requirements for the Upstream Petroleum Industry](#);
- b) be constructed of steel, plastic, or fibreglass-reinforced plastic; or
- c) be a specifically prepared surface. The surface option can only be used if the contaminants in the waste are relatively non-leachable (i.e., the waste does not exceed an EC of

4 deciSiemens per metre, a SAR of 6, a hydrocarbon concentration of 2 per cent by mass, and metal concentrations beyond Tier 1 de-minimus-soil values) and the soil at the site has a hydraulic conductivity 10^{-6} cm/s or less measured in situ.

- 50) If a specifically prepared surface is chosen as the containment device, the duty holder must remove the A and B soil horizons and prepare the C soil horizon for the base pad.
- 51) The duty holder must manage the fluids collected in the leachate collection system by
 - a) irrigation within the containment device provided that the fluid does not hinder the biodegradation process or create a soil quality problem, or
 - b) injection into an approved disposal well as per [*Directive 051: Injection and Disposal Wells – Well Classifications, Completions, Logging, and Testing Requirements*](#).
- 52) The duty holder must analyze representative waste samples prior to the start and at the end of the biodegradation process for the following parameters:
 - pH
 - EC
 - total metals (as per Tier 1)
 - hydrocarbons (i.e., BTEX and F1 to F4 hydrocarbon fractions)
 - major ions (e.g., Ca, Mg, Na, and Cl)
 - extractable organic halogen
- 53) The duty holder must use the analytical results to confirm the treated material's suitability for its intended use.
- 54) The duty holder must remove the biodegraded or partially biodegraded oilfield material at the end of treatment or within the maximum allowable five-year timeframe, whichever is reached first, for further treatment or disposal, or if appropriate, for use as fill material on the originating site or another site within the same production system.
- 55) The duty holder must close the one-time, on-site biocell or biopile treatment area by removing the material, removing the containment device and leachate collection system, and returning the treatment area to equivalent land capability within five years from commencement of treatment.
- 56) The duty holder must document the following information:
 - a) the location where the biocell or biopile was used
 - b) start date of treatment
 - c) the analyses of the parameters of the original waste and the final treated material

- d) the biocell or biopile construction details
 - e) the volume of waste and location of the originating site
 - f) the types, rates, and frequency of any amendments added to enhance the biodegradation process
 - g) the volume of leachate collected and how it was disposed of
 - h) the name and location of the site or facility where the treated material was sent for final disposition or for further treatment
 - i) confirmation that the biocell or biopile has been closed
- 57) The duty holder must retain all documentation on site for a minimum of two years after the treated material has been removed.

4.2 Mobile Thermal Treatment of Oilfield Wastes

Mobile thermal treatment units are regulated by AEP. Duty holders that have received approval from, or have been registered with, AEP may use these units at AER-regulated sites provided that all operations comply with

- the operating requirements of the AER-licensed or -approved site, including any site-specific conditions; and
 - the mobile thermal unit licence, approval, or registration.
- 58) If operations may or will exceed six months, the duty holder must review the possible environmental impacts of the mobile thermal unit with the AER prior to the operations exceeding six months.
- 59) The duty holder must only thermally treat oilfield wastes originating from the site where the mobile thermal unit is located or from sites within the same production system.
- 60) The duty holder must only use mobile treatment units approved to treat hazardous waste to treat DOW.

4.2.1 Notification of Operations

- 61) The duty holder must notify the AER at Directive058@aer.ca and all landowners and residents within 1.5 km the mobile thermal unit at least 30 days prior to mobilization of the unit. If the AEP licence, approval, or registration has more stringent public notification requirements, the duty holder must follow those.

62) The notification must include

- the AEP licence, approval, or registration number and operator of the mobile thermal unit;
- the AER licence or approval number and legal land location of the site on which the mobile thermal unit will be operated;
- the volumes, types, and sources of the oilfield waste to be treated by the mobile unit;
- the final disposition of the treated material; and
- the duration of the mobile thermal treatment activity.

63) At least 48 hours before running the mobile treatment unit, the duty holder must notify the local AER field centre that operations will be starting.

4.3 Movement of Oilfield Waste From Remediation or Reclamation Activities

The duty holder may move oilfield waste from remediation or reclamation activities from one site to another for temporary storage as per *Directive 055* or one-time treatment if

- the originating AER site (e.g., battery, well site) is not suitable for managing the waste, and
- the other site is an AER-regulated site within the same production system.

This type of oilfield waste includes contaminated soils, sludges, and waters from earthen pit/pond reclamation, spill reclamation, or tank reclamation.

4.4 Control and Disposal of Returned Radioactive Fracturing Sand

The use of radioactive substances and their disposal are subject to regulation and licensing by the Canadian Nuclear Safety Commission in accordance with the [Nuclear Safety Control Act](#) and the [Nuclear Substances and Radiation Devices Regulations](#).

Sand and fluids returned back to surface after fracturing a well are oilfield wastes.

4.5 Management of Naturally Occurring Radioactive Materials

Naturally occurring radioactive materials (NORMs) are regulated by the provincial and territorial governments, each having its own specific regulations on the handling and disposal of the material. The [Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials](#) has been developed by the Federal Provincial Territorial Radiation Protection Committee to harmonize standards throughout the country and ensure appropriate control over NORMs.

64) The duty holder must monitor waste containing NORMs in accordance with the *Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials* and must send the waste to a facility authorized to accept it.

- 65) The waste receiver must apply to the AER for approval to receive oilfield waste containing NORMs for management.
- 66) The duty holder must have in place a management plan for handling NORMs in accordance with provincial [occupational health and safety legislation](#) to ensure worker safety.

4.6 Management of Drilling Waste

As per the [Oil and Gas Conservation Rules \(OGCR\)](#), section 8.151(4), the duty holder must manage drilling waste in accordance with [Directive 050: Drilling Waste Management](#) and this directive.

4.7 Landfilling

4.7.1 AER-Approved Oilfield Landfills

As per the [Standards for Landfills in Alberta \(Standards for Landfills\)](#), duty holders must not accept liquid oilfield waste for landfilling. Liquid oilfield waste is waste that does not pass the paint filter test¹ before any amendments are added.

The duty holder must not dispose of DOW by landfilling unless the landfill is a Class I and the waste is listed in section 13(2) of *the WCR*.

4.7.2 AEP-Regulated Landfills

The duty holder may send only construction and demolition debris, garbage and domestic wastes, and scrap metal to registered landfills in Alberta or landfills currently operating under the [Code of Practice for Landfills](#).

Duty holders are allowed to send oilfield waste to an AEP-regulated Class II landfill if the facility is approved to accept oilfield waste, the oilfield waste does not impact the lifespan of the facility, and the waste does not exceed the limits set out in table 1 for total petroleum hydrocarbons and chloride based on landfill design.

In addition, if the facility is a municipal Class II landfill, either the oilfield waste must be treated for use (e.g., contaminated soils for cover material) or the facility must have dedicated trenches or cells for oilfield waste.

¹ Method 9095B: Paint Filter Liquids Test in [Test Methods for Evaluating Solid Waste: Physical/Chemical Methods](#) (United States Environmental Protection Agency Publication No. SW-846).

Table 1. Total petroleum hydrocarbon (TPH) and chloride limits for accepting non-dangerous oilfield waste at Class II landfills

Landfill design	Oilfield waste quality
Engineered clay or synthetic liner <i>and a</i> leachate collection and removal system	TPH no limit Chloride no limit
Engineered clay or synthetic liner <i>but no</i> leachate collection and removal system	TPH <30 000 mg/kg Chloride <5 000 mg/kg
Natural clay liner <i>but no</i> leachate collection and removal system	TPH <20 000 mg/kg Chloride <3 000 mg/kg

The limits in table 1 address oilfield wastes such as produced sands, drilling mud and cuttings, oily sludges, tank and treater bottoms, and flare pit material, which are often unsuitable for landfilling due to their non- or semivolatile hydrocarbon content or salt content.

Class II landfills approved prior to 1996 may not meet the current requirements set out in the *WCR, Code of Practice for Landfills*, or *Standards for Landfills*. These Class II landfills, such as municipal landfills, often lack an engineered liner and a leachate collection and removal system.

4.8 Waste Minimization

The AER expects duty holders to minimize waste production by reducing, reusing, recycling, and recovering waste. Duty holders should ensure effective management strategies are employed to minimize and effectively handle wastes. See appendix 4 for examples.

5 Alternative Waste Management Activity

As per section 8.152 of the *OGCR*, the duty holder, through the designated information submission system, must apply for approval to use alternative storage, treatment, or disposal activity. Examples of alternatives include the following:

- one-time temporary variance to the requirements for a waste management method or activity
- one-time temporary variance to approval conditions (e.g., accepting waste not included in the approval during emergency circumstances)
- managing an oilfield waste in a manner not specified in this directive (e.g., volatilization, boiling or heating for volume reduction, solvent extraction)
- conducting a pilot, including testing a technology for waste management

67) The duty holder must include the following in the application:

- a) the legal land description of the well or facility and its corresponding AER licence or approval number where the activity will take place
- b) a description of the activity and how it varies from existing oilfield waste management methods (if applicable), including its purpose and the criteria that will be used to measure its success
- c) the proposed start date and the anticipated duration (e.g., weeks, months) of the activity
- d) the volumes and types of oilfield waste to be managed or treated, including a description of the waste acceptance procedures to verify composition, volume, characterization, and classification
- e) a description of how the residual liquids or solids will be managed
- f) a plot plan identifying the location of all infrastructure (e.g., storage systems, equipment) associated with the activity and a process flow diagram (if applicable) for the activity
- g) a description of related storage systems as per *Directive 055*
- h) a description of the record-keeping program
- i) any other relevant information to support the application

- 68) If an approval is granted for a pilot, the duty holder must complete a summary report containing the following information upon completion of the activity, retain it for two years, and make it available to the AER upon request:
- a) the total volume of each waste type managed
 - b) the volume of by-products and residuals generated, as well as where these materials were disposed of
 - c) any operational problems encountered and how they were overcome
 - d) whether the activity was successful, including the data and rationale used to make this determination
 - e) confirmation that the associated surface infrastructure was dismantled and necessary remedial work to mitigate impacts caused by the activity was completed

6 Oilfield Waste Management Facilities and Oilfield Waste Management Components

This section sets out requirements that cover the full life cycle of an oilfield waste management facility or an oilfield waste management component from preapplication through to closure. It does not, however, cover activity-specific requirements (see section 7) or application requirements (see section 8).

Under the [*Oil and Gas Conservation Act*](#), a duty holder must apply for an approval for an oilfield waste management facility.

If a duty holder is proposing a waste management activity to occur at one of their existing AER-licensed or -approved sites, they can apply for approval for an oilfield waste management component. However, this option is only available if the duty holder is managing oilfield waste that was generated at that site and other sites within the same production system. The approval, issued through a letter, would be tied to the existing active AER-licensed or -approved site.

Table 2 explains the differences between an oilfield waste management facility and an oilfield waste management component.

- 69) Oilfield waste management facilities and oilfield waste management components must be designed, constructed, operated, and closed by **qualified persons**.
- 70) The duty holder must keep all required approvals, licences, and permits on site or at the field or plant office.
- 71) The total annual volume of **non-oilfield waste** received at an oilfield waste management facility must not exceed 25 per cent of the total annual volume of oilfield waste received.

Table 2. Oilfield waste management facility vs. an oilfield waste management component

	Facility	Component
Location	Standalone site	On an existing AER-licensed or -approved site that is active
Under the Oilfield Waste Management Liability Program	✓	
Site-specific liability assessment	✓	
Public notification	✓	
Activity		
Waste processing (including surface infrastructure for waste caverns)	✓	✓
Waste storage excluding water for reuse	✓	✓
Storage of water for reuse	✓	
Waste transfer	✓	
Surface facility associated with disposal wells (Class Ia or Ib)	✓	✓
Biodegradation (permanent biopiles or biocells)	✓	✓
Oilfield landfilling	✓	
Thermal treatment (limited to first party and on an AER-licensed or -approved oil and gas site)	✓	✓
Drilling fluid management (may only be approved for a facility)	✓	
Other activities to process, treat, store, dispose of, or recycle oilfield waste	✓	✓
Scale of activities	Large	Small
Accepts third-party waste	✓	
Accepts non-oilfield waste	✓	
Accepts imported oilfield waste	✓	

6.1 Participant Involvement

The participant involvement process is set out in [Directive 056: Energy Development Applications and Schedules](#), section 3.

The duty holder must meet the consultation and notification requirements set out in *Directive 056* based on the following table for an oilfield waste management facility.

Table 3. Notification and consultation for an oilfield waste management facility

Facility description	Personal consultation and confirmation of nonobjection	Notification
Facility not accepting H ₂ S material	<ul style="list-style-type: none"> • Landowner and occupants • Residents within 0.5 km 	<ul style="list-style-type: none"> • Crown disposition holders • Local authority • Landowners, occupants, and urban authorities within 1.5 km
Facility accepting H ₂ S material	<ul style="list-style-type: none"> • Landowner and occupants • Residents within 0.5 km 	<ul style="list-style-type: none"> • Crown disposition holders • Local authority • Landowners, occupants, and urban authorities within 2.0 km

A participant involvement program is typically not required for oilfield waste management components since they must be located on a portion of an **active AER-licensed** or -approved upstream petroleum site.

6.2 Siting Criteria

72) The duty holder must consider site location when designing an oilfield waste management facility or oilfield waste management component. At a minimum, the following requirements must be met:

- a) The site must be chosen so as to minimize the risks to human, animal, and plant health and to the environment, including soils, surface water, and groundwater, during the entire life cycle of the facility.
- b) The site must not be within 100 m of a water well used for domestic purposes and any water body as defined in *Directive 056*.
- c) The site must avoid drainage ways, areas subject to seasonal flooding, environmentally sensitive areas, and areas where the public would be directly affected.

6.3 Site Assessment

73) The duty holder must conduct and document a site assessment consisting of both a regional assessment and a site-specific investigation for an oilfield waste management facility.

74) The scope and level of detail for the site assessment must be at a sufficient level of detail to design and implement an effective groundwater monitoring system.

75) The site assessment must be planned, conducted, and certified by a qualified person.

The duty holder may be directed by the AER to complete portions of the site assessment for oilfield waste management components.

6.3.1 Regional Assessment

The purpose of the regional assessment is to gain a preliminary understanding of the soil characteristics, geology, groundwater chemistry, and direction of groundwater flow within a 3 km radius of the facility site.

76) The regional assessment must include the following:

- a) a detailed topographical map that shows all local surface water bodies, soil types and distribution, and any nearby operations such as industrial facilities, waste transfer stations, and landfills that may affect the quality or flow of groundwater
- b) a description of the geology (surficial deposits and underlying bedrock) and hydrogeology based on information available in the public domain, such as published reports, maps, aerial photos, water well records, and research papers
- c) surface water users based on government records
- d) groundwater users and the depths, specific yields, and water quality of the aquifers being used based on government records

6.3.2 Site-Specific Investigation

The purpose of a site-specific investigation is to establish the **background conditions**, reconcile the information gathered during the regional assessment with the site-specific conditions, and determine the placement of groundwater monitoring wells.

77) The site-specific investigation must include the following:

- a) surface and near surface features, such as the natural slope of the site
- b) existing or potential sources of contamination and any manmade or natural features that may act as conduits for contaminant migration
- c) surface drainage patterns and locations of all surface water
- d) locations of pipelines, utility lines, conduits, pits, or tanks
- e) locations of buildings, loading facilities, or storage areas

- f) locations of disposal or source wells
- g) locations of existing or abandoned monitoring wells or standpipes
- h) areas containing buried fill material or waste
- i) areas of extensive or frequent spills
- j) the soil characteristics, including
 - i) the geological parent materials, thickness, and type and depth of genetic horizons
 - ii) physical characteristics, including texture (e.g., coarse or fine grained), evidence of fracturing, internal drainage characteristics, and an estimate of moisture content
 - iii) background chemical characteristics, including test results for the following parameters and for any additional site-specific parameters of concern:
 - pH
 - EC
 - major ions (e.g., Ca, Mg, Na, Cl, potassium [K], sulphate [SO₄])
 - cation exchange capacity
 - metals
 - BTEX
 - petroleum hydrocarbon fractions F1–F4
 - sodium adsorption ratio
- k) background groundwater conditions, including test results for the following parameters and for any additional site-specific parameters of concern:
 - i) pH
 - ii) EC
 - iii) major ions (e.g., Ca, Mg, Na, K, Cl, SO₄, nitrite, nitrate)
 - iv) dissolved metals
 - v) BTEX
 - vi) petroleum hydrocarbon fractions F1 and F2

The background soil and groundwater conditions should not exceed the *Alberta [Tier 1](#)* and *[Tier 2 Soil and Ground Remediation Guidelines](#)*.

- l) a description of the hydrogeology, including
 - i) the type, thickness, and distribution of each stratigraphic unit
 - ii) the depth of the water table (i.e., shallowest water-bearing)
 - iii) an estimate of the moisture content and its variation in the unsaturated zone
 - iv) measured hydraulic conductivity of the first saturated strata; including the raw test data and method of analysis
 - v) the horizontal and vertical direction, rate, and approximate velocity of the groundwater
 - vi) local groundwater discharge and recharge areas within 3 km of site

6.4 Groundwater Monitoring and Reporting

78) The duty holder must have a site-specific groundwater monitoring program for the following oilfield waste management facilities to provide an early indication of potential adverse effects on groundwater:

- a) waste processing facilities
- b) storage facilities managing waste for reuse
- c) storage facilities or transfer stations managing DOWs
- d) surface facilities associated with a Class Ia disposal well
- e) biodegradation facilities that do not have secondary containment
- f) oilfield landfills
- g) fixed thermal treatment facilities

The duty holder may also be required by the AER to implement a groundwater monitoring program for a facility not listed above if it is warranted by the site-specific investigation.

79) The duty holder must select an alternative monitoring program if the results of the site assessment conclude that groundwater monitoring will not provide the necessary early detection of contamination. Examples of alternative monitoring programs include soil vapour surveys, soil sampling surveys, and shallow geophysical techniques (i.e., electrical conductivity, electromagnetic, or ground-penetrating radar surveys).

80) The duty holder must have qualified persons design and implement the network of groundwater monitoring wells in accordance with best practices and industry standards.

81) Before construction of the facility, at least four permanent monitoring wells must be installed in locations where they will not be damaged during facility construction.

- 82) At least three of the four permanent monitoring wells must be installed to determine the depth and direction of the lateral groundwater flow in the shallowest water-bearing zone, typically the permanent water table.
- 83) One of these three wells must be placed hydraulically upgradient of the site to provide the background (unimpacted) water chemistry and one must be placed hydraulically downgradient of the site.
- 84) A fourth well must be installed beside the downgradient well that is most likely to be affected but at a deeper depth in order to measure the vertical hydraulic gradient.
- 85) Additional groundwater monitoring wells must be installed if
 - a) a perched water table exists, or
 - b) if groundwater contamination is detected and delineation is required to determine the vertical and horizontal extent.
- 86) During well installation, the duty holder must
 - a) ensure no contaminants are introduced into the well,
 - b) minimize subsurface material disturbance,
 - c) ensure placement of the well will provide representative samples of groundwater chemistry, and
 - d) prevent contaminants from zones other than the screened interval from entering the well.
- 87) Monitoring wells must be secured and protected from damage and vandalism.
- 88) Monitoring wells that are no longer used as part of the monitoring program (i.e., as a result of damage or inappropriate placement) must be abandoned according to best practices.
- 89) Any new well that is replacing an existing well in the monitoring program must be ready before the next sampling date.
- 90) The duty holder must document their abandonment procedures.
- 91) The duty holder must determine if additional work beyond the minimum outlined in this directive is required and be able to justify why the actions taken at a specific site are sufficient.
- 92) The duty holder must sample each groundwater monitoring well once in the spring and once in the fall and analyze for the same parameters as for determining the background conditions. Additional monitoring may be required depending on the site-specific conditions.
- 93) The duty holder must prepare an annual groundwater monitoring report by March 31 of each year, unless noted below, and retain it on site for five years.

- 94) The annual groundwater report must include
- a) a site map showing the locations of the facility's structures, monitoring wells, and the horizontal direction of the shallow groundwater;
 - b) monitoring results for the previous calendar year and the previous four years before that for each monitoring well, including groundwater elevation and analyses, in tabular format;
 - c) monitoring results for the previous calendar year and the previous four years before that from the alternative monitoring program, if applicable;
 - d) a summary of any work done on the monitoring system;
 - e) an assessment of whether the monitoring results indicate there may be groundwater impacts;
 - f) a discussion of the work to mitigate any identified groundwater impacts, including the status of the work (e.g., proposed, ongoing, completed); and
 - g) a trend analysis of the monitoring data.
- 95) If impacts on groundwater are identified, the duty holder must describe the source of the impacts and potential for off-site contamination, prepare a preliminary plan to address the problem, and notify the AER no later than 60 days after the sampling date.

Exception for a storage facility managing water for reuse

- 96) The annual groundwater monitoring report must be completed and submitted every second year to the AER by March 31 following the start of operations.
- 97) During years that a groundwater monitoring report does not have to be submitted, the duty holder must
- a) assess the results from the groundwater monitoring data, and
 - b) notify the AER in writing if the assessment indicates a potential for adverse effects and include the monitoring results and assessment.

6.5 Soils Monitoring

- 98) The duty holder must have a site-specific soil monitoring program for oilfield waste management facilities storing water for reuse.
- 99) The soil monitoring program must be developed as per the Government of Alberta's [*Soil Monitoring Directive*](#).

- 100) The duty holder must implement the soil monitoring program once every five years and, as per the *Soil Monitoring Directive*, complete a soil monitoring report.
- 101) If there is an exceedance in any soil quality parameter, the duty holder must implement a soil management program and complete a soil management report, as per the *Soil Monitoring Directive*.

6.6 General Operational Requirements

The following requirements apply to both oilfield waste management facilities and oilfield waste management components unless otherwise indicated.

- 102) The duty holder must install a perimeter fence to prevent unauthorized access (e.g., public, wildlife, livestock) to the oilfield waste management facility.
- 103) The duty holder must maintain on site a copy of the corporate-level emergency response plan, developed as per [Directive 071: Emergency Preparedness and Response Requirements for the Petroleum Industry](#).
- 104) If any monitoring indicates that contamination has occurred, the duty holder must follow AER release reporting requirements.
- 105) The duty holder must control fugitive odours when receiving, processing, treating, and disposing of waste materials.

Fugitive emissions are governed by the Government of Alberta's [Alberta Ambient Air Quality Objectives and Guidelines Summary](#) and the AER's [Directive 060: Upstream Petroleum Industry Flaring, Incinerating, and Venting](#).

- 106) If the oilfield waste management facility or oilfield waste management component is approved to handle sour fluids, the duty holder must have extra precautions in place to prevent any fugitive odours.
- 107) The duty holder must incorporate a surface water run-off control system able to accommodate the volume of water from a 1-in-10-year, 24-hour storm for oilfield waste management facilities.

The duty holder may use the collected surface run-off water in the facility's processes with proper authorizations or alternatively surface discharge the water as per *Directive 055*.

The AER expects duty holders to implement a quality assurance and quality control program to verify characterization of incoming waste materials. The AER also expects duty holders to develop a waste management plan for the handling and disposing of **residuals** (i.e., solids and liquids) resulting from the facility's processes.

6.7 Financial Security

The duty holder must meet the financial security requirements as set out in section 16.6 of the *OGCR*, [Directive 001: Requirements for Site-Specific Liability Assessments in Support of the AER's Liability Management Programs](#), and [Directive 075: Oilfield Waste Liability \(OWL\) Program](#) for oilfield waste management facilities, including oilfield landfills, prior to issuance of an approval.

6.8 End of Operations – Closure

108) The duty holder must ensure that the site on which an oilfield waste management facility or an oilfield waste management component is situated will be capable of being reclaimed to conditions suitable for the next intended land use.

As per the [Conservation and Reclamation Regulation](#), oilfield waste management facilities are not included in the definition of “specified lands” thus are not subject to the reclamation certification process under that legislation. Oilfield waste management components are subject to the *Conservation and Reclamation Regulation* and the reclamation process of the site it is located on.

Refer to section 9.7 for operational status relating to closure activities for oilfield waste management facilities and components.

109) The duty holder must have qualified persons complete the closure activities. If it becomes apparent that future remediation or reclamation work is necessary as a result of activities that occurred on the site during operations or while it was undergoing suspension or closure, the duty holder will continue to be liable for the site.

110) The duty holder must carry out the groundwater and soil remediation in accordance with the *Alberta Tier 1 and Tier 2 Soil and Groundwater Remediation Guidelines*.

7 Oilfield Waste Management Activities That Require Approval

The duty holder must apply for either an oilfield waste management facility or a component for the following activities unless otherwise noted. The duty holder may also apply for *Directive 056* activities, including custom treating, clean oil terminalling, and Class II fluid injection/disposal, for an oilfield waste management facility.

7.1 Waste Processing

Waste processing changes the physical, chemical, or biological character or composition of waste; separates and recovers specific material from waste; or manufactures a by-product from waste.

Waste processing may involve

- using surface equipment and infrastructure to slurry and inject waste into a waste cavern;
- washing contaminants or residuals off of or out of equipment, piping, and rags to allow for reuse;
- applying methods or techniques to recover crude oil and reduce volumes, alter chemical characteristics, or remove dangerous constituents of the waste prior to final disposal;
- supplying oilfield waste to a manufacturer to use as an ingredient to manufacture a commercial product (e.g., concrete, bricks, silica, glass); or
- distributing or marketing a treated oilfield waste as a by-product (e.g., treating fracturing return fluids or drilling wastes and then marketing the fluids as fracturing- or drilling-fluid product).

7.2 Waste Storage and Waste Transfer

Collecting and storing waste until volumes are sufficient for economic transfer to another facility for treatment, processing, recycling, disposal, or reuse are waste storage or waste transfer activities.

111) If the waste to be stored at a site includes waste generated at other sites, the duty holder must apply for an oilfield waste management facility or component.

If the waste is generated by multiple companies and is accepted for transfer, the approval will list the activity as waste transfer rather than waste storage.

The duty holder does not need to apply to store or consolidate small volumes of waste provided that all of the following parameters are met:

- the storage system is a bin or, if the waste contains free liquid or is leachable, a bin and bag system
- the lid of the bin is kept closed
- the total aggregate volume of the storage system at the site does not exceed 10 m³

- the storage system is located on an AER-licensed or -approved site
 - the waste is generated within the same production system
 - the waste is tracked and disposed of or treated in accordance with this directive
- 112) If the duty holder is treating the waste being stored, they must also apply for a waste processing activity. Crushing filters and containers, removing liquids by gravity settling, and adding biocides and fracture treatment proppants are not considered waste processing.
- 113) If a duty holder wants to store water such as produced water, flow back, or leachate for reuse as an alternative to high-quality nonsaline water in hydraulic fracturing operations, they must apply for an oilfield waste management facility with a waste storage activity. Applying for an oilfield waste management component is not an option.
- 114) The duty holder must not dilute water for reuse with nonsaline water during storage. The duty holder may blend the water for reuse with different types of water before conveyance or directly prior to hydraulic fracturing, but not during storage.
- 115) Water being stored for reuse must be managed as a waste until it has been used.
- 116) For facilities storing water for reuse, the duty holder must meet the following requirements regarding topsoil and subsoil:
- a) During construction and operation of the storage area, the topsoil and upper subsoil must be recovered and stockpiled separately.
 - b) The stockpiles must be protected against erosion.
 - c) The recovered topsoil and upper subsoil must only be used for reclamation of the storage area. This also applies to areas where a natural liner is incorporated into the design.

7.3 Surface Facility Associated with Disposal Wells (Class Ia or Ib)

The deep well disposal of oilfield waste fluids into a Class Ia or Ib well (well class defined in *Directive 051*) requires an approval for both the disposal well and, unless otherwise noted, the surface facility that is associated with the disposal well. Surface facilities include any storage system and the associated piping, processing equipment, and pumps.

- 117) If the surface facility is receiving waste generated at other sites, the duty holder must apply for an oilfield waste management facility or an oilfield waste management component.

The duty holder does not need to apply for either an oilfield waste management facility or an oilfield waste management component if

- the disposal well is tied into a pipeline originating from an AER-approved facility and there are no additional surface facilities at the disposal well site,

- the waste received for disposal is produced water, or
- the facility is under the jurisdiction of AEP.

118) The duty holder must segregate oilfield wastes from non-oilfield wastes upon receipt at a Class Ia well prior to disposal.

7.4 Biodegradation

Biocells and biopiles that are used more than once or for more than five years are permanent structures and are considered to be facilities doing biodegradation. The duty holder must design and operate the biocells and biopiles as permanent infrastructure rather than for one-time use.

119) For permanent biocells or biopiles, the duty holder must apply for either an oilfield waste management facility or an oilfield waste management component.

120) The duty holder must design permanent biocells and biopiles with either

- a) a primary containment device, a secondary containment system consisting of an impervious liner, a leachate collection system, and a leak detection system; or
- b) a primary containment device, a leachate collection system, and a groundwater monitoring system.

121) For permanent biocells, the primary containment device must consist of an impervious liner or a tank or a vault of steel or plastic, including fibreglass-reinforced plastic.

122) For permanent biopiles, the primary containment device must consist of a curbed impervious liner at least 15 cm in height.

Concrete and asphalt can provide a durable working surface, but as stated in *Directive 055*, these materials are not considered appropriate for use as an impervious liner for primary containment.

123) For permanent biocells and biopiles, the leachate collection system must collect any leachate generated from the treatment activities and any precipitation that enters the containment area and the collected fluids must be managed as oilfield waste.

124) The leak detection system must be monitored as per *Directive 055*.

125) Controls must be in place to mitigate any emissions during biodegradation.

The biodegradation process is the same for permanent biocells and biopiles as that for one-time biocells and biopiles.

Before the start and at the end of the biodegradation process, the duty holder must analyze representative samples for the parameters in section 4.1.2 except for the following:

- Bulk density does not need to be analyzed before the start or at the end.
- Parameters in the waste that did not exceed the criteria before biodegradation for the intended use or disposition of the treated material do not need to be analyzed at the end of the process.

The initial sampling results are to be used to predict the time to treat the waste to levels suitable for the intended disposition or for reuse. The end results are to be used to confirm if the waste material has been successfully treated.

126) The biodegradation process must be completed within five years.

127) For each load of oilfield waste treated, the duty holder must document

- a) the information under requirement 56,
- b) the leak detection results (if applicable), and
- c) the groundwater monitoring results (if applicable).

128) The duty holder must retain the documentation on site for a minimum of two years after the treated material has been removed.

7.5 Oilfield Landfill

The AER's oilfield landfill requirements are consistent with the *WCR* and the *Standards for Landfills*.

129) For an oilfield landfill, the duty holder must apply for an oilfield waste management facility if they are landfilling oilfield waste.

130) The duty holder must locate the landfill on an AER-licensed or -approved site or within the footprint of an oil sands commercial scheme.

There are three types of landfills in Alberta based on the waste streams accepted:

- Class I – hazardous waste / dangerous waste
- Class II – non-hazardous waste / non-dangerous waste
- Class III – inert waste

131) The duty holder must meet the following sections in the *Standards for Landfills*:

- Section 2: Landfill Development and Siting
- Section 3: Design and Construction

- Section 4: Landfill Operation
- Section 5: Monitoring, Analysis, and Corrective Actions
- Section 6: Final Landfill Closure and Post Closure
- Sections 7.3 and 7.5: Record Keeping and Reporting

An exception to above is that the AER does not require the duty holder to have a landfill operator certification. However, it is recommended. If there is a conflict between a requirement in the *Standards for Landfills*, this directive, or another AER directive, the duty holder must comply with the more stringent requirement. The AER expects duty holder that use leachate ponds to meet the more stringent requirements (e.g., siting, design and operations) under *Directive 055*.

132) The duty holder must prepare an annual landfill report, as per sections 7.3 and 7.5 of the *Standards for Landfills*.

133) The duty holder must retain the following information until the end of the post-closure period:

- a) the waste generator identification information, type and volume of oilfield waste, and disposition location within the landfill for each load of oilfield waste
- b) the results from the technical investigation program
- c) the results of the groundwater monitoring program

7.6 Thermal Treatment

Thermal treatment uses heat to remove or destroy contaminants in oilfield waste and is effective at removing organic constituents in the waste.

134) The duty holder must locate fixed **thermal treatment units** and **small incinerators** on an existing site regulated by the AER.

7.6.1 Fixed Thermal Treatment Unit

135) For **fixed thermal treatment units**, the duty holder must apply for an oilfield waste management facility.

136) Unless the unit has already been approved for the waste, the duty holder must conduct test burns to verify that the waste can be treated while meeting the unit's performance requirements and contaminant emission limits in the *National Guidelines for Hazardous Waste Incineration Facilities: Design and Operating Criteria*.

The duty holder may be required to complete **compliance testing** depending on the thermal treatment technology being used.

The *National Guidelines for Hazardous Waste Incineration Facilities: Design and Operating Criteria* provides detailed information on test burns and compliance tests.

- 137) The duty holder must conduct additional testing if
 - a) the facility design or operating conditions change,
 - b) the matrix of the waste feed changes, or
 - c) the principle contaminants in the waste feed changes.
- 138) The duty holder must determine stack emission levels based on the volume and type of waste being treated, the technology being used, and the site-specific requirements.
- 139) The duty holder must give special consideration to air quality issues and dispersion characteristics in the local area when selecting and operating the fixed thermal unit.
- 140) The duty holder must not thermally treat waste that contains PCBs.

The oilfield waste management facility approval may identify other waste feed restrictions (e.g., **halogenated** organics) depending on the thermal treatment technology being used.

- 141) The duty holder must not stockpile waste waiting for treatment that exceeds six months of processing volumes.
- 142) All thermal treatment equipment must have an automatic alarm system that is triggered when preset levels of key design parameters are not met, including when an upset is imminent.
- 143) Written operating practices for receiving, unloading, and segregating waste and for responding to automated alarms must be maintained on site.

As per requirement 6, the duty holder must characterize and classify waste prior to mixing. Conditioning the waste feed is allowed only for operational purposes (e.g., thorough mixing with processed or uncontaminated materials).

- 144) The duty holder must not reuse liquid residuals resulting from the thermal treatment operation in the thermal treatment process.
- 145) The duty holder must identify signs of wear, leaks, spills, corrosion, hot spots, and potential malfunctions by completing regular inspections of the thermal treatment equipment during operating periods. The duty holder should record the inspection results and any operational changes that were completed to correct deficiencies in the daily operations log.
- 146) The duty holder must continuously monitor the parameters that indicate the successful destruction or removal of contaminants and successful pollution control.

7.6.2 Small Incinerator

147) For small incinerators, the duty holder must apply for an oilfield waste management component.

148) If the duty holder is using a small incinerator, the following must be met:

- a) The **incineration** site must be located a minimum of 1.5 km from any residences or public facility unless otherwise authorized by the AER.
- b) The surface terrain at the incinerator site must allow for the prompt and effective cleanup of all materials that may spill or leak during waste storage and disposal operations. The cleanup materials must be managed as oilfield waste.

149) Ash resulting from the incineration of oilfield waste must be managed as oilfield waste. Ash may contain significant levels of metals, and landfill acceptance may be subject to passing the toxicity characteristics leaching procedure. The incinerator ash should be stored and transported in enclosed containers.

The metal filter cores may be recovered and sent to a scrap metal recycler if appropriate.

150) The duty holder must follow the sections listed below in the Government of Alberta's [*Code of Practice for Small Incinerators*](#):

- Section 3: Analytical Requirements
- Section 5: Design Requirements
- Section 6: Operational and Emission Requirements
- Section 7: Monitoring Requirements
- Section 10: Record Keeping Requirements

If similar requirements are set out in this section of this directive, the more restrictive ones must be followed.

151) The duty holder must notify the AER at Directive058@aer.ca at least 30 days before starting to operate a small incinerator on an AER-regulated site to manage oilfield waste. The notification must include the following:

- a) the legal land description and the licence or approval number of the site the small incinerator is located on
- b) a technical assessment of the small incinerator, signed and stamped by a qualified person (e.g., professional engineer, the manufacturer, or equipment supplier), that includes
 - i) the make, model, and serial number of the incinerator

- ii) the incinerator type
- iii) the design and number of the combustion chambers
- iv) the operating temperatures of the combustion chambers or, if applicable, the operating temperatures of the desorption and combustion chambers of a thermal desorber
- v) any modifications made to the small incinerator
- vi) the equipment to be used in conjunction with the small incinerator
- vii) the actual and rated capacity, as specified by the manufacturer, in kilograms per hour
- viii) the source, quantity, and chemical characteristics of each oilfield waste expected to be processed
- ix) the proposed disposition of any waste resulting from the operation
- x) monitoring to be conducted

7.7 Drilling Fluid Management

Drilling fluid management is storing, blending, and processing used drilling fluid for reuse and recycling in drilling operations.

152) The duty holder must apply for an oilfield waste management facility for drilling fluid management.

If drilling fluid management occurs on a portion of an AER-licensed or -approved upstream petroleum site, the duty holder must follow the requirements under *Directive 050*.

7.8 Reporting and Document Retention

For biodegradation and oilfield landfill, refer to the specific activity section for reporting requirements.

For waste storage, including water for reuse; waste transfer; and fixed thermal treatment monthly and annual reporting is required as described below.

153) The duty holder must summarize the following information in an annual report by March 31 of each year.

For waste storage, waste transfer, and fixed thermal treatment:

- a) types of oilfield waste processed monthly, including for each receipt of waste material, the volume, source, generator, waste characterization, and date received

- b) an opening and closing inventory balance for each month identifying total volumes of waste received, total volumes of waste sent for treatment, processing, recycling, disposal, or reuse and the name and location of the receiving facility or location
- c) if waste is being thermally treated, include the total volume of waste waiting to be treated
- d) a summary of the results of any monitoring programs

For waste storage of water for reuse only:

- e) manufacturer and construction QA/QC reports, including as-built drawings of the storage system
- f) a summary of operations, including records on the quality and quantity of water released to the environment, leak detection, action leakage rate, and any corrective actions taken
- g) an assessment of the performance of the storage system, including the effectiveness of its wildlife and bird controls
- h) information indicating the ongoing need for the storage facility
- i) the soil monitoring report (completed every five years)
- j) the soil management report, if applicable

For fixed thermal treatment only:

- k) the amount of residual material (liquids and solids) disposed of monthly, the name and location of the disposal facility, and the volume of residuals stored on site
- l) a summary of the operational performance of the continuous thermal treatment process and emission monitoring, including an explanation of any incidents lasting more than 60 minutes when operating parameters were not met or emissions limits were exceeded
- m) copies of all analyses conducted for feed characterization

- 154) The annual report must be retained for a minimum of two years for waste transfer and waste storage and a minimum of five years for fixed thermal treatment and submitted on request to the AER.
- 155) The annual report for storage of water for reuse must be submitted yearly to the AER by March 31 for the first five years of operating life.
- 156) The monitoring data (e.g., leachate, wildlife data) and associated documents for all activities other than biodegradation and oilfield landfill must be retained for a minimum of five years, but preferably for the lifetime of the site.

8 Applications for New Oilfield Waste Management Facilities and Oilfield Waste Management Components

This section sets out the specific information that needs to be submitted in an application. The information cannot be provided simply by referring to a page or section of an attached report. An attached report, however, may be cited for additional information.

8.1 General Application Requirements

157) The duty holder must provide the following information when applying to construct and operate an oilfield waste management facility or an oilfield waste management component:

- a) the geographical area that would be serviced
- b) the legal land description and, for an oilfield waste management component, the existing well site or facility licence number or *EPEA* approval number for the site
- c) the current land use and zoning for the site
- d) confirmation that participant involvement was completed as per this directive
- e) whether the waste to be accepted will be the duty holder's own or from multiple generators
- f) the activities that will be conducted (see section 7 for list of activities)
- g) a facility plot plan clearly showing the location of
 - i) all equipment on site, including disposal and source wells;
 - ii) surface improvements (as defined in *Directive 056*), water bodies, and vegetation for at least 100 metres past the edge of the lease boundaries to demonstrate off-site setback requirements are met; and
 - iii) groundwater monitoring wells and horizontal direction of the shallow groundwater flow
- h) a list of storage systems, including any identification numbers and capacity in cubic metres
- i) process flow diagrams that clearly identify process equipment (e.g., centrifuges, shaker systems), measurement points as required under [Directive 017: Measurement Requirements for Oil and Gas Operations](#), storage systems, sources of receipt and deliveries, and all fluid lines, disposal wells, flare lines, and vent points
- j) a description of the treatment and process technologies, from receipt to disposition of waste that aligns with the process flow diagrams
- k) a list of all proposed waste streams to be received under each activity

- l) a list of the facility identifiers, as per [Directive 007: Volumetric and Infrastructure Requirements](#) and *Directive 047*
- m) a description of the operational procedures to manage waste streams that may or will contain hydrogen sulphide (e.g., routed through a vapour recovery unit and either a flare stack or scrubber)
- n) any waste streams that are non-oilfield waste or **imported oilfield waste** and the information under section 9.4
- o) in a table, from the regional assessment,
 - i) the surface and groundwater users, and
 - ii) the depths, specific yields, and water quality of the aquifers being used
- p) a description of the regional hydrogeology and geology from the regional assessment
- q) a description of soil characteristics from the site-specific investigation
- r) groundwater details from the site-specific investigation
- s) in a table, the monitoring well construction details
- t) rationale for the locations, depths, and screen intervals of the monitoring wells
- u) a description of any alternative monitoring program
- v) copies of any waivers obtained from the AER

For an oilfield waste management facility, the duty holder must also

- complete a site-specific liability assessment to estimate costs for suspending, abandoning, remediating, and reclaiming the facility, as per *Directive 001*, *Directive 075*, and the *OGCR*, section 16.6; and
- complete the relevant Facility Liability Declaration Form under *Directive 075*.

158) Both the site-specific liability assessment and the Facility Liability Declaration Form must be included with the application for an oilfield waste management facility under a separate cover.

The duty holder should review *Directive 001*, *Directive 075*, and the *OGCR* to ensure that all the required information is submitted with the application.

In accordance with [Directive 068: ERCB Security Deposits](#), *Directive 075*, and the *OGCR*, duty holders must be prepared to post financial security upon AER request, which will occur prior to issuance of an approval.

In addition to the general application requirements in this section, the duty holder must provide activity-specific application information as per the following sections.

8.2 Waste Processing

- 159) If the waste processing is associated with cavern disposal and the cavern disposal scheme has been approved, the duty holder must include the scheme approval number with the application.
- 160) If the waste processing manufactures a by-product to sell, a safety data sheet for the by-product must be included for approval.

8.3 Waste Storage and Transfer Stations

- 161) If the waste storage is for storing water for reuse, the following information must be included in the application:
- a) the need for the storage facility
 - b) a summary of other sites assessed and justification for the chosen site
 - c) the proposed storage system design, including supporting diagrams, and a statement that the design is appropriate for how long the system will be used for and the fluids that will be stored
 - d) the source of the waste (i.e., the duty holder or another oil and gas company)
 - e) who will be reusing the waste (i.e., the duty holder only, the duty holder and other oil and gas operators, or other oil and gas operators not including the duty holder)

8.4 Surface Facility Associated with Disposal Wells

The duty holder may apply for the surface facilities associated with disposal wells either concurrently with the disposal well application or after the disposal well and scheme have been approved.

- 162) If the disposal scheme has been approved, the scheme's approval number and surface location must be included in the application for surface facilities associated with disposal wells.

8.5 Biodegradation (Permanent Biocells or Biopiles)

- 163) The duty holder must include descriptions of the following when applying for a biodegradation facility:
- a) the oilfield waste sources and typical chemical and physical characteristics
 - b) the proposed biodegradation process, including any amendments that will be added, and the anticipated degradation period for each load of oilfield waste

- c) the intended use of the treated material
- d) how any leachate will be managed or disposed of
- e) the design of the biodegradation facility, including
 - i) the primary containment device,
 - ii) the secondary containment device,
 - iii) the leachate collection system, and
 - iv) the leak detection system
- f) how fugitive air emissions will be monitored

8.6 Oilfield Landfill

- 164) The duty holder must include the following information when applying for an oilfield landfill:
- a) the class (e.g., Class I, II, or III) of the landfill
 - b) the AER licence, approval, or scheme approval number for where the landfill would be located
 - c) the method for measuring and accounting for the volumes of waste received
 - d) a schematic cross-section of the proposed landfill, including the location of the trench or cell in relation to the seasonal high water table
 - e) the information required under the following sections in the *Standards for Landfills* (if an item does not apply, identify it as “not applicable” with an explanation):
 - Section 2: Landfill Development and Siting
 - Section 3: Design and Construction
 - Section 4: Landfill Operation
 - Section 5: Monitoring, Analysis, and Corrective Action
 - Section 6: Final Landfill Closure and Post Closure

8.7 Thermal Treatment

- 165) The duty holder must include the following information when applying for a fixed thermal treatment facility:
- a) the proposed uses for the residual solids (e.g., alternative landfill cover, fill material)
 - b) the site-specific emissions criteria with supporting data explaining how the criteria were selected
 - c) a description of the incinerator's design and the manufacturer's specifications, including the make, model number, chamber type, rated capacity, and charging method
 - d) the design and operating limits for the parameters listed below and a discussion of why the limits apply:
 - i) primary chamber temperature, pressure, design volume, and hearth area
 - ii) secondary chamber temperature, pressure, and retention time
 - iii) primary air injection
 - iv) secondary air injection
 - v) auxiliary burner type, primary ignition, secondary afterburner, timer cycle, supply fuel, and type of flame-failure control
 - vi) minimum destruction and removal efficiency
 - vii) combustion performance parameters, including minimum oxygen level, maximum carbon monoxide level, and minimum incinerator operating temperature
 - viii) stack emission levels for opacity, hydrogen chloride, particulates, dioxins and furans, carbon monoxide, carbon dioxide, nitrogen oxides, and sulphur dioxide
 - e) a description of the incinerator stack, including its diameter, height above grade, height above roof, distance from the nearest building and the building's height, height of other obstructions, spark arrester, sampling ports, and pollution control equipment
 - f) a description of the process monitoring system for the incinerator and of the continuous emissions monitoring system for the stack
 - g) a scale drawing of the incinerator showing its internal dimensions, burner locations, charging doors, size and location of test openings, temperature control device, and temperature recording device
 - h) a description of the testing to ensure that the required destruction and removal efficiencies and emission limits will be met

- i) a copy of the test burn protocol, including
 - i) waste type and source
 - ii) waste feed characterization, including sampling and analysis methods
 - iii) parameters to be monitored in all effluent streams, including sampling and analysis methods
 - iv) operating parameters such as temperature, air-flow rate, mass-flow rate, waste-feed rate, residence time, total hydrocarbons, and combustion and destruction efficiencies (if applicable)
 - v) the time period for the test
- j) confirmation of a successful test burn
- k) a description of the operational procedures, including
 - i) the method of receiving, storing, and preparing waste for incineration
 - ii) a list of the gaseous and particulate substances and their volumes that will be released into the environment as a result of the incinerator's operation, as well as the methods of release and the operational steps to reduce the volumes released
 - iii) a discussion of the method to dispose of or treat the liquid and solid residue or ash generated by the incinerator
- l) a description of the facility's operational safety procedures, as well as the contingency plan to respond to emergencies such as fires or fugitive emissions

8.8 Other Oilfield Waste Management Activity

- 166) Duty holders that want to apply for an oilfield waste management activity that is not described in this directive must provide information on the design features, the operating procedures, and the monitoring systems for the activity, with the level of detail reflecting the scope and complexity of the proposed activity.

9 Applications to Modify Existing Oilfield Waste Management Facilities or Oilfield Waste Management Components

To modify an existing oilfield waste management facility or an oilfield waste management component, the duty holder, through the designated information submission system, will need to either apply to amend the approval or notify the AER. The sections below indicate which of the two is required based on the modification.

167) For modifications that require the duty holder to notify the AER, the notification must be submitted at least 15 business days before starting the modifications.

168) For modifications that require the duty holder to amend the approval, the duty holder must not implement the modification until the AER has granted approval. Refer to the AER website for application processing times.

Duty holders do not need to notify the AER or amend the approval for the routine replacement of existing equipment (e.g., pumps, heaters, treaters), including the replacement of one tank for another tank of the same volume provided the dimensions of the new tank do not reduce the secondary containment capacity.

9.1 General Application and Notification Requirements

169) The duty holder must include the following information when applying to amend an approval or when notifying the AER:

- a) the approval number and the name of the oilfield waste management facility or oilfield waste management component
- b) the legal land description and, for a component, the existing licence or approval number of the site
- c) the purpose and a description of the modification, including the area of the facility where the proposed activity will occur
- d) updated plot plan (if applicable)
- e) updated process flow diagram for the entire facility (if applicable)
- f) statement as to whether or not additional financial security will be required based on an updated site-specific liability assessment; if additional security is required, provide information about the security adjustment, in accordance with section 16.6 of the *OGCR*, *Directive 068*, and *Directive 075*
- g) confirmation that *Directive 055* will be met

- h) any additional tracking, record keeping, or reporting requirements, including any new facility identifiers
- i) any other information requested by the AER, including during preapplication meetings

9.2 Modifying a Storage Device

170) The duty holder must notify the AER when

- a) adding or removing storage tanks or aboveground synthetically lined walled storage systems (AWSSs) within an existing tank farm or secondary containment area;
- b) replacing or upgrading an existing tank farm, AWSS secondary containment area, or bulk pad;
- c) adding or expanding an existing tank farm, AWSS secondary containment area, or bulk pad; or
- d) redesignating storage devices.

171) The notification must include the following information:

- a) the number of tanks or AWSSs being added or removed (if applicable)
- b) the storage device identifier and volume (m³) or maximum storage capacity (for solids pad) associated with the storage device being added, removed, or redesignated; if being redesignated, include the previous device identifier and new device identifier
- c) the dimensions of the new or expanded storage device area (if applicable)
- d) whether the replacement storage device will be located within the same area or within a different area (if applicable)
- e) if the replacement storage device is located within a different area,
 - i) confirmation that any materials stored in the existing storage device will be removed within 30 days after the replacement storage device is complete, and
 - ii) a description, including timelines, of how *Directive 055* requirements for the permanent withdrawal of the existing storage device will be met
- f) if the existing storage area will be expanded, description of how the new portion will be tied into the existing containment system (i.e., dikes, liners), and how the dike and liner integrity will be maintained prior to completion
- g) confirmation that public consultation has been completed

172) If the tanks were identified in the original application as future tanks, the duty holder must notify the AER at Directive058@aer.ca once they are put into service.

9.3 Adding a New Cavern or Disposal Well

173) If the existing approval does not include waste processing associated with a cavern or deep well disposal, the duty holder must apply to amend the approval as per section 7.2 and section 7.4, respectively.

174) The duty holder must notify the AER once the new cavern or disposal well has been approved and include the legal land location of the cavern or well, disposal scheme approval number, and facility ID for the cavern.

9.4 Adding or Removing Waste

Whether the duty holder has to apply to amend the approval or has to notify the AER depends on the waste being added or removed.

175) For any of the following, the duty holder must apply to amend the approval:

- a) To add a non-oilfield waste or an imported oilfield waste, unless the waste is already included in the approval, in which case the AER must be notified. The notification must provide the same information as that required in applying for an amendment.
- b) To add **materials requiring special handling**, including NORMs and PCBs.
- c) To add waste containing H₂S, which will change a sweet facility to a sour facility.

176) The amendment application must include the waste management activity associated with the waste, the type of waste being added based on the list in the requirement directly above, and the waste name and waste code from appendix 2.

177) The amendment application must also include the following information depending on the waste type:

For imported oilfield waste and non-oilfield waste

- a) confirmation that the waste has similar characteristics to the oilfield waste currently approved for the facility
- b) the waste classification (i.e., hazardous or non-hazardous)
- c) source of the waste
- d) a description of the acceptance procedures and methods used to verify the characteristics and classification of the waste
- e) if the waste is hazardous, the recoverable material and how will it be recovered

- f) if the waste is being received for consolidation and transfer, the name, location, and approval number of the recycling facility

For materials requiring special handling

- g) a description of the materials to be added, including any unique properties or characteristics
- h) source of the materials
- i) a description of the acceptance and handling procedures
- j) name, location, and approval number of the facility where the residual waste will be sent for further treatment or disposal
- k) confirmation that public consultation as per this directive has been completed

For waste containing H₂S

- l) a description of the waste acceptance and handling procedures
 - m) a description of the modifications to accommodate the waste, including odour control during receiving, processing, and disposing of residuals (e.g., vapours routed through a vapour recovery unit or flare stack)
 - n) confirmation that public consultation has been completed
- 178) To add or remove any oilfield waste not previously identified in this section, the duty holder must notify the AER.
- 179) The notification must include
- a) the waste being added or removed, including its oilfield waste code; and
 - b) the waste management activity associated with the waste (e.g., waste processing, fluid disposal, storage, transfer).

9.5 Changing a Soil or Groundwater Monitoring Program

- 180) The duty holder must apply to amend the approval when making a change to an existing soil or groundwater monitoring program *unless* a new groundwater monitoring well is being added, in which case the AER must be notified.
- 181) The amendment application must include
- a) a description of the proposed change and the purpose of the change, and
 - b) an updated plot plan, if applicable.

182) The notification to add a new groundwater monitoring well must include

- a) the rationale for adding the well, and
- b) an updated plot plan showing the well's location.

9.6 Adding a New Waste Management Activity

183) The duty holder must apply to amend the approval when adding a new waste management activity.

184) The amendment application must include

- a) the activity-specific application information (sections 8.2 to 8.8),
- b) the information from section 9.5 if there are any changes to the groundwater or soil monitoring program, and
- c) confirmation that public consultation has been completed.

9.7 Changing Status of an Oilfield Waste Management Facility or Oilfield Waste Management Component

The status of an oilfield waste management facility or oilfield waste management component must be accurately reflected in the approval.

185) To change the status of the oilfield waste management facility or oilfield waste management component, or a portion of either, the duty holder must apply to amend the approval.

The AER does not consider any adjustment to financial security until the duty holder has submitted documentation demonstrating that the work associated with the status change has been completed.

The amendment application must include the information set out below.

186) To change the status from operating to suspended, provide

- a) a description of the work that will be taken to
 - i) eliminate all inventories (include the volumes of each waste type or material and the types of facilities the inventories will be sent to for treatment, disposal, or recycling), and
 - ii) secure the facility or the relevant portion of it to prevent waste management activities in the suspended area; and
- b) the timelines for abandonment, decontamination, and surface land reclamation.

187) To change the status to abandonment, provide

- a) the information under requirement 186, if suspension has not already occurred;
- b) a description of the work to remove associated equipment and structures and to abandon wells and pipelines;
- c) a description of the work
 - i) to determine the extent of any impacts caused by the waste management activity, and
 - ii) to secure the facility or portion of the facility that will be abandoned; and
- d) the timelines for decontamination and surface land reclamation work.

188) To change the status to undergoing closure, provide

- a) the information under requirements 186 and 187 if suspension or abandonment has not already occurred;
- b) a closure plan describing
 - i) the environmental site assessment to determine the potential sources, nature, and extent of contamination; and
 - ii) the reclamation work to return the site to **equivalent land capability**, including timelines; if only a portion of the facility is undergoing closure, indicate if the reclaimed lands will be removed from the facility footprint and used for the next intended land use;
- c) rationale for any structures or buildings remaining on site; and
- d) the next intended land use.

189) To change the status to undergone closure, provide a closure report that includes

- a) a summary of the suspension and abandonment work;
- b) the results from the environmental site assessment, including a discussion about the types and extents of any contamination found;
- c) a summary of any work completed to decontaminate the site, including confirmatory environmental site assessment work;
- d) a summary of the surface land reclamation work; and
- e) details on the post-closure monitoring program, if required, including the time period and type of monitoring.

All work associated with closure activities (i.e., suspension, abandonment, undergoing closure) must be documented.

190) To change the status from suspension to operating, provide

- a) confirmation that public consultation has been completed as per this directive if the entire facility has been suspended for more than one year, and
- b) a summary of work done and planned for operations to resume.

9.8 Changing Ownership of an Oilfield Waste Management Facility or Oilfield Waste Management Component

191) The duty holder must apply to amend the existing approval if there is a change in ownership. Reimbursement of financial security to the original duty holder will only occur after the new owner has posted financial security and the approval amended to reflect the new owner.

192) The amendment application must include the following, if applicable:

- a) written confirmation from both parties involved in the ownership change,
- b) legal documentation (e.g., amalgamation certificate, purchase agreement) to confirm the change in ownership,
- c) an updated site-specific liability assessment as per *Directive 075* or section 16.6 of the *OGCR* (if an oilfield landfill) completed by the original duty holder, and
- d) confirmation of financial security posted by the new duty holder.

Facility ID in Petrinex associated with the approval must also be transferred to the new owner.

9.9 Adding, Expanding, or Closing a Landfill Cell or Closing a Landfill

193) The duty holder must apply to amend the approval to add, expand (vertically or horizontally), or close a landfill cell or to close the entire landfill.

The amendment application must include the following information.

194) For the addition or expansion of a landfill cell, provide

- a) all of the applicable information detailed in section 8.6 of this directive, and
- b) if expanding beyond the initial landfill footprint, confirmation that public consultation as per this directive has been completed.

195) For the closure of a landfill cell or closure of the entire landfill, provide all of the applicable information detailed in the *Standards for Landfills* pertaining to final closure and post-closure care.

9.10 Adding or Expanding an Engineered Containment Pond

- 196) The duty holder must apply to amend the approval to add or expand an engineered containment pond.
- 197) The amendment application must include
- a) all the applicable information in section 8.3, and
 - b) if expanding beyond the initial facility lease boundary, confirmation public consultation as per this directive has been completed.

9.11 Expanding Lease Boundaries

- 198) The duty holder must apply to amend the approval to expand the lease boundaries.
- 199) The amendment application must include
- a) written confirmation from the landowner consenting to the lease expansion;
 - b) an updated plot plan clearly identifying the expanded lease area, including the dimensions;
 - c) a detailed description of the oilfield waste management activities proposed in the expanded lease area;
 - d) a description of the effects of the lease expansion on the current groundwater and soil monitoring programs (as applicable), including the need for additional groundwater wells and additional site investigation in the area of the expanded lease as per section 6.3.2;
 - e) information set out in section 9.5 to support modifications to the groundwater or soil monitoring program; and
 - f) the background soil conditions in the expanded area as per section 6.3.2.

9.12 Disposing of Residual Wastes by an Alternative Method Not Authorized by the Approval

- 200) The duty holder must apply to amend the approval to dispose of residual waste by a method not authorized in the existing approval.
- 201) The amendment application must include
- a) a description of the residual waste to be disposed of by the alternative method, including the characterization and classification of the waste;
 - b) the estimated annual volume of residual waste to be disposed of by the alternative method; and

- c) if the alternative method is occurring off site, the name, location, and operator of the facility; confirmation that the facility is authorized to accept the material; and a description of how the residual waste will be managed.

Appendix 1 Glossary

active AER-licensed site	An AER-licensed well or facility that has <i>not</i> been designated one of the following: RecExempt, Cancelled, Abandoned, or RecCertified.
adverse effect	As defined in <i>EPEA</i> under section 1(b).
background condition	As defined in <i>Alberta Tier 1 Soil and Groundwater Remediation Guidelines</i> , section 2.4.2, for background concentration.
compliance test	Evaluation of a thermal treatment process to determine if the process meets the terms and conditions of the regulatory approvals issued for that treatment process and the approved waste tested. Requirements for compliance testing will be specified in the operating approval for the thermal treatment process.
composition	As defined in <i>Directive 047</i> for waste composition.
equivalent land capability	As defined in the <i>Conservation and Reclamation Regulation</i> under section 1(e).
facility	As defined in the <i>Oil and Gas Conservation Act</i> under section 1(w).
halogenated	The product of incorporating a halogen (i.e., fluorine, chlorine, bromine, or iodine) into a chemical compound.
impervious liner	As defined in <i>Directive 055</i> .
imported oilfield waste	Waste generated from the exploration and production of oil and gas outside of Alberta that has similar characteristics to oilfield waste. Imported oilfield waste that is hazardous needs to contain recoverable material.
incineration	A thermal treatment process that destroys contaminants by oxidation in a controlled environment at temperatures that are effective to reduce contaminants to ashes, inert gases, or vapours.
material requiring special handling	Material that may pose an extra risk to the environment, public, or worker safety, such as NORMs and PCBs.
non-oilfield waste	Waste generated from non-upstream petroleum industries in Alberta that has similar characteristic to oilfield waste.
oilfield waste	As defined in the <i>OGCR</i> under section 1.020(12.1).
oilfield waste generator	The licensee or approval holder, as defined by the records of the AER, of a well, pipeline, or facility over which the AER has jurisdiction that generates oilfield waste.

oilfield waste receiver	A person or party that accepts or receives oilfield waste for storage, consolidation, transfer, treatment, disposal or waste minimization.
qualified person	A licensee-appointed technical person who has the necessary training, expertise, and technical knowledge of subject matter to ensure licensee adherence to the requirements of this directive. The person must also be a member in good standing of an association regulated by a professions or societies act of Alberta or be certified in Canada, including appropriately trained and experienced members of the Alberta Institute of Agrologists, Alberta Society of Engineering Technologists, Alberta Society of Professional Biologists, Association of the Chemical Profession of Alberta, Association of Professional Engineers, Geologists and Geophysicists of Alberta, and College of Alberta Professional Foresters.
residuals	The material left after a treatment process, which can include ash, solids, water, and recovered contaminants.
same production system	An interconnected system of upstream production facilities (e.g., wells, pipelines, batteries) that have the same duty holder.
sludge	Semisolid material typically consisting of hydrocarbon, water, and inorganic sediments (e.g., sands, silts) where the basic sediment and water exceeds 0.5 per cent.
small incinerator	Thermal treatment equipment burning no more than 10 tonnes of waste per month.
standalone facility	A facility constructed and operated on its own site.
thermal treatment unit	
fixed	Thermal treatment equipment that has been approved for use at one location only and that cannot be moved without dismantling.
mobile	Thermal treatment equipment with an AEP approval that does not restrict the equipment to one location and that can be moved to different locations.
transporter	A person or party who receives or takes control of oilfield waste for the purpose of transportation.
treatment	Any method, technique, or process that is applied to change the physical, chemical, or biological character or composition of a substance.
water for reuse	Water that is classified as an oilfield waste under the <i>OGCR</i> —such as produced water, flow back and leachate—that is used as an alternative to high-quality nonsaline water in hydraulic fracturing operations.

Appendix 2 Waste Names, Codes, and Common Waste Classification

This appendix provides common waste classifications for waste with historical data (pre-1996) along with the waste codes for use in the oilfield waste disposition report and AER Alberta Oilfield Waste Form. However, it is the duty holder's responsibility to ensure that the waste is classified correctly. For instance, a waste may commonly be a non-DOW; however, in certain circumstances it may be a DOW based on the waste's specific properties. Thus, testing is required to confirm the classification.

Common waste management practices, in addition to those in the main body of this directive, are also provided.

Waste name	Waste code	Common waste classification	Common properties for waste characterization	Waste management options
Absorbents	[OILABS]	Testing required	<ul style="list-style-type: none"> Flash point Leachate 	<ul style="list-style-type: none"> Reuse via laundering/dry cleaning
Acid solutions (unneutralized)	[ACID]	DOW	<ul style="list-style-type: none"> Corrosivity Heavy metals Flash point (if hydrocarbon present) pH 	
Activated carbon	[ACTCRB]	Testing required	<ul style="list-style-type: none"> Flash point Leachate 	<ul style="list-style-type: none"> Reuse or regenerate
Aerosol cans	[EMTCON]	Non-DOW		<ul style="list-style-type: none"> Recycle (if possible)
Asbestos	[ASBEST]		<ul style="list-style-type: none"> Toxic airborne fibres 	<ul style="list-style-type: none"> See AEP's <i>Disposal of Asbestos Waste: Acceptable Industry Practices</i>
Barrels, pails	[EMTCON]	Testing required depending on materials stored		<ul style="list-style-type: none"> Reuse/return to supplier Recycle (barrel/container reconditioning)
Batteries (wet and dry cells)	[BATT]	Wet cell: DOW Dry cell: Testing required	<ul style="list-style-type: none"> Corrosivity leachate (heavy metals) 	<ul style="list-style-type: none"> Recycle via battery recycler Alkaline batteries as per "Garbage/Domestic Waste"
Boiler blowdown water	[BLBDWT]	Normally a non-DOW (may be a DOW based on characterization)	<ul style="list-style-type: none"> Heavy metals 	<ul style="list-style-type: none"> Reuse Surface discharge (under specific circumstances)
Catalyst – non-sulphur	[CATNS]	Testing required	<ul style="list-style-type: none"> Leachate Pyrophoric characteristics 	<ul style="list-style-type: none"> Reuse/regenerate

Waste name	Waste code	Common waste classification	Common properties for waste characterization	Waste management options
Catalyst – sulphur	[CATSU]	Testing required	<ul style="list-style-type: none"> Leachate, corrosivity Pyrophoric characteristics 	<ul style="list-style-type: none"> Reuse/regenerate See AEP's <i>Guidelines for Landfill Disposal of Sulphur Waste and Remediation of Sulphur Containing Soil</i>
Caustic solutions (unneutralized, spent)	[CAUS]	DOW	<ul style="list-style-type: none"> Corrosivity 	
Cement (returns dry)	[CEMENT]	Non-DOW		<ul style="list-style-type: none"> If the waste is a result of drilling, see <i>Directive 050</i>
Chemicals –inorganic	[INOCHM]	DOW	<ul style="list-style-type: none"> Dangerous when wet Oxidizer Toxicity Corrosivity Leachate 	<ul style="list-style-type: none"> Disposal practice will vary with specific chemical (consideration of compatibility and solubility) Reuse/recycle when possible
Chemicals – organic	[ORGCHM]	DOW	<ul style="list-style-type: none"> Flash point Oxidizer Toxicity Corrosivity Leachate 	<ul style="list-style-type: none"> Disposal practice will vary with specific chemical Reuse/recycle when possible
Construction and demolition material	[CONMAT]	Normally a non-DOW (unless contaminated with a DOW)		<ul style="list-style-type: none"> Decontaminate and reuse
Contaminated debris and soil – chemical/solvent	[SOILCH]	Testing required	<ul style="list-style-type: none"> Flash point Leachate Toxicity 	
Contaminated debris and soil – crude oil / condensate	[SOILCO]	Normally a non-DOW (may be a DOW based on characterization)	<ul style="list-style-type: none"> Flash point Leachate Toxicity 	
Contaminated debris and soil –emulsion	[SOILEM]	Testing required		
Contaminated debris and soil – mercury/metals)	[SOILHM]	Testing required	<ul style="list-style-type: none"> Leachate (heavy metals) Toxicity 	
Contaminated debris and soil – pesticide/herbicide	[SOILPT]	Testing required	<ul style="list-style-type: none"> Leachate Toxicity 	<ul style="list-style-type: none"> On-site treatment (with activated carbon)
Contaminated debris and soil – produced/salt water	[SOILPW]	Non-DOW		
Contaminated debris and soil – refined fuels/oils	[SOILRO]	Testing required	<ul style="list-style-type: none"> Flash point Leachate 	

Waste name	Waste code	Common waste classification	Common properties for waste characterization	Waste management options
Contaminated debris and soil – sulphur	[SOILSU]	Non-DOW		<ul style="list-style-type: none"> See AEP's <i>Guidelines for Landfill Disposal of Sulphur Waste and Remediation of Sulphur Containing Soil</i>
Corrosion inhibitor/oxygen scavenger solutions	[CORINH]	DOW	<ul style="list-style-type: none"> Heavy metals 	
Crude oil/condensate emulsions (residuals after treatment)	[COEMUL]	Normally a non-DOW (may be a DOW based on characterization)	<ul style="list-style-type: none"> Flash point Leachate Toxicity 	
Crude oil sample bottles	[EMTCON]	Non-DOW		<ul style="list-style-type: none"> Reuse Recycle (commercial bottle washing facility or a plastic/glass recycling facility)
Cutting oil tubes	[EMTCON]	Non-DOW		
Dessicant	[DESICT]	Testing required	<ul style="list-style-type: none"> Corrosivity Flash point Leachate 	<ul style="list-style-type: none"> Reuse/regenerate Recycle (construction fill) if non-DOW
Dimethyl disulphide solutions	[DMDS]	DOW	<ul style="list-style-type: none"> Flash point Toxicity 	<ul style="list-style-type: none"> Reuse if possible Return to supplier
Drilling waste – hydrocarbon	[DRWSHC]	Non-DOW		<ul style="list-style-type: none"> See <i>Directive 050</i>
Drilling waste – advanced gel chemical	[DRWSAC]	Non-DOW		<ul style="list-style-type: none"> See <i>Directive 050</i>
Drilling waste – gel chemical	[DRWSGC]	Normally a non-DOW (may be a DOW based on characterization)	<ul style="list-style-type: none"> Flash point Leachate 	<ul style="list-style-type: none"> See <i>Directive 050</i>
Filters – air pollution control	[FILAPC]	Testing required	<ul style="list-style-type: none"> Leachate 	
Filters – gas sweetening (MEA, DEA, MDEA, sulphinol)	[FILSWT]	DOW	<ul style="list-style-type: none"> Flash point Pyrophoric characteristics Leachate 	<ul style="list-style-type: none"> Recycle (metal recovery) Recovered entrained liquids (DOW): Recycle or inject down an appropriate disposal well.
Filters – glycol	[FILGLY]	DOW	<ul style="list-style-type: none"> Flash point Pyrophoric characteristics Leachate 	<ul style="list-style-type: none"> Recycle (metal recovery) Recovered entrained liquids (DOW): Recycle or inject down an appropriate disposal well

Waste name	Waste code	Common waste classification	Common properties for waste characterization	Waste management options
Filters – lube oil (waste type 201)	[FILLUB]	Undrained are DOW Drained are non-DOW	<ul style="list-style-type: none"> Flash point Leachate 	<ul style="list-style-type: none"> Recycle (metal recovery) Recovered entrained liquids (DOW): Recycle or inject down an appropriate disposal well Internal combustion engine lube oil filters are non-DOW if they are fully drained and have a drainage efficiency (DE) >0.5
Filters – methanol	[FILMTH]	DOW	<ul style="list-style-type: none"> Flash point Leachate 	<ul style="list-style-type: none"> Recycle (metal recovery) Recovered entrained liquids (DOW): Recycle or inject down an appropriate disposal well
Filters – other (raw/fuel gas, NGLs)	[FILOTH]	DOW	<ul style="list-style-type: none"> Flash point Pyrophoric characteristics Leachate 	<ul style="list-style-type: none"> Recycle (metal recovery) Recovered entrained liquids (DOW): Recycle or inject down an appropriate disposal well
Filters – produced/ process water	[FILPWT]	DOW	<ul style="list-style-type: none"> Flash point Pyrophoric characteristics Leachate 	<ul style="list-style-type: none"> Recycle (metal recovery) Recovered entrained liquids (DOW): Recycle or inject down an appropriate disposal well
Filters – raw/fresh water	[FILFWT]	Non-DOW		
Filters (media) – water treatment	[FILWTT]	Testing required	<ul style="list-style-type: none"> Flash point Leachate 	<ul style="list-style-type: none"> Reuse/regenerate Recycle (construction fill) if non-DOW
Filter backwash liquids – gas sweetening	[FLBWSW]	DOW	<ul style="list-style-type: none"> Leachate 	
Filter backwash liquids – water treatment	[FLBWWT]	Non-DOW		<ul style="list-style-type: none"> Reuse Recycle (land irrigation) Return to source
Frac fluid – hydrocarbon based	[FRFLDH]	Testing required		<ul style="list-style-type: none"> Recycle/reuse in hydraulic fracturing operations
Frac fluid – water based	[FRFLDW]	Testing required		<ul style="list-style-type: none"> Recycle/reuse in hydraulic fracturing operations
Frac fluid – radioactive	[FRFLDR]	Testing required		
Frac sand – non-radioactive	[FRCSND]	Normally a non-DOW (may be a DOW based on characterization)	<ul style="list-style-type: none"> Flash point Leachate 	<ul style="list-style-type: none"> Recycle (return to supplier)

Waste name	Waste code	Common waste classification	Common properties for waste characterization	Waste management options
Frac sand – radioactive (plus other radioactive diagnostic materials)	[FRSDR]	May be a DOW after radioactive decay (based on waste characterization)	<ul style="list-style-type: none"> Leachate 	<ul style="list-style-type: none"> Recycle (return to supplier)
Garbage/domestic waste	[DOMWST]	Non-DOW		<ul style="list-style-type: none"> To reduce volumes, reduce, reuse, recycle, or replace
Glycol solutions – contains lead or other heavy metals (waste type 202)	[GLYCHM]	DOW	<ul style="list-style-type: none"> Flash point Toxicity (heavy metals) 	<ul style="list-style-type: none"> Recycle
Glycol solutions – no heavy metals	[GLYC]	Testing required	<ul style="list-style-type: none"> Flash point Toxicity 	<ul style="list-style-type: none"> Recycle
Grease cartridges	[EMTCON]	Non-DOW		
High solids produced water	[HSPWTR]	Testing required		
Hydraulic and transmission oil	[HYDOIL]	Normally a non-DOW (may be a DOW based on characterization)	<ul style="list-style-type: none"> Heavy metals 	<ul style="list-style-type: none"> Recycle
Hydrovac material – chemical/solvents impacted	[HYDVCH]	Testing required		
Hydrovac material – crude oil/condensate impacted	[HYDVCO]	Testing required		
Hydrovac material – emulsion impacted	[HYDVEM]	Testing required		
Hydrovac material – mercury/heavy metals impacted	[HYDVHM]	Testing required		
Hydrovac material – pesticide/herbicide impacted	[HYDVPT]	Testing required		
Hydrovac material – produced/salt water impacted)	[HYDVPW]	Non-DOW		
Hydrovac material – refined fuels/oils impacted	[HYDVRO]	Testing required		
Hydrovac material – sulphur impacted	[HYDVSU]	Testing required		
Hydrotest fluids – methanol	[MBTHNL]	DOW	<ul style="list-style-type: none"> Flash point Toxicity 	<ul style="list-style-type: none"> Reuse Recycle
Incinerator ash	[INCASH]	Testing required	<ul style="list-style-type: none"> Leachate (heavy metals) 	<ul style="list-style-type: none"> If a non-DOW, recycle (construction fill)
Ion exchange resin	[IEXRES]	Non-DOW		
Ion exchange resin regenerant liquids	[IEXLIQ]	Normally a non-DOW (may be a DOW based on characterization)	<ul style="list-style-type: none"> pH 	

Waste name	Waste code	Common waste classification	Common properties for waste characterization	Waste management options
Iron sponge	[IRNSPG]	DOW	<ul style="list-style-type: none"> Pyrophoric characteristics Leachate 	<ul style="list-style-type: none"> See AEP's <i>Guidelines for Landfill Disposal of Sulphur Waste and Remediation of Sulphur Containing Soil</i>
Lead-based products – H ₂ S sensing tape	[LDTAPE]	DOW	<ul style="list-style-type: none"> Heavy metals (Pb) 	
Lead-based products – pipe dope/greases	[LDDOPE]	DOW	<ul style="list-style-type: none"> Heavy metals (Pb) 	<ul style="list-style-type: none"> Recycle (if possible)
Lubricating oil (hydrocarbon and synthetic)	[LUBOIL]	Normally a non-DOW (may be a DOW based on characterization)	<ul style="list-style-type: none"> Heavy metals Flash point 	<ul style="list-style-type: none"> Direct to a licensed lube oil recycling facility
Metal (scrap)	[SMETAL]	Normally a non-DOW (may be a DOW based on characterization or if cross-contaminated with a DOW)		<ul style="list-style-type: none"> Decontaminate (if a DOW) and recycle via a scrap metal dealer
Mud sacks – drilling	[EMTCON]	Non-DOW		<ul style="list-style-type: none"> Reuse (return to mud supplier)
Naturally occurring radioactive materials	[NORM]	DOW	<ul style="list-style-type: none"> Toxicity 	<ul style="list-style-type: none"> See <i>Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials (NORM)</i>
Paints	[WPAINT]	DOW	<ul style="list-style-type: none"> Toxicity Flash point Heavy metals 	<ul style="list-style-type: none"> Recycle Approved toxic roundup (if small volumes)
Paint cans/brushes	[EMTCON]	Non-DOW if empty and dry	<ul style="list-style-type: none"> Toxicity 	
Pesticides/herbicides	[PSTHRB]	DOW	<ul style="list-style-type: none"> Toxicity 	<ul style="list-style-type: none"> Reduce Reuse Recycle
Pesticide/herbicide – containers	[PSTCON]	DOW	<ul style="list-style-type: none"> Toxicity 	<ul style="list-style-type: none"> Recycle (pesticide container collection site)
Pigging waste – liquid and wax	[PIOWST]	Testing required	<ul style="list-style-type: none"> Flash point Pyrophoric characteristics 	
Pipe dope containers/brushes	[EMTCON]	Non-DOW if empty and dry	<ul style="list-style-type: none"> Heavy metals 	<ul style="list-style-type: none"> Reuse
Polychlorinated biphenyls – askarel liquids	[PCBLIQ]	DOW	<ul style="list-style-type: none"> Toxicity 	<ul style="list-style-type: none"> Direct to an approved hazardous waste disposal facility
Polychlorinated biphenyls – contaminated solids <50 ppm	[PCBSLF]	Non-DOW		

Waste name	Waste code	Common waste classification	Common properties for waste characterization	Waste management options
Polychlorinated biphenyls – contaminated solids ≥50 ppm and <1000 ppm	[PCBSLI]	DOW	<ul style="list-style-type: none"> Toxicity 	<ul style="list-style-type: none"> Direct to an approved hazardous waste disposal facility
Polychlorinated biphenyls – contaminated solids ≥1000 ppm	[PCBSGI]	DOW	<ul style="list-style-type: none"> Toxicity 	<ul style="list-style-type: none"> Direct to an approved hazardous waste disposal facility
Polychlorinated biphenyls – fluorescent light ballasts	[PCBBAL]	DOW	<ul style="list-style-type: none"> Toxicity 	<ul style="list-style-type: none"> Direct to an approved hazardous waste disposal facility Recycle metal component if possible
Rags	[OILRAG]	Normally a non-DOW (may be a DOW based on characterization)	<ul style="list-style-type: none"> Flash point Toxicity Leachate 	<ul style="list-style-type: none"> Reuse via laundering/ dry cleaning
Residual formation fines after treatment and settlement	[FRMFNS]	Testing required		
Salt heat medium	[SALT]	Normally a non-DOW (may be a DOW based on characterization)	<ul style="list-style-type: none"> Oxidizes 	
Sand – produced	[SAND]	Normally a non-DOW (may be a DOW based on characterization)	<ul style="list-style-type: none"> Flash point Toxicity Leachate 	<ul style="list-style-type: none"> Recycle (other industrial uses)
Sludge – cooling tower	[SLGCTW]	DOW	<ul style="list-style-type: none"> Leachate (heavy metals) 	
Sludge – emulsion	[SLGEML]	Testing required		
Sludge – flare pit	[SLGPIT]	Testing required	<ul style="list-style-type: none"> Flash point Leachate Toxicity 	
Sludge – gas sweetening systems	[SLGSWT]	DOW	<ul style="list-style-type: none"> Flash point Leachate 	
Sludge – glycol/gas drying	[SLGGLY]	DOW	<ul style="list-style-type: none"> Flash point Leachate Toxicity 	
Sludge – hydrocarbon	[SLGHYD]	Testing required	<ul style="list-style-type: none"> Flash point Leachate 	
Sludge – lime	[SLGLIM]	Testing required	<ul style="list-style-type: none"> Corrosivity 	
Sludge – process	[SLGPRO]	Testing required	<ul style="list-style-type: none"> Leachate 	
Sludge – sulphur	[SLGSUL]	Testing required	<ul style="list-style-type: none"> Leachate Corrosivity 	<ul style="list-style-type: none"> See AEP's <i>Guidelines for Landfill Disposal of Sulphur Waste and Remediation of Sulphur Containing Soil</i>

Waste name	Waste code	Common waste classification	Common properties for waste characterization	Waste management options
Solvents/residues – halogenated	[SOLHAL]	DOW	<ul style="list-style-type: none"> Flash point Toxicity Leachate 	<ul style="list-style-type: none"> Recycle (regenerate, alternate uses)
Solvent/residues – non-halogenated aliphatic	[SOLALP]	DOW	<ul style="list-style-type: none"> Flash point Toxicity Leachate 	<ul style="list-style-type: none"> Recycle (regenerate, alternate uses)
Solvents/residues – non-halogenated aromatic	[SOLARO]	DOW	<ul style="list-style-type: none"> Flash point Toxicity Leachate 	<ul style="list-style-type: none"> Recycle (regenerate, alternate uses)
Sweetening agents – liquids	[SWTLIQ]	Normally a non-DOW (may be a DOW based on waste characterization)	<ul style="list-style-type: none"> Flash point Leachate 	
Sweetening agents – solids	[SWTSOL]	Normally a non-DOW (may be a DOW based on characterization)	<ul style="list-style-type: none"> leachate 	
Thread protectors – casing/tubing	[THPROT]	Non-DOW		<ul style="list-style-type: none"> Reuse (return to pipe supplier) Recycle
Treater hay	[TRTHAY]	Normally a DOW (may be a non-DOW based on characterization)	<ul style="list-style-type: none"> Flash point Pyrophoric characteristics 	
Wash fluids – organic	[WSHORG]	Testing required	<ul style="list-style-type: none"> Flash point Halogenated organics content Toxicity 	<ul style="list-style-type: none"> Recycle (regenerate, alternate uses) Recover hydrocarbons and inject via disposal well
Wash fluids – water	[WSHWTR]	Normally a non-DOW (may be a DOW based on characterization)	<ul style="list-style-type: none"> Flash point Halogenated organics content pH 	<ul style="list-style-type: none"> Recover hydrocarbons and inject via disposal well
Water – contaminated (leachate, collected surface water)	[CWATER]	Testing required		
Water – process (with organic chemicals)	[PWTROR]	Testing required	<ul style="list-style-type: none"> Flash point Halogenated organics content Toxicity 	
Water – process (with heavy metals)	[PWTRHM]	DOW	<ul style="list-style-type: none"> Heavy metals pH 	

Waste name	Waste code	Common waste classification	Common properties for waste characterization	Waste management options
Water – produced (including brine solutions)	[WATER]	Non-DOW		<ul style="list-style-type: none"> Recycle (waterflood, hydraulic fracturing) Recover hydrocarbon and inject via disposal well Recover any hydrocarbons prior to reuse or recycle in hydraulic fracturing
Waste – compressed or liquefied gases	[WSTCGS]	Testing required	<ul style="list-style-type: none"> Depends on specific waste 	
Waste – corrosive (liquid)	[WSTCLQ]	Testing required	<ul style="list-style-type: none"> Toxicity Corrosivity 	
Waste – corrosive (solid)	[WSTCSO]	Testing required	<ul style="list-style-type: none"> Corrosivity 	
Waste – flammable (liquid)	[WSTFLQ]	Testing required	<ul style="list-style-type: none"> Flammability 	
Waste – flammable (solid)	[WSTFSD]	Testing required	<ul style="list-style-type: none"> Flammability 	
Waste – miscellaneous	[WSTMIS]	Testing required		
Waste – oxidizing (liquid)	[WSTOLQ]	Testing required	<ul style="list-style-type: none"> Oxidizes 	
Waste – oxidizing (solid)	[WSTOSD]	Testing required	<ul style="list-style-type: none"> Oxidizes 	
Waste – poisonous (liquid)	[WSTPLQ]	Testing required	<ul style="list-style-type: none"> Toxicity 	
Waste – poisonous (solid)	[WSTPSD]	Testing required	<ul style="list-style-type: none"> Toxicity 	
Waste – radioactive material	[WSTRDM]	Testing required	<ul style="list-style-type: none"> Toxicity 	
Well workover fluids	[WWOFLD]	Testing required	<ul style="list-style-type: none"> Corrosivity Flash point 	<ul style="list-style-type: none"> Recover hydrocarbon and inject via disposal well
Wood – chemically treated / cooling tower	[WOODCT]	Normally a non-DOW (may be a DOW based on characterization)	<ul style="list-style-type: none"> Heavy metals Leachate 	

Appendix 3 Treatment and Disposal Method Descriptors for the Oilfield Waste Disposition Report

This appendix provides the descriptors for the disposal and treatments methods that are needed to complete the oilfield waste disposition report.

- Biodegradation through one-time on-site biocell or biopile
- Biodegradation at an oilfield waste management facility
- Burial (on site)
- Cavern disposal
- Disposal wells
 - Class Ia disposal well
 - Class Ib disposal well
 - Class II disposal well
- Landfills
 - Class I landfill
 - Class II landfill
 - Class III landfill
- Manufacturer (covers manufacturing, processing, or distributing a commercial product)
- Recycling facility (excluding used oil recycler)
- Road spread (spreading oily by-product on roads)
- Small oilfield waste incinerator (small batch feed and campsite incinerators)
- Swan Hills Treatment Centre
- Thermal treatment (fixed and mobile incinerators)
- Transport by pipeline
- Used oil recycler
- Waste processing at an oilfield waste management facility
- Other (oilfield waste treated or disposed of using method not listed above)

Appendix 4 Examples of Minimizing Waste

The most effective waste management practice is to avoid producing the waste in the first place. However, where that is not possible, the AER expects companies to minimize waste. Below are examples of how to do so through reducing, reusing, recovering, and recycling.

Reduce

Companies have the greatest opportunity to minimize waste by reducing the waste at its source.

Ways to Reduce

- Purchase chemicals in bulk to reduce container waste and possible spills when handling.
- Segregate process streams to minimize sludge or liquid production.
- Dry sludge prior to treatment and disposal, thereby reducing the waste volume.
- Install more efficient processing equipment or improving the operating efficiency of existing equipment.
- Analyze compressor and engine lubricating oils by a laboratory to determine if an oil change is actually required.
- Reduce the use of filters in water injection streams.
- Discontinue the use of treater clay from treater vessels.
- Use less hazardous substitutes for toxic products.

Reuse

Companies should make every effort to reuse waste.

Ways to Reuse

- Reuse cleaned oil rags.
- Use reusable filters.
- Reuse filtered lube oil for chemical injection pumps.
- Filter gear lubricating oil to extend period of use.
- Reuse water-based hydraulic fracturing flow back and produced water as an alternative water in hydraulic fracturing.

Recycle

Companies may have limited opportunities to recycle waste and will often require the use of a third-party waste contractor. Waste to be recycled should be segregated from other waste to prevent cross-contamination.

Ways to Recycle

- Use waste acids to neutralize caustic wastes.
- Recycle lube oil, glycol, solvents, unspent chemicals, batteries, paper, metal, plastic containers, and glass.

Recover

Companies may have limited opportunities to recover substances contained in the waste and will often require the use of a third-party waste contractor.

Ways to Recover

- Separate and recover hydrocarbons in wash waters.
- Recover oil from oily sludges.