Directive 058

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Oilfield Waste Management Requirements for the Upstream Petroleum Industry

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Contents

1 Introduction

1.1 Purpose of This Directive

This directive sets out the requirements for handling, **treatment**, reuse, and disposal of **oilfield waste** produced by the upstream petroleum, geothermal, and brine-hosted mineral resource development industries, including waste management responsibilities, activities, methods, and documentation.

Definitions applicable to *Directive 058* are included in appendix 1, and defined terms are set in **boldface** at first use. Waste codes and descriptors for waste identification and tracking purposes, applicable to waste generators and receivers, are included in appendix 2. Also, see *Manual XXX: Oilfield Waste Management* and supporting schedules available on the AER website.

1.2 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" indicates a requirement, and terms such as "should," "recommends," and "expects" indicate a recommended practice.

Section 8.150(2) of the *Oil and Gas Conservation Rules* (*OGCR*), section 62(2) of the *Geothermal Resource Development Rules* (*GRDR*), and section 69(2) of the *Brine-Hosted Mineral Resource Development Rules* (*BMR*) set out the responsibilities of the **oilfield waste generator**, while section 8.150(3) of the *OGCR* sets out the responsibilities for the **oilfield waste receiver**. In this directive, the duty holder has been identified when a requirement is specific to the oilfield waste generator or oilfield waste receiver.

Each AER requirement that is unique to this directive is numbered.

Manual 013: Compliance and Enforcement Program outlines the AER's compliance assurance program. For more information, visit the AER website.

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

1.3 Jurisdictional Overview

Both the Alberta Energy Regulator (AER) and Alberta Environment and Protected Areas (AEPA) have jurisdiction over waste in Alberta.

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

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

1.4 Applicability

Directive 058 requirements apply to the following:

- A well, facility, well site, facility site, or pipeline licensed or approved by the AER, but excludes oil sands mining and processing plant operations as defined in the *Oil Sands Conservation Act*.
- A well, facility, well site, or facility site licensed by the AER under the *Geothermal Resource Development Act* and *Mineral Resource Development Act* (*MRDA*), including the *BMR*, but excludes mines, mine sites, external mine discard dumps, and processing plants throughout their life cycles as defined in the *MRDA*.
- Drilling waste as described in section 8.151(4) of the *OGCR*.

1.5 Managing Drilling Waste

Section 8.151(4) of the *OGCR* sets out the responsibilities for drilling waste management, requiring the duty holder to follow *Directive 050: Drilling Waste Management* or *Directive 058*, whichever is applicable, and any other requirement approved by the AER.

1.6 Minimizing Waste

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 waste. See *Manual XXX* for examples.

1.7 What's New in This Edition

The directive has been extensively restructured and rewritten. Some of the major changes include the following:

- The directive has been streamlined to focus on requirements, and a new manual has been developed that contains additional guidance. Information from various brochures and FAQs has been incorporated into the directive and manual.
- Application forms have been created that encompass the various application requirements (found on the AER Forms page of our website).
- The directive now aligns with the *Contaminated Sites Policy Framework* and legislation such as the *Remediation Regulation*.

- Expectations have been clarified around release reporting and response when contamination has been identified (section 2).
- Requirements for generator knowledge have been clarified (section 3).
- Receiver waste verification requirements have been clarified (section 4).
- Requirements around transportation documentation have been clarified (section 5).
- Requirements and processes around discrepancies have been updated (section 6.2).
- Because *Directive 030: Digital Data Submission of the Annual Oilfield Waste Disposition Report* has been rescinded, the process for the submission of the oilfield waste disposition report has been updated (section 6.3).
- Statuses and authorization processes for oilfield waste management facilities and oilfield waste management components have been updated (section 7).
- Requirements around volatilization during biodegradation activity, including reporting requirements, have been clarified (section 10.4.3).
- Updates have been made as part of the implementation of the *Liability Management Framework*, including information about oilfield waste management facility approval transfers (sections 7.7 and 11.7).
- Updated waste codes, removed the common waste classification, removed the common properties for waste characterization, and removed the waste management options (appendix 2).

2 Release of Oilfield Waste and Release Reporting

2.1 Substance Release

A **substance** release can arise in various ways while managing waste, for example:

- a loss of containment, such as a tank leak or failure
- a cumulative release that developed over time, such as slow leaks
- a previously accepted and compliant practice that now requires remedial measures, such as the use of a drilling waste sump or a flare pit

Watching for substance releases that can potentially cause **adverse effects** is an ongoing process of diligence that can and should occur throughout the energy development life cycle. There are various ways that a duty holder can know or become aware of a substance release, for example:

- Physically observing a substance release, such as oil on the ground.
- A **leak detection system** has shown a potential failure of a containment "system."
- A laboratory test that shows an *Alberta Tier 1 Soil and Groundwater Remediation Guidelines* (Tier 1 guidelines) exceedance (e.g., groundwater monitoring identifying the presence of benzene in groundwater that may cause an adverse effect).

For additional information on managing contamination from a substance release, see section 8 of this directive.

2.2 Release Reporting

Section 110 of the *Environmental Protection and Enhancement Act* (*EPEA*) and sections 8.050 and 8.051 of the *OGCR* contain provisions for reporting substance releases.

The following are reportable releases of oilfield waste:

- release is off lease (i.e., the release is not confined to the well or facility site) from which the spill or release occurred,
- release is on site and is in excess of two cubic metres, or
- release is on site and of a size that may cause, is causing or has caused an adverse effect as defined in the *EPEA* (e.g., exceedance of Tier 1 guidelines).

2) As soon as the duty holder knows or ought to know of a reportable release of oilfield waste, they must immediately notify the AER by calling the Energy and Environment Emergency 24-Hour Response Line at 1-800-222-6514.

The AER Record of Site Condition (RoSC) Notice of Contamination may be used to notify the AER of unreported, lower-risk substance releases that are not related to an ongoing incident. (In such cases, the Energy and Environment Emergency 24-Hour Response Line at 1-800-222-6514 may also still be used.)

For additional information, see the Release Reporting Requirements brochure on the AER's website and *Manual 021: Contamination Management*.

3 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 to classify the waste. The classification determines the dangers relating to transporting the waste on public roads and the appropriate management option.

The AER and AEPA use different terminology to classify waste, but the terms have the same meaning.

AER term	AEPA 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 AEPA documents such as the *Waste Control Regulation* (*WCR*) or the *Alberta User Guide for Waste Managers*.

3) Prior to shipment, the oilfield waste generator must classify the waste (i.e., DOW vs non-DOW) using one of the following methods:

   a) the *WCR*, Schedule 1, sections 1 and 2

   b) generator knowledge provided that the process that produced the waste (i.e., inputs, throughputs, and outputs) has not changed since the last time it was characterized and classified

Prior to shipment, under the *Canadian Guidelines for* the *Management of Naturally Occurring Radioactive Materials* (*NORM*), NORM material must be assessed to determine activity concentration.

4) When generator knowledge is applied to classify a waste, including waste generated by a spill, the generator must use one or more of the following:

   a) process knowledge (e.g., waste origin, considering field/regional differences), **composition**, process producing the waste (along with the process flow diagram), information about the chemicals and other inputs to the process that generated the waste)

   b) knowledge of products, by-products, and intermediates (from safety data sheets or other supplier and manufacturer literature)

   c) previous waste characterization (i.e., laboratory analysis) of the waste completed within the last five years

   d) information on the chemical and physical properties of the chemicals used or produced by the process or otherwise contained in the waste

   e) other reliable and relevant information about the properties of waste or its constituents

5) When waste is classified by relying on generator knowledge, the oilfield waste generator must document how it determined the waste classification and provide it to the AER upon request.

6) When available generator knowledge is determined by the AER or generator to be inadequate to make an accurate classification determination, the generator must test the waste using an accredited laboratory.

7) A container or collection of containers with an aggregate internal volume greater than 5 litres (L) must be classified as a DOW if

   a) it contains a substance listed in the *Alberta User Guide for Waste Managers*, table 4a, and is not "empty" as defined in the *WCR* or

   b) it contains a substance listed in the *Alberta User Guide for Waste Managers*, table 4b, and is an "unrinsed empty container" as defined in the *WCR*.

The oilfield waste generator may manage DOW *not* listed in table 4b of the *Alberta User Guide for Waste Managers* as non-DOW if the following two conditions are met:

- 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.
- The total quantity accumulated over a 30-day period does not exceed 5 kg (if solid) or 5 L (if liquid).

8) The duty holder must characterize and classify the waste before adding any sorbent materials (e.g., sawdust) to facilitate transportation (i.e., waste must meet landfill acceptance criteria, including passing the paint filter test).

9) The duty holder must not dilute DOW by adding any solid or liquid or divide the waste to avoid regulatory requirements.

10) Duty holders must handle (e.g., transport, store, treat) incompatible waste in such a manner that there will be no contact between them, even in the event of release.

4 Receiver Waste Acceptance and Verification

Per the *OGCR*, section 8.150(3), oilfield waste receivers are required to do the following:

- understand the capabilities and limitations of the treatment and disposal methods of the facility
- communicate those capabilities and limitations to oilfield waste generators
- accept only oilfield waste that the facility is approved to receive
- maintain accurate and complete oilfield waste documentation and records
- follow any other requirements as directed by the regulator

11) Prior to unloading incoming waste, the receiver must acquire complete and accurate shipping documentation from the generator and confirm the following:

    a) generator name

    b) generating location (e.g., surface location, license number, UWI)

    c) receiving location

    d) AER waste code

    e) classification (DOW or non-DOW, hazardous or non-hazardous) and *Transportation of Dangerous Goods Act* information (i.e., UN number, shipping name, class, packing group)

    f) volume/quantity with units of measurement

    g) that incoming waste matches the waste description on the shipping document

12) The receiver must collect a representative sample of the total quantity of the waste received to determine composition and retain the sample for 90 days.

13) The receiver must not unload a waste that

    a) does not match the description on the accompanying shipping document, or

    b) is not accompanied by the appropriate shipping document.

Further action by the receiver is required if a discrepancy is noted. See section 6.2 on managing discrepancies.

The AER also expects duty holders to develop a waste management plan for the handling and disposal of **residuals** (both solid and liquid) resulting from the facility's processes. Residual waste resulting from treatment or processing is also considered to be oilfield waste and is subject to the requirements of this directive.

5 Documentation for Transportation

Shipping documents include recycle dockets, a movement document, the Alberta Oilfield Waste Form (fillable/printable PDF, multicopy, or dot matrix), manifests, truck tickets, or bills of lading. They are used to track the movement of waste from the time it leaves the generator's site until it reaches its designated receiving facility for management (e.g., treatment, disposal).

14) The oilfield waste generator must ensure that oilfield waste is transported with the required shipping document.

15) The oilfield waste generator must ensure that their portion of the shipping document is complete and accurate. For non-DOW shipments, the shipping document must include the waste generator name, source site location (surface location), waste code, waste classification, destination, and quantity with units.

16) The oilfield waste receiver must ensure that their portion of the shipping document is complete and accurate.

Tracking and classification requirements for the movement of hazardous waste and hazardous recyclables between Alberta and other provinces and territories are set out in the *Cross-Border Movement of Hazardous Waste and Hazardous Recyclable Material Regulations* under the *Canadian Environmental Protection Act*.

Where applicable, DOW shipments follow the *Transportation of Dangerous Goods (TDG) Act* and *TDG Regulations*, which promote public safety when dangerous goods are being handled or transported by road, rail, air, or water. The safe transportation of hazardous waste and hazardous recyclables in Alberta is regulated under *EPEA* and the *WCR*.

5.1 Alberta Oilfield Waste Form

5.1.1 Using the Alberta Oilfield Waste Form

17) An oilfield waste generator may use the Alberta Oilfield Waste Form (i.e., fillable/printable PDF) from the AER website or a form developed in house or by a third party. Regardless, the following conditions must be met:

    a) In-house or third-party forms must include the same information as requested on the most recent version of the AER Alberta Oilfield Waste Form.

    b) The duty holder must follow the completion and distribution instructions identified on the back of the AER Alberta Oilfield Waste Form.

    c) There is a unique numbering system to ensure that the generator can track and reconcile their waste shipments (e.g., BA code-number, 0338-9999999).

    d) The form and supporting data are retained for two years after the date the waste was transported and are made available to the AER upon request.

18) 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.

For DOW shipments, part A is completed by the oilfield waste generator, part B by the **transporter**, and part C by the oilfield waste receiver. Waste quantities may be recorded in tonnes, kilograms, cubic metres, or litres. If using the Alberta Oilfield Waste Form for non-DOW, see requirement 21.

19) An Alberta Oilfield Waste Form is required for each load of DOW being transported. However, where a single truck must make several trips to transport the entire quantity of a specific oilfield waste, a single Alberta Oilfield Waste Form may be used with attachments documenting each load. Where more than one truck is used to move a quantity of a specific oilfield waste, each truck must carry an Alberta Oilfield Waste Form, with attachments for repeat trips if necessary. The following information must be attached for each load:

    a) form number

    b) truck unit number

    c) waste code

    d) TDG UN number and corresponding TDG shipping name, waste classification, and appropriate packing group

    e) quantity shipped

    f) composition (oil, water, solids; determined by oilfield waste receiver only)

    g) handling code

If more space is needed (there are more than four waste streams listed on the form), additional pages may be attached to the form (see the AER Forms page for the Alberta Oilfield Waste Form: Multiple Waste Attachment Sheet).

Shipments of DOW across provincial, territorial, or international borders fall under federal jurisdiction. The federal requirements for shipping documents must be followed.

20) When a shipment contains mixed waste (e.g., hydrovac tank bottoms mixed with hydrovac sump waste, bin bag waste collection, milk runs), the oilfield waste generator must classify the shipment based on the most dangerous waste and identify for each waste type its code, source, and volume. If the individual volumes are not known, an estimate of waste types and quantity must be documented.

21) If the oilfield waste generator uses the AER's Alberta Oilfield Waste Form as a shipping document for non-DOWs, they must complete part A and clearly identify on the form that the waste is non-dangerous and include the waste generator name, source site location (surface location), waste code, waste classification, destination, and quantity with units.

5.1.2 Exemption from Using the Alberta Oilfield Waste Form

The oilfield waste generator does not need to complete an Alberta Oilfield Waste Form in the following situations:

- The quantity of DOW being transported does not exceed 5 kg (if solid) or 5 L (if liquid).
- The DOW is treated or disposed of at the site of origin.
- The DOW is transported from the site of origin to another site, provided that
  - the duty holder of both sites is the same,
  - the transport vehicle displays a placard with the appropriate UN number (as per the *TDG Regulations*), and
  - the DOW is accompanied by a shipping document that includes the hazard class, emergency response contact, total mass or volume of the DOW, and the number of packages if applicable.
- The DOW is being transported to an AEPA-authorized recycling facility using an AEPA recycle docket.
- The DOW is being transported across provincial, territorial, or international boundaries with a Federal Movement Document.

5.2 Permit for Equivalent Level of Safety

A permit for equivalent level of safety (Alberta) and an equivalency certificate (Transport Canada) allow the handling, offering for transport, or transporting of dangerous goods in a manner that does not necessarily comply with the *TDG Regulations*. They may be granted for the purpose of reducing documentation requirements where appropriate.

Permits for equivalent level of safety are addressed in section 5 of Alberta's *Dangerous Goods Transportation and Handling Act* and are valid only for road transportation within Alberta. Equivalency Certificates are addressed in Part 14 of the *TDG Regulation* and are valid for the transportation of dangerous goods between provinces.

22) The oilfield waste generator must provide a copy of the permit or certificate to the AER upon request if used for or during a waste shipment.

6 Waste Tracking and Reporting

6.1 Waste Tracking

As per section 8.150 of the *OGCR*, oilfield waste generators and receivers must maintain documentation in support of receipts and dispositions.

23) The oilfield waste generator must track, using a system of their choice, the handling, movement, treatment, and disposal of waste from the initial point of generation through to final disposition, including the quantities and characteristics of both DOW and non-DOW.

24) 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 (i.e., track oilfield waste "from cradle to grave").

25) The oilfield waste generator must retain the shipping documents, including waste characterization documentation, and tracking information for a minimum of two years from the date shipped.

26) The oilfield waste receiver must retain copies of all shipping documents for materials received and shipped for a minimum of two years from the date received (e.g., electronically, 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*.

6.2 Reconciling Waste Discrepancies

Discrepancies occur when the information on the shipping document provided by the waste generator does not align with the waste received. Whenever possible, the generator should determine the quantity of waste using meters (e.g., Coriolis meter), tank gauges, or weigh scales. In situations where the use of such devices is not possible, estimated volumes should be based on the dimensions of the container used to store or transport the waste.

Discrepancies may be due to inaccurate measurement in the field. Discrepancies involving quantity are only required to be reconciled with the generator if the receiver, using reasonable professional judgement, suspects that the discrepancy is due to a spill during transportation.

27) In the event of a discrepancy, the receiver must record the discrepancy on the shipping document and contact the generator to resolve (i.e., investigate the discrepancy and take corrective action).

28) In the event of a discrepancy related to a spill or a suspected spill during transport, the receiver must notify the generator immediately, and the generator must follow the release reporting requirements (see section 2).

29) If the waste discrepancy cannot be resolved, the generator must contact the AER by email at Directive058@aer.ca (with the subject line "Waste Discrepancy") within 21 calendar days of waste receipt and include the following:

   a) a copy of the shipping document

   b) discrepancy details

   c) description of actions taken to resolve the discrepancy

   d) reasons why it cannot be resolved

   e) further proposed action

6.3 Oilfield Waste Disposition Reports

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

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.

30) The oilfield waste generator must electronically submit the OWD report to the AER through the designated submission method within 45 calendar days of a request.

Refer to *Manual XXX* for the OWD report submission.

31) The OWD report must include all DOW and non-DOW, except for

   a) garbage/domestic waste (DOMWST) and

   b) produced water that is classified as non-DOW.

32) The OWD report must use the waste codes from appendix 2 and the descriptors for the disposal or treatment methods in appendix 4 of *Manual XXX*.

33) The OWD report must quantify solid oilfield waste in tonnes (t) and liquid oilfield waste in cubic metres (m^3); therefore, the oilfield waste generator may need to convert the volumes recorded in the Alberta Oilfield Waste Form. If known, the actual density of the oilfield waste should be used for the conversion.

7 General Requirements for 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 unless otherwise indicated. It does not, however, cover oilfield waste management activity-specific requirements (see section 10) or application requirements (see section 9).

An oilfield waste management facility is one that is on a licensed site or standalone site and accepts oilfield waste from third-party waste generators (i.e., waste generator and receiver are different companies) or from first-party waste generators (i.e., waste generator and receiver have the same BA code) from outside the **same production system**.

Under the *Oil and Gas Conservation Act* (*OGCA*), a person must apply for approval of an oilfield waste management facility. Per section 12 of the *OGCA*, the duty holder must obtain the appropriate approvals before starting any site preparation, construction, or operation (including receipt of waste).

A duty holder may apply for approval of an oilfield waste management component if all the following are true:

- The well or facility is licensed or approved under the *OGCR*.
- The oilfield waste management component is on an **active site**.
- The duty holder is managing oilfield waste that was generated at that site and other sites within the same production system.

An oilfield waste management component is not permitted if the well or facility is licensed under the *GRDR* or *BMR*. See *Manual XXX* for further information on the differences between an oilfield waste management facility and an oilfield waste management component.

34) Oilfield waste management facilities and oilfield waste management components must be designed, constructed, operated, and **closed** by **qualified persons**.

35) The duty holder must ensure that all required approvals, licences, and permits are available electronically or on site. A current plot plan, process flow diagram, as-built diagrams, safety procedures, and operational procedures must be readily available on site, at the field office, or electronically accessible.

36) For oilfield waste management facilities, the duty holder must install a perimeter fence to prevent unauthorized access (e.g., public, wildlife, livestock).

37) For oilfield waste management facilities, the duty holder must have an up-to-date copy of the corporate-level emergency response plan (hard copy or electronic) developed as per *Directive 071: Emergency Preparedness and Response.*

38) For oilfield waste management facilities, 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 rainfall event.

Refer to the *Standards for Landfills in Alberta* for requirements around surface water run-on and run-off control system capacity for oilfield waste landfills.

The duty holder may use the collected surface water run-off in the facility's processes with proper authorizations or surface discharge the water as per *Directive 055: Storage Requirements for the Upstream Petroleum Industry*.

39) For oilfield waste management facilities, the total annual volume of **non-oilfield waste** must not exceed 25% of the total annual volume of oilfield waste received.

7.1 Emissions and Odours

Fugitive emissions are governed by the *Alberta Ambient Air Quality Objectives and Guidelines* and AER *Directive 060: Upstream Petroleum Industry Flaring, Incinerating, and Venting*.

40) The duty holder must document and implement an emission and off-lease odour management plan to control odours (e.g., hydrogen sulphide [H_2S], hydrocarbons) when receiving, processing, treating, and disposing of waste materials.

Trucks are viewed as part of the facility operation when loading, unloading, and transporting waste material.

41) The duty holder must not accept DOW or hazardous waste or residual waste (e.g., due to flash point, TCLP BTEX) onto the receiving pad or solids pad for the purpose of reducing the properties so the material becomes non-DOW or non-hazardous through volatilization (e.g., application of heat, retention time, turning waste over, etc.).

42) If the oilfield waste management facility or oilfield waste management component is approved to handle sour fluids (i.e., contains H_2S), the duty holder must have mechanisms in place to prevent any off-lease fugitive odours.

7.2 Siting Criteria

Through appropriate site selection, the duty holder is expected to minimize risks to humans, animals, and the environment (including plant health, soils, surface water, and groundwater) during the entire life cycle of the facility.

43) At a minimum, the following siting requirements must be met at an oilfield waste management facility or oilfield waste management component:

a) The site must not be within 100 m of a domestic use water well or any water body as defined in *Directive 056: Energy Development Applications and Schedules*.

b) The site must avoid environmentally sensitive areas.

7.3 Site Assessment

44) The duty holder must conduct and document a regional assessment (see section 7.3.1) and a site-specific assessment (see section 7.3.2) for an oilfield waste management facility.

45) The site assessment must be planned, conducted, and certified by a qualified environmental professional as per the Alberta *Environmental Site Assessment Standard*.

46) The site assessment report must be submitted with an RoSC to OneStop at the time of application.

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

7.3.1 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-kilometre (km) radius of the facility site. For a storage facility managing **water for reuse** (i.e., at **engineered containment ponds**), the regional assessment extent is 5 km as per *Directive 055*.

47) The regional assessment must include the following:

a) a detailed topographic map that shows all local surface water bodies, soil types and distribution, and any nearby operations that may affect the quality or flow of groundwater, such as industrial facilities, waste transfer stations, and landfills

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

7.3.2 Site-Specific Assessment

The purpose of a site-specific assessment 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.

The site-specific soil and groundwater natural conditions should be used as baseline information to assist in the management of any contamination caused during the waste management facility operation.

48) The site-specific assessment must include the following:

a) surface and near-surface features, such as the natural slope of the site

b) identification of existing or potential sources of contamination and any man-made 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, and tanks

e) locations of buildings, loading facilities, and 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 the following:

i) the geological parent materials, thickness, 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 soil chemical characteristics, including test results, and comparison to Tier 1 guidelines for the following parameters:

- pH
- major ions (e.g., Ca, Mg, Na, Cl, K, SO_4)
- electrical conductivity (EC)
- sodium adsorption ratio (SAR)
- cation exchange capacity
- metals

- benzene, toluene, ethylbenzene, xylenes, and styrene (BTEXS)
- petroleum hydrocarbon fractions 1 to 4
- any additional site-specific contaminants of potential concern that have been present at the site and may have been released

k) background groundwater conditions, including test results and comparison to Tier 1 guidelines for the following parameters:

i) pH

ii) major ions (e.g., Ca, Mg, Na, K, Cl, SO4, nitrite [NO_2], nitrate [NO_3])

iii) EC

iv) dissolved metals

v) BTEXS

vi) petroleum hydrocarbon fractions 1 and 2

vii) any additional site-specific contaminants of potential concern that have been present at the site and may have been released

l) a description of the hydrogeology, including the following:

i) the type, thickness, and distribution of each stratigraphic unit

ii) the depth of the water table (i.e., shallowest water-bearing zone)

iii) an estimate of the moisture content and its variation in the unsaturated zone

iv) measured hydraulic conductivity of the first saturated stratum, 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 the site

7.4 Groundwater Monitoring and Reporting

49) Where an oilfield waste management facility has one or more of the following activities, the duty holder must have a site-specific groundwater monitoring program to provide an early indication of potential adverse effects on groundwater due to released substances:

a) waste processing facilities

b) storage facilities managing water for reuse

c) storage and transfer facilities 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 or for an oilfield waste management component if it is warranted by activity and the findings of the site-specific assessment.

50) The duty holder must select an alternative monitoring program if the site-specific assessment concludes that groundwater monitoring will not provide early detection to manage the contamination risk (e.g., due to deep groundwater levels or dry monitoring well conditions).

Examples of alternative monitoring programs include soil vapour surveys, soil sampling surveys, electromagnetic (EM) surveys, or ground-penetrating radar surveys.

51) The duty holder must use a qualified groundwater professional (i.e., qualified person) to design and implement the network of groundwater monitoring wells in accordance with best practices and industry standards.

52) Before construction of the facility, at least four permanent monitoring wells must be installed to implement a groundwater monitoring program.

53) 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.

54) One of these three wells must be placed hydraulically upgradient of the site to provide the background water chemistry conditions, and one must be placed hydraulically downgradient of the site.

55) A fourth well must be installed beside the downgradient well that is most likely to be affected, but at a deeper depth to measure the vertical hydraulic gradient.

56) Additional groundwater monitoring wells must be installed if

a) a perched water table exists or

b) groundwater contamination is detected, and further work is required to fully characterize and delineate the substance release-affected area.

57) During well installation, the duty holder must

a) ensure that no contaminants are introduced into the well,

b) minimize subsurface material disturbance,

c) ensure that 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.

58) Monitoring wells must be secured and protected from damage and vandalism.

59) The duty holder must abandon monitoring wells that are no longer used as part of the monitoring program, including those that are damaged or inappropriately placed, according to industry standards and best practices, and document their abandonment procedures.

60) If a monitoring well is damaged or requires replacement during the facility construction or during operation, the well must be repaired or replaced prior to the next monitoring event.

61) The duty holder must determine if additional work beyond the minimum outlined in this directive is required (e.g., due to complex geological and hydrogeological conditions) and be able to justify why the actions taken at a specific site are sufficient.

62) The duty holder must conduct a groundwater monitoring program (i.e., sample and analyze for the same parameters as for determining the background conditions) a minimum of twice per year for the first five years of operations to establish background conditions. Additional monitoring may be required depending on the site-specific conditions.

63) In the absence of any discoveries of released substances (i.e., on lease or off lease), groundwater monitoring may be reduced (e.g., frequency, parameters) after five years of monitoring has been completed. The duty holder must submit an amendment application as per section 11.4 and provide a supporting professional rationale.

64) The duty holder must prepare and submit an annual groundwater monitoring report, or alternative soil monitoring report, for the respective oilfield waste management facility with an RoSC to the AER through OneStop by March 31 of each year and retain documentation either in hard copy or electronic format for the life of the oilfield waste management facility approval or oilfield waste management component letter of approval.

65) The groundwater monitoring report must include the following:

a) a site map showing the locations of the facility's structures, all monitoring wells (noting those that are active, damaged, repaired, or replaced), and the horizontal direction of the shallow groundwater

b) monitoring results for the previous calendar year and the 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 four years before that from the alternative monitoring program (e.g., EM survey, soil monitoring), if applicable

d) a summary of any work undertaken to augment the monitoring system

e) an assessment of whether the monitoring results indicate there may be groundwater contamination

f) a discussion of the work to mitigate any identified groundwater contamination, including the status of the work (e.g., proposed, ongoing, completed)

g) a trend analysis (e.g., Mann-Kendall trend test, Theil-Sen trend line) of the monitoring data

7.5 Soil Monitoring

In certain situations, some oilfield waste management facilities and oilfield waste management components may require a soil monitoring program (included as an approval condition).

66) For oilfield waste management facilities storing water for reuse in an engineered containment pond, the duty holder must develop and implement a soil monitoring program and complete and submit a soil monitoring report with an RoSC to the AER through OneStop once every five years by March 31, or as specified in the approval.

67) The soil monitoring program must be developed and implemented as per the Alberta Government's *Soil Monitoring Directive*.

7.6 Reporting and Document Retention

Each waste management activity type has specific reporting requirements set out in either this directive or *Directive 047*. Refer to table 4 in *Manual XXX* for a summary of the applicable directives for oilfield waste management facility or oilfield waste management component reporting requirements. The following outlines annual reporting requirements for oilfield waste management facilities and oilfield waste management components.

68) For landfills, the annual report must be prepared by March 31 in accordance with the *Standards for Landfills in Alberta* and retained until the end of post closure.

69) For each of the following waste management activities, a report must be prepared annually as described in the corresponding subsection:

a) waste storage and transfer (excluding storage of water for reuse; section 7.6.1)

b) waste storage of water for reuse (section 7.6.2)

c) biodegradation (section 7.6.3)

d) fixed thermal treatment (section 7.6.4)

70) All monitoring data (e.g., **leachate**, wildlife data, alternative monitoring, etc.) and associated documents for all waste activities must be retained for a minimum of five years, but preferably for the lifetime of the site.

For the activities of oilfield waste processing facilities, surface facilities associated with a standalone class 1a or class 1b disposal well, oilfield waste caverns, or other oilfield waste management facilities required to report waste by an AER approval are required to report monthly to the AER through Petrinex following the requirements set out in *Directive 047*.

7.6.1 Waste Storage and Transfer (Excluding Water Storage for Reuse)

71) By March 31 of every year, the duty holder must summarize the following information for the previous calendar year:

a) types of oilfield waste managed 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 that identifies the total volumes of waste received, the total volumes of waste sent off site for further management, and the name and location of the receiving facility or location

c) a summary of the results of any monitoring programs (e.g., soil, groundwater, leachate, air, etc.)

72) The report does not need to be submitted to the AER, but it must be retained for at least two years and made available to the AER upon request.

7.6.2 Waste Storage of Water for Reuse

73) By March 31 of every year, the duty holder must summarize the following information for the previous calendar year:

a) types of oilfield waste managed 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 that identifies the total volumes of waste received, the total volumes of waste sent off site for further management, and the name and location of the receiving facility or location

c) a summary of the results of any monitoring programs (e.g., soil, groundwater, leachate, air, etc.)

d) manufacturer and construction QA/QC reports, including as-built drawings of the storage system

e) 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

f) an assessment of the performance of the storage system, including the effectiveness of its wildlife and bird controls

74) Submit the report by email to Directive058@aer.ca (with the subject line "Waste Storage of Water for Reuse") as per the approval, by March 31 of each year, for the first five years of operating life. After the fifth year, only submit the report if requested by the AER.

7.6.3 Biodegradation

75) By March 31 of every year, the duty holder must summarize the following information for the previous calendar year:

a) types of oilfield waste managed 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 that identifies the total volumes of waste received, the total volumes of waste sent off site for further management, and the name and location of the receiving facility or location

c) a summary of the results of any monitoring programs (e.g., soil, groundwater, leachate, air, leak detection, etc.)

d) the analyses of the parameters of the original waste and the final treated material, including presentation in data tables and comparison to the applied remediation guidelines

e) the types, rates, and frequency of any amendments added to enhance the biodegradation process

f) the volume of leachate collected and how it was disposed of

g) the name and location of the site or facility where the treated material was sent for final disposition or for further treatment

76) The report does not need to be submitted to the AER, but it must be retained for at least two years from the date the biodegraded material was removed from the biocell or biopile and made available to the AER upon request.

7.6.4 Fixed Thermal Treatment

77) By March 31 of every year, the duty holder must summarize the following information for the previous calendar year:

a) types of oilfield waste managed 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 that identifies the total volumes of waste received, the total volumes of waste sent off site for further management, and the name and location of the receiving facility or location

c) if waste is being thermally treated, the total volume of waste waiting to be treated

d) a summary of the results of any monitoring programs (e.g., soil, groundwater, leachate, air, etc.)

e) 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

f) a summary of the operational performance of the continuous thermal treatment process and emissions monitoring, including an explanation of any incidents lasting more than 60 minutes when operating parameters were not met or emissions limits were exceeded

g) copies of all analyses conducted for feed characterization

78) The report does not need to be submitted to the AER, but it must be retained for at least five years and made available to the AER upon request.

7.7 Liability Management and Security Deposits

The duty holder of an oilfield waste management facility must complete a site-specific liability assessment, as per *Directive 011: Estimated Liability*, before applying for a new oilfield waste management approval or amending an existing oilfield waste management approval. The duty holder should review *Directive 001: Requirements for Site-Specific Liability Assessments* and the *OGCR* to ensure that all the required information is submitted with the application.

The duty holders of oilfield waste management facilities, including oilfield landfills, must also meet the financial security requirements as set out in Part 1.1 of the *OGCR* and in *Directive 068: Security Deposits* before the AER will issue an approval or a security refund.

A holistic licensee assessment in accordance with *Directive 088: Licensee Life-Cycle Management* may be performed at any point during the life cycle of an oilfield waste management facility, which may include upon application or amendment.

7.8 End of Operations – Closure

As per the *Conservation and Reclamation Regulation*, oilfield waste management facilities are excluded from the definition of "specified lands," and therefore are not subject to the reclamation certification process under that legislation; however, the closure outcomes are equivalent. Oilfield waste management components are subject to the *Conservation and Reclamation Regulation* and the reclamation process of the sites they are on.

79) The duty holder must ensure that an oilfield waste management facility or an oilfield waste management component is reclaimed to conditions suitable to achieve **equivalent land capability** for the next intended land use.

Refer to schedule 3 for application requirements relating to closure activities for oilfield waste management facilities and oilfield waste management components. For withdrawal of any storage device from service (e.g., biopiles, biocells, tanks, etc.), refer to *Directive 055*.

80) The duty holder must complete a Phase 1 environmental site assessment and, if necessary (where areas of potential environmental concern are identified), complete a Phase 2 environmental site assessment to demonstrate that a waste management facility or oilfield waste management component is in a condition where a change of status to closed is appropriate. Where contamination is identified, the duty holder must complete remediation to meet the Tier 1 guidelines or *Alberta Tier 2 Soil and Groundwater Remediation Guidelines* for equivalent land capability based on the next intended land use.

81) The duty holder must work with qualified persons as per the *Alberta Environmental Site Assessment Standard* and the *Professional Responsibilities in Completion and Assurance of Reclamation and Remediation Work in Alberta – Joint Practice Standard* to complete the closure activities. If it becomes apparent that future remediation or reclamation work is necessary because 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.

8 Contamination Management

The management of released substances must be carried out in accordance with *OGCR*, the Government of Alberta's *Contaminated Sites Policy Framework*, *EPEA* (in particular, section 112), and the *Remediation Regulation* (including the adopted guidelines within). Also refer to section 2 of this directive for information on the reporting of substance releases and the *OGCR* section 8.050 for requirements pertaining to the control of spills. Further information on regulatory requirements and AER processes is available in *Manual 021: Contamination Management*.

8.1 Remediation Guidelines

The duty holder must remediate a substance release to soil and groundwater to meet the requirements of the Tier 1 guidelines as per section 2.3 of the *Remediation Regulation*.

As per the Alberta *Contaminated Sites Policy Framework,* the Tier 1 guidelines are not "pollute-up-to" levels; the action of polluting up to a limit is not accepted. If an environmental site assessment detects cumulative release of substances to the environment, mitigative measures must be taken, including, at a minimum, source control, even when a contaminant concentration is below an applicable Tier 1 or Tier 2 soil or groundwater quality standard.

Alternatively, as per section 2.4 of the *Remediation Regulation*, the duty holder may remediate an area in accordance with the Tier 2 guidelines if the AER is satisfied that a level of protection equivalent to the Tier 1 guidelines can be reached.

82) The duty holder must submit a Phase 2 environmental site assessment or complete remediation and submit a report with an RoSC via OneStop as soon as possible upon becoming aware of a substance release, in accordance with section 2.2(1) of the *Remediation Regulation*.

83) If remediation cannot be completed within two years of discovering a substance release, the duty holder must immediately submit a remedial action plan (RAP) as per section 2.2(2) of the *Remediation Regulation* with an RoSC via OneStop.

Further information on discovering and reporting a substance release is provided in section 2.

8.2 Movement and Temporary Storage 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 treat using one-time biodegradation 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** soil, **sludge**, and water from earthen pit/pond reclamation, spill reclamation, or tank reclamation. As per *Directive 055*, oilfield waste cannot be stored for longer than one year.

9 Oilfield Waste Management Applications

The following schedules include the information required for applications:

- Schedule 1: Applicant General Information System
- Schedule 2: New Oilfield Waste Management Facilities or Oilfield Waste Management Components
- Schedule 3: Amendments and Notifications for Oilfield Waste Management Facilities and Oilfield Waste Management Components
- Schedule 4: One-time and Pilot Project Applications

Schedule 1 is in the designated information system. Schedules 2, 3, and 4 are on the AER Forms webpage.

84) The duty holder must provide the information detailed in the applicable schedule when applying to construct and operate or amend or modify an oilfield waste management facility or an oilfield waste management component.

If the applicant cannot meet a technical requirement, cannot meet all participant involvement requirements, cannot resolve all outstanding concerns or objections, or proposes to implement new technology, the applicant must disclose the situation in the application and seek a waiver where applicable. If there are outstanding concerns or objections to an exempt activity (see section 9.2), the activity is no longer exempt, and an application disclosing the situation must be submitted.

Oilfield waste management facilities and oilfield waste management components may require other approvals and licensing under the AER. The *Directive 058* application may be submitted concurrently with other approval and license applications (e.g., scheme, *Water Act*, *Public Lands Act*).

85) If an approval under *Directive 058* is issued before a decision on other associated applications, construction and site preparation must not commence until all necessary approvals are obtained or otherwise specified in the oilfield waste management approval or oilfield waste management component letter of approval.

9.1 Participant Involvement

The participant involvement process is set out in section 3 of *Directive 056*.

86) For an oilfield waste management facility, the duty holder must meet the consultation and notification requirements set out in *Directive 056*, based on table 1.

A participant involvement program is typically not required for oilfield waste management components, as they are on a portion of an active AER-licensed or -approved upstream petroleum site.

Table 1. Notification and consultation for an oilfield waste management facility

Facility description	Personal consultation and confirmation of nonobjection	Notification
Facility not accepting H_2S material	• Landowner and occupants • Residents within 0.5 km	• Crown disposition holders • Local authority • Landowners, occupants, and urban authorities within 1.5 km
Facility accepting H_2S material	• Landowner and occupants • Residents within 0.5 km	• Crown disposition holders • Local authority • Landowners, occupants, and urban authorities within 2.0 km

9.2 Exempt Activities

Applications are not required for the following activities under *Directive 058*, provided that additional oilfield waste management activities are not added:

- replacing measurement and separation equipment
- replacing a storage tank of the same capacity within an existing tank farm, provided the volumetric capacity of the secondary containment meets section 4.2 of *Directive 055*
- routine replacement of existing equipment (e.g., pumps, heaters, treaters)
- replacement or additional groundwater monitoring wells

87) Even though no application is required under this directive for the exempt activities, a duty holder must meet all applicable regulatory requirements, including the participant involvement requirements in section 9.1.

88) For modification of storage devices as per section 11.1 (excluding aboveground synthetically lined walled storage systems [AWSSs]) at an oilfield waste management facility, duty holders must provide a project-specific information package to landowners, occupants, and residents who may be directly and adversely affected by the activity; however, personal consultation and confirmation of nonobjection is not required.

89) To proceed with a proposal where a concern or objection has been received and remains unresolved, the duty holder must apply under this directive.

9.3 Process Flow Diagrams

The process flow diagram (PFD) identifies all existing and proposed equipment and measurement points at a facility.

90) The duty holder must clearly identify the following on the PFD:

- a) process equipment
- b) measurement points
- c) storage systems
- d) sources of all inlets, receipts, and deliveries, including all fuel lines, flare lines, and vent points
- e) for approval amendments, the applicant must identify the new equipment proposed for installation on a full-site PFD (a partial PFD is not acceptable):
  - i) identify new equipment in the legend and annotate in the diagram
  - ii) identify equipment designated for removal by the application

Diagrams are acceptable provided they accurately represent the actual operations of the facility and include the correct location and the duty holder's name.

9.4 Plot Plans and Equipment and Off-Lease Spacing Requirements

91) The duty holder must clearly identify the following on the plot plan:

- a) on-lease location of all equipment (except for valves), including tanks, disposal and source wells, groundwater monitoring wells, and surface water run-off control systems
- b) lease boundaries
- c) all surface improvements (as defined in *Directive 056*), water bodies, and vegetation for a minimum of 100 m past the edge of the lease

For spacing requirements, see section 5.6.10 of *Directive 056*.

9.5 Noise Requirements

92) A noise impact assessment meeting the requirements of *Directive 038: Noise Control* and section 5.6.12 of *Directive 056* must be completed before submitting an oilfield waste management facility application for any new permanent facility or for modifications to existing permanent facilities if there is a reasonable expectation of a continuous or intermittent noise source.

9.6 Alberta Culture

93) The duty holder must obtain *Historical Resources Act* clearance from the Government of Alberta for proposed new or amended waste facilities that include a lease expansion on Freehold lands if the site is identified in the Government of Alberta's list of historic resources.

9.7 Activities Within the Boundary of a Regional Plan

The AER is legally obligated to act in compliance with any approved regional plans under the *Alberta Land Stewardship Act*. To ensure compliance, the AER requires any applicant seeking approval for an activity that would be within the boundary of an approved regional plan to meet the requirements outlined in section 8.5 of *Directive 056*.

10 Oilfield Waste Management Activity Types

An oilfield waste management facility or oilfield waste management component may consist of one or more of the following activity types:

- waste processing
- waste storage and transfer
- waste storage of water for reuse (oilfield waste management facility only)
- surface facilities associated with disposal wells (class Ia and Ib)
- biodegradation
- landfills (oilfield waste management facility only)
- thermal treatment
- drilling fluid reuse and recycling (oilfield waste management facility only)
- other oilfield waste management activity

This section also includes notification requirements for thermal treatment and biodegradation.

10.1 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 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 treated/processed oilfield waste to a manufacturer to use as an ingredient to manufacture a commercial product; or
- distributing or marketing treated oilfield waste as a by-product.

AER-approved waste processing facilities may also have an integrated clean oil terminalling facility, or an integrated custom treating facility designated for processing oil/water emulsions extracted from the solids during waste processing.

10.2 Waste Storage and Transfer

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

94) If the site is receiving waste generated from other sites, the duty holder must apply for an oilfield waste management facility or an oilfield waste management component.

95) 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.

10.2.1 Exception: Consolidation of Small Volumes of Oilfield Waste

The duty holder does not need to apply to store or consolidate "small volumes" of oilfield waste (e.g., filters, rags, and contaminated soils) from within or outside the same production system if the following conditions are met:

- If the waste is solid, the storage system is a bin.
- If the waste contains free liquid or is leachable, the storage system is a bin and bag.
- The total aggregate volume of the storage system does not exceed 10 m^3.
- The storage system is on an AER-licensed or -approved site.
- The waste is tracked and disposed of or treated in accordance with this directive.

96) Bin lids and the lids of the bin and bag system must not be left open.

97) The bin or bin and bag system must be impervious to the stored materials and have no openings that may provide a direct connection to the ground underneath.

98) If the conditions above cannot be met, then the duty holder must apply for AER approval.

10.2.2 Water Storage for Reuse

99) If a duty holder wants to store water, such as produced water, water-based flowback, 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. Applying for an oilfield waste management component is not an option.

100) 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.

101) Water being stored for reuse must be managed as waste until it has been used.

102) 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 subsoil must be recovered and stockpiled separately.

b) The stockpiles must be protected against erosion.

c) The recovered topsoil and 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.

Also see *Directive 055* for requirements relating to storing water for reuse for hydraulic fracturing.

10.3 Surface Facility Associated with Disposal Wells (Class 1a or 1b)

The deep well disposal of oilfield waste fluids into a class Ia or Ib well (well class defined in *Directive 051: Injection and Disposal Wells – Well Classifications, Completions, Logging, and Testing Requirements*) requires an approval for both the disposal well (refer to *Directive 051*, *Directive 056*, and *Directive 065: Resources Applications for Oil and Gas Reservoirs*) and, unless otherwise noted, the surface facility that is associated with the disposal well. Surface facilities include any storage system with an aggregate volume greater than 1 m^3 and the associated piping, processing equipment, and pumps.

103) 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 any of the following apply:

- 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 fluid is acceptable for class II deepwell disposal as per *Directive 051* and is received at a class II disposal well.
- The facility is under the jurisdiction of AEPA.

104) If recovering hydrocarbons, the duty holder must segregate oilfield waste from non-oilfield waste upon receipt at surface facilities associated with a class Ia well prior to disposal.

For skim oil recovered from surface facilities associated with a water injection or disposal facility, refer to section 15.2.4 of *Directive 017: Measurement Requirements for Oil and Gas Operations*.

10.4 Biodegradation

This section establishes the minimum requirements for the biodegradation of oilfield waste, including design, operation, and techniques.

Biodegradation using biopiles and biocells is a technique commonly used to aerobically biodegrade hydrocarbon-contaminated soils and sludges. They can be used either for one-time treatment by an oilfield waste generator at a licensed site or on a permanent basis where waste may be received from third parties or from outside the same production system. Biocells and biopiles that are used more than once or for more than five years are permanent structures and are biodegradation facilities. If the requirements for one-time biodegradation under section 10.4.4.2 cannot be met, refer to section 12.

For biodegradation on public lands, the following apply:

- A regulator temporary field authorization (RTF) disposition issued under the *Public Lands Act* is required if on-site biodegradation exceeds one year.
- An RTF is required if biodegradation is to occur on another site within the same production system.
- If biodegradation is to take five years or longer, a formal land disposition (i.e., MLL) is required.

Contact AERAuth.OilGas@aer.ca to discuss public land disposition requirements.

The duty holder should only attempt to treat oilfield waste that is amenable to remediation (the reduction, removal, or destruction of contaminants via the application of physical, chemical, or biological processes).

Treatment trials are often conducted to assess the feasibility and efficacy of remediation technologies for successful deployment at contaminated sites in Alberta. See section 12 for more information on pilot projects.

Duty holders are responsible for ensuring that no further inadvertent adverse effects occur while assessing and addressing the contamination.

As per Tier 1 guidelines, using dilution to reduce contaminant concentrations is not an acceptable form of management unless authorized by the appropriate regulatory authority under an operating approval, code of practice, or directive.

105) Biodegradation must be in an area that is not subject to seasonal flooding and that is at least 100 m from a water body or a domestic use well, and the treatment area's base must be at least 1 m above the seasonal high groundwater table.

As per *Directive 055*, care must be taken to protect the integrity of liners, especially when treating soil or moving material in and out of the treatment area.

10.4.1 Design Requirements

10.4.1.1 Permanent Biodegradation Facility

106) The duty holder must design a biocell or biopile containment system with one of the following:

   a) a primary containment device and a secondary containment system consisting of an **impervious liner**, a **leachate collection system**, and a leak detection system

   b) a primary containment device, a leachate collection system, and a groundwater monitoring system (see section 7.4 for further details on design and placement of groundwater monitoring networks to detect substance releases)

107) The containment system must be sloped away from the entrance point and allow for leachate collection.

108) For biocells, the primary containment device must consist of an impervious liner with continuous curbs at least 15 cm in height on at least three sides or a tank or a vault of steel or plastic (including fibreglass-reinforced plastic).

109) For biopiles, the primary containment device must consist of an impervious liner with continuous curbs at least 15 cm in height on at least three sides.

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

110) Permanent biocells and biopiles must include a leachate collection system as per section 10.4.3.2.

See oilfield waste management facility siting requirements in section 7.2, which also apply to permanent biodegradation facilities.

10.4.1.2 One-time Biocell and Biopile

One-time use biocells and biopiles have a maximum lifespan of five years.

111) The duty holder must treat the waste

a) on the site it was generated, or

b) on another active 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 excavate the off-site contaminated soil and biodegrade it on the site from which the spill originated.

112) One-time biocells and biopiles must include a containment device and a leachate collection system as per section 10.4.3.2.

113) The containment device must

a) have a minimum 15 cm high curbed impervious liner (primary containment device);

b) be constructed of steel, plastic, or fibreglass-reinforced plastic; or

c) be a specifically prepared surface (see requirement 114).

114) If a specifically prepared surface is chosen as the primary containment device, the duty holder must ensure the following:

a) The contaminants in the waste must be relatively non-leachable (i.e., the waste does not exceed an EC of 4 decisiemens per metre, a SAR of 6, and a hydrocarbon concentration of 2% by mass, and metal concentrations do not exceed Tier 1 guidelines).

b) The soils beneath the treatment area must have an in situ hydraulic conductivity of 10^{-6} cm/s or less.

c) The A and B soil horizons must be removed.

d) The C soil horizon must be prepared to meet *Directive 055* primary containment requirement (i.e., compacted clay or natural liner).

10.4.2 Characterization and Management of Soil for Biodegradation

The following outlines requirements for both permanent and one-time biocells and biopiles.

115) Before the start and at the end of the biodegradation process, the duty holder must accurately characterize the waste material by the collection and analysis of representative samples for the parameters listed below:

a) pH

b) EC

c) SAR

d) major ions (i.e., Ca, Mg, Na, and Cl)

e) nutrients (i.e., NO_3, SO_4, K, PO_4)

f) total metals (as per Tier 1 guidelines)

g) hydrocarbons (i.e., BTEXS and petroleum hydrocarbons fractions 1 to 4)

h) any other site-specific potential contaminants of concern, including amendments

116) The results from analysis of the initial characterization samples must be used to predict the time required to treat the waste to levels that meet the applied Tier 1 guidelines for the intended receiving site.

The duty holder does not need to analyze parameters after treatment if they did not exceed applicable Tier 1 and Tier 2 guidelines before biodegradation.

117) The duty holder must ensure that treated soils intended for reuse are returned to their construction or reclamation projects in the same production system or area at the end of treatment.

118) The results from analysis of the final characterization samples must be used to confirm if the waste material has been successfully remediated to meet those standards.

119) The duty holder must use analytical results from an accredited laboratory to confirm the treated material's chemical and physical suitability for its intended use.

120) Background soil conditions must be assessed to determine whether the receiving site is appropriate to receive the treated soil (i.e., treated soils are chemically and physically similar to the receiving site background conditions).

121) The treated soil must not exceed the applied Tier 1 or Tier 2 guidelines at the receiving site.

122) The biodegradation process must be completed within five years (from commencement of treatment).

123) 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.

10.4.3 Operations: Monitoring and Management

The following operational requirements apply to both permanent biodegradation facilities and one-time biopiles and biocells.

10.4.3.1 Air Emissions

The purpose of this section is to ensure that emissions from contaminants of potential concern (CoPCs) are efficiently monitored, and volatilization and odour generation will be mitigated during biodegradation.

124) The duty holder must not use volatilization as the primary means to reduce contaminant levels.

125) CoPCs must not exceed the applicable occupational exposure limits for chemical substances on site or *Alberta Ambient Air Quality Objectives and Guidelines* at the site boundary.

126) An ambient air monitoring program must be completed during excavation of soil containing volatile contamination and during each soil processing event (e.g., soil turning).

127) The ambient air monitoring program must be established under the direction of a qualified person and include locations that represent both upwind and downwind of the soil treatment facility or area of biodegradation.

128) Air samples must be collected from multiple locations around the perimeter of the property and analyzed for CoPCs associated with the soil undergoing treatment.

129) Because there is a lag between the collection of samples and receipt of laboratory analysis results, it is expected that emissions are also monitored on site using appropriate field screening equipment (e.g., a photoionization detector to correlate with air samples analyzed in a laboratory).

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

When monitoring results indicate an air quality issue or when the duty holder or environmental professionals' knowledge of a site (e.g., contamination, soil type and condition, weather conditions, etc.) shows that potential for volatilization or odour issues is high, the duty holder should take mitigative measures like the following:

- Cover the faces of excavations and soil piles to mitigate odour.
- Control the pace of the excavation and soil processing where exposure of fresh material increases volatilization rates.
- Use vacuum hoods and filters to capture emissions of volatile compounds.
- Consider the weather conditions and wind direction when handling contaminated soils.

The duty holder may be directed to take additional actions to manage emissions if the AER determines that they are needed to mitigate potential risks to the environment or safety.

10.4.3.2 Leachate and Leak Detection

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

132) The leachate collection system must collect all leachate generated from the treatment activities and all precipitation that enters the biocell or biopile containment area.

133) Any collected leachate must be managed as oilfield waste by doing one of the following:

   a) Irrigate within the containment device, provided that the fluid does not hinder the biodegradation process or create a soil quality problem.

   b) Inject into an approved disposal well as per *Directive 051*.

   c) Transfer to an authorized waste management facility.

   d) Dispose of or treat in an alternative method approved by the AER.

10.4.4 Authorizations and Notifications

10.4.4.1 Permanent Biodegradation Facility Application Requirements

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

10.4.4.2 One-time Biopile or Biocell Notification Requirements

135) Duty holders that choose to manage contamination through biodegradation activities must submit a work plan either as part of a RAP, with an RoSC through OneStop, or (if not part of a RAP) to Directive058@aer.ca (with the subject line "Notification – Biodegradation Work Plan").

As per section 2.2(2) of the *Remediation Regulation*, if the site cannot be remediated within two years, a RAP must be immediately submitted. If contaminated soil can be treated using biodegradation within two years, the submission of a RAP is not necessary. For additional details, see section 8 of *Manual 021*.

As part of a RAP, duty holders are expected to describe the contamination management activities that are planned or underway to address the risk of adverse effects to human health and the environment. The work plan information is to be included with the RAP.

136) For all one-time biocells or biopiles, duty holders must notify the AER at least ten business days before constructing the biopile or biocell. Send an email notification to Directive058@aer.ca (with the subject line "Notification – One-time Biodegradation") and include the following:

   a) company name

b) legal land description and licence numbers of the source site and treatment site

c) volumes of waste to be treated

d) the biodegradation start date

e) confirmation that the biopile/biocell meets all requirements (i.e., spacing, design, monitoring, etc.) regarding one-time biodegradation

f) OneStop submission ID number of RAP or RoSC (if applicable)

137) The duty holder must submit a work plan for one-time biocells or biopiles not part of a RAP and where the volume of oilfield waste treated at one time is greater than or equal to 100 m^3.

138) The work plan must be included as part of the email notification in requirement 135 and must include the following:

a) a description of contaminants from the oilfield waste source that will undergo treatment, with supporting laboratory analysis

b) information on remedial processes that will be used on the known and anticipated contaminants, including any amendments that may be added, and the typical or anticipated degradation period for each batch (i.e., quantity being actively treated in a single biocell or biopile) of oilfield waste

c) a description of how any air emissions, including odours, will be monitored and managed (as per section 10.4.3.1)

d) the intended use of the treated material, including applicable Tier 1 and Tier 2 guidelines that will be used to demonstrate the waste material has been successfully remediated to meet those standards

For example: “The concentration of petroleum hydrocarbon fraction 2 in soil will be reduced by bioremediation to meet the Tier 1 guidelines for fine-grained surface soil in a natural land use setting. This will be facilitated by the addition of nitrogen fertilizer and, with four turning / processing events is anticipated to take three years to complete. The treated soil will be used to backfill the original excavation.”

139) Where a work plan is modified after having been submitted, the duty holder must update a RAP/RoSC in OneStop and notify Directive058@aer.ca (with the subject line “Notification Update – Biodegradation Work Plan”) with a description of progress and rationale.

10.4.5 Record Keeping and Reporting

For permanent biodegradation facilities, see section 7.6 for reporting and documentation retention requirements.

140) For one-time biopile and biocells, the duty holder must prepare a remediation report as per the *Alberta Environmental Site Assessment Standard* and submit it along with an RoSC to the AER via OneStop as soon as possible upon completion of the treatment. The remediation report must contain the following information:

a) the volume of waste and location of the originating site

b) the location (LSD) where the biocell or biopile was used

c) the analyses of the parameters of the original waste and the final treated material, including presentation in data tables and comparison to the applied remediation guidelines

d) the biocell or biopile construction details

e) the types, rates, and frequency of any amendments added to enhance the biodegradation process

f) start date of treatment

g) ambient air monitoring results

h) the volume of leachate collected and how it was disposed of

i) the name and location of the site or facility where the treated material was sent for final disposition or for further treatment (if the material was used as fill, the disposition site location should be described using latitude-longitude coordinates and clearly shown on site figures)

j) confirmation that the biocell or biopile has been **decommissioned** and closed, including analysis of soil samples from and below the treatment pad for contaminants of concern identified in the waste material and any amendments used during the treatment process (refer to *Directive 055* for more information on contamination assessments)

For further information on waste management reporting, see section 8 (Contamination Management) and section 6 (Waste Tracking and Reporting).

10.4.6 Decommissioning and Closure

For permanent biodegradation facilities, see section 11.6 for decommissioning and closure requirements.

141) For one-time biopiles and biocells, the duty holder must close the treatment area by removing the material, removing any structures such as the containment device and leachate collection system, remediating any residual contamination, and restoring the treatment area to

equivalent land capability such that the area of land used for biodegradation meets the criteria for reclamation certificate eligibility.

10.4.7 Land Treatment

The AER will not accept, review, or approve any applications for land treatment, including new dedicated land treatment facilities, one-time land treatment facilities, or the expansion of existing approved land treatment facilities. However, previously approved dedicated land treatment facilities will be allowed to continue to operate, provided they are operated in accordance with their AER approval. Only hydrocarbon-contaminated soils that are suitable for biodegradation may be sent to AEPA-regulated land treatment facilities.

10.5 Oilfield Waste Landfills

There are three landfill types in Alberta based on the minimum engineered design and waste accepted:

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

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

142) The duty holder must meet the following sections of the *Standards for Landfills*:

a) Section 2: Landfill Development and Siting

b) Section 3: Design and Construction

c) Section 4: Landfill Operation

d) Section 5: Monitoring, Analysis, and Corrective Actions

e) Section 6: Final Landfill Closure and Post Closure

f) Section 7: Record Keeping and Reporting, subsections 7.1(c), 7.3, 7.5, 7.6, 7.7, and 7.8

Despite the above, the AER does not require the duty holder to have a landfill operator certification, but 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.

For landfills that have a leachate pond, the duty holder also has the obligation to meet the Government of Alberta's *Action Leakage Rate Guideline*.

143) The duty holder must not landfill DOW unless the landfill is class I and the waste meets the criteria listed in section 13(2) of the *WCR*.

As per section 4.8 of the *Standards for Landfills*, "Liquid Waste Restriction," no oilfield waste that is liquid shall be disposed of in any landfill cell. Liquid oilfield waste is waste that does not pass the paint filter test (i.e., US EPA *Method 9095b, Paint Filter Liquids Test*) before any amendments are added.

144) The duty holder must apply for an oilfield waste management facility if they are landfilling their own oilfield waste.

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

146) 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

10.6 Thermal Treatment

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

147) The duty holder must locate **fixed thermal treatment units**, **small incinerators**, and **campsite incinerators** on an active site regulated by the AER.

10.6.1 Fixed Thermal Treatment Unit

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

149) 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.

The duty holder may be required to complete testing to verify compliance with the operating approval for the thermal treatment process.

150) 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 principal contaminants in the waste feed change.

151) 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.

152) When selecting and operating the fixed thermal unit, the duty holder must give special consideration to air quality issues and dispersion characteristics in the local area.

153) The duty holder must not thermally treat waste that contains polychlorinated biphenyls (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.

154) The duty holder must not stockpile more waste than the treatment facility/component can process in six months.

155) 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.

156) Written operating practices for receiving, unloading, and segregating waste and for responding to automated alarms must be maintained on site.

As per section 3, waste must be characterized and classified before mixing. Conditioning the waste feed (e.g., thorough mixing with processed or uncontaminated materials) is allowed only for operational purposes.

The AER expects liquid residuals to be collected and reused in the thermal treatment process as much as possible. Collected liquids that are not reused may be recycled as appropriate.

157) 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 in the daily operations log the inspection results and any operational changes completed to correct deficiencies.

158) The duty holder must continuously monitor the parameters that indicate the successful destruction or removal of contaminants and successful pollution control.

10.6.2 Small Incinerator

159) For small incinerators, the duty holder must do one of the following:

a) If the waste being managed includes waste generated off site, apply for an oilfield waste management component.

b) If the waste being managed is only generated on site, notify the AER at Directive058@aer.ca (with the subject line "Notification – On-Site Small Incinerator").

160) If notification is required, it must be provided at least 30 days before the start of operations and include the following:

a) the legal land description and the licence or approval number of the site of the small incinerator

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 the following:

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

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

a) The **incineration** site must be at least 1.5 km away from any residences or public facilities 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.

162) 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 (US EPA, Method 1311). 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.

163) 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 stringent ones must be followed.

10.6.3 Campsite Incinerator

The AER expects campsite incinerators to be used only if access to an approved disposal site is not available.

If a campsite incinerator is used, the duty holder does not need to get approval from the AER or notify the AER, provided that the campsite incinerator is

- capable of burning the waste to an inert ash;
- incorporates a stack of suitable height and an effective spark arrestor;
- maintained in good operating condition such that warped components, leaks, or other damage are repaired as soon as is practicable;
- provided with underfire air; and
- provided with overfire air for all incinerator types except controlled air units.

10.6.4 Mobile Thermal Treatment of Oilfield Waste

Mobile thermal treatment units are regulated by AEPA. Duty holders that have received approval from, or have been registered with, AEPA 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.

164) If the mobile thermal unit is expected to operate for more than six months, the duty holder must review the possible environmental impacts of the unit with the AER before operations exceed six months.

165) The duty holder must thermally treat only oilfield waste originating from the same site as the mobile thermal unit or from sites within the same production system.

Since the terms DOW and hazardous waste are synonymous, a mobile unit approved to handle hazardous waste may also be used for DOW.

166) The duty holder must notify the AER at Directive058@aer.ca (with the subject line "Mobile Thermal Treatment") and all landowners and residents within 1.5 km of the mobile thermal unit at least 30 days before mobilizing the unit. If the AEPA licence, approval, or registration has more stringent public notification requirements, the duty holder must follow those requirements.

167) The notification must include the following:

a) the AEPA licence, approval, or registration number and the operator of the mobile thermal unit

b) the AER licence or approval number and legal land location of the site where the mobile thermal unit will operate

c) the volumes, types, and sources of the oilfield waste to be treated

d) the final disposition of the treated material

e) the duration of the mobile thermal treatment activity

168) The duty holder must notify the local AER operational area at least 48 hours before running the mobile treatment unit.

10.7 Drilling Waste Reuse and Recycling

169) If receiving drilling waste from other duty holders at a standalone site or at a segregated area on a site for reuse or recycling, the duty holder must apply for an oilfield waste management facility (referred to as a drilling fluid facility in the drilling fluid facility approval).

10.8 Other Oilfield Waste Management Activity

170) Duty holders must apply for an oilfield waste management activity that is not included in this directive.

Contact Directive058@aer.ca to discuss the project details and application requirements.

11 General Notification and Amendment Application Requirements

Only facilities that have an existing AER oilfield waste management facility approval or oilfield waste management component letter of approval may apply to modify their facility through a notification or amendment application through the applicable designated information submission system. See schedule 3 for specifics on what to submit.

If the type of modification is not listed in the directive, contact Directive058@aer.ca with a description of the modification to discuss the application type (notification or amendment) and the application requirements.

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

172) 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.

11.1 Modify a Storage Device

173) The duty holder must submit a notification to the AER when doing any of the following:

   a) adding 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 a new or expanding an existing tank farm, AWSS secondary containment area, or bulk pad

   d) redesignating the storage devices (i.e., changing the identifiers)

174) Before removing storage tanks and AWSSs, the duty holder must email Directive058@aer.ca (with the subject line "Notification – Tank Removal") identifying the tanks (i.e., notation and capacity) for removal and provide an updated plot plan.

11.2 Add a New Cavern or Disposal Well

175) If the existing approval does not include waste processing associated with a cavern or deepwell disposal (section 10.1), the duty holder must apply to amend the approval as per sections 9 and 10.3.

176) If the duty holder's approved activity types include a cavern or disposal well, and it is decided to add another cavern or disposal well for the same activity, the duty holder must notify the AER.

11.3 Add or Remove Waste

Whether the duty holder must apply to amend the approval or submit a notification depends on the waste being added or removed.

177) 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**

   b) to add **materials requiring special handling**, including naturally occurring radioactive materials and PCBs

   c) to add waste containing H_2S, which will change a sweet facility to a sour facility

178) For any of the following, the duty holder must submit a notification to the AER:

   a) to add additional non-oilfield waste streams or imported oilfield waste streams (the notification must provide the same information as that required in applying for an amendment)

   b) to add additional oilfield waste or remove an oilfield waste listed on the oilfield waste management approval or oilfield waste component letter of approval

11.4 Change a Soil or Groundwater Monitoring Program

179) The duty holder must apply to amend the approval when making a change to an existing soil or groundwater monitoring program.

180) To reduce groundwater monitoring (e.g., frequency, reduction in parameters) following the establishment of background conditions, duty holders must submit an amendment application.

11.5 Add a New Waste Management Activity

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

11.6 Change the Status of an Oilfield Waste Management Facility or Oilfield Waste Management Component

Operational statuses include operating, **suspended**, **abandoned**, decommissioned, and closed.

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

183) 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.

184) All work associated with changes in operational status must be documented.

11.7 Transfer of an Oilfield Waste Management Facility

Agreements for the purchase and sale of AER-approved oilfield waste management facilities do not result in a transfer of the associated approval until a transfer application is submitted to and approved by the AER.

185) The duty holder must submit a transfer application in accordance with *Directive 088* for the transfer of an oilfield waste management facility.

11.8 Add, Expand, or Close a Landfill Cell or Closing a Landfill

186) 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.

11.9 Add or Expand an Engineered Containment Pond

187) The duty holder must apply to amend the approval to add or expand an engineered containment pond.

11.10 Expand Lease Boundaries

188) The duty holder must apply to amend the approval to expand the lease boundaries.

11.11 Disposal of Residual Waste by an Alternative Method Not Authorized by the Approval

189) The duty holder must apply to amend the approval to dispose of residual waste by a method not authorized in the existing approval.

12 Pilot Projects and One-Time Waste Management Applications

As per section 8.152 of the *OGCR*, section 64 of the *GRDR*, and section 71 of the *BMR*, the duty holder, through the designated information submission system, must apply for approval to use alternative storage, treatment, or disposal to that prescribed in this directive. See schedule 4 for specifics on what to submit. Examples of alternatives include the following:

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

190) If an approval is granted for a pilot project, the duty holder must submit a summary report to the AER by email to Directive058@aer.ca (with the subject line “Pilot Project Summary”),

including the application number in the subject line, within 30 days of completion and include the following:

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 the necessary remedial work to mitigate impacts caused by the activity was completed

If the pilot project proves successful and the duty holder would like to implement it permanently, an application must be submitted to the AER for permanent implementation (see schedule 2 or 3).

13 Other Waste Management and Disposal Options

13.1 Send to an AEPA-Regulated Landfill

The duty holder may send only construction and demolition debris, garbage, domestic waste, 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 AEPA-regulated class II landfill if the waste does not exceed the limits set out in table 2. Class II landfills approved prior to 1996 often lack an engineered liner and a leachate collection and removal system.

If the facility is a municipal class II landfill, either (a) the oilfield waste must be of a quality or treated to a quality that allows it to be used (e.g., contaminated soils for cover material; see table 2), or (b) the facility must have dedicated trenches or cells for oilfield waste. The limits in table 2 address oilfield waste, such as produced sand, drilling mud and cuttings, oily sludge, tank and treater bottoms, and flare pit material, which are often unsuitable for landfilling due to their nonvolatile or semi-volatile hydrocarbon content or salt content.

Table 2. Total petroleum hydrocarbon (TPH) and chloride limits at class II landfills

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

Landfill design	Oilfield waste quality
Natural clay liner *but no* leachate collection and removal system	TPH <20 000 mg/kg Chloride <3 000 mg/kg

*TPH = mineral oil and grease (via the American Public Health Association 5520 test method)

13.2 Control and Dispose of Returned Radioactive Fracturing Sand

Sand and fluids returned to the surface after fracturing a well are considered oilfield waste.

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

191) The duty holder must notify the AER through email at Directive058@aer.ca (with the subject line "Radioactive Fracturing Sand") when radioactive fracturing sand is being managed on a well site. The email must contain the following:

   a) well license number

   b) surface location

   c) a copy of the CNSC authorization

13.3 Managing Naturally Occurring Radioactive Materials

Naturally occurring radioactive materials (NORMs) are regulated by provincial and territorial governments, each with its own specific regulations for 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 Canada and ensure appropriate control over NORMs.

192) 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.

193) The waste receiver must apply to the AER for approval to receive oilfield waste containing NORMs for management.

194) To ensure worker safety, the duty holder must have in place a management plan for assessing, controlling, and handling NORMs in accordance with provincial occupational health and safety legislation.

Appendix 1 Definitions

abandoned	An approval status for an oilfield waste management facility or oilfield waste management component that has undergone abandonment as defined in the *OGCA*.
active site	Site that has not been designated as "recexempt," "cancelled," "abandoned," or "recertified."
adverse effect	As defined in section 1 of *EPEA*.
background condition	As defined in *Alberta Tier 1 Soil and Groundwater Remediation Guidelines* for background concentration.
biodegradation facilities	An oilfield waste management facility or an oilfield waste management component consisting of a biocell or biopile that is used more than one time or for more than five years.
campsite incinerator	Thermal treatment equipment that has a burning capacity of less than 90.7 kilograms per hour and is used to dispose of a campsite's kitchen waste.
closed	An approval status for an oilfield waste management facility where reclamation is complete. An approval status for an oilfield waste management component where applicable closure requirements have been met. Reclamation may or may not be required to be complete at the time of closure depending on the status of the well or facility site.
composition	The portion of oil, water, and solid in a given waste as determined by analysis.
contaminated	For the purposes of this directive, "contaminated" refers to the presence of a substance that may cause, is causing, or has caused an adverse effect. For further information, refer to *Manual 021*.
decommissioned	An approval status for an oilfield waste management facility or oilfield waste management component reflecting that suspension, abandonment, and decontamination of the surface and subsurface has been completed.

engineered containment pond	An in-ground storage system engineered to securely contain fluids, as per *Directive 055*.
equivalent land capability	As defined in section 1 of the *Conservation and Reclamation Regulation*.
facility	As defined in section 1 of the *OGCA*.
fixed thermal treatment unit	Thermal treatment equipment that has been approved for use at one location only and that cannot be moved without dismantling.
halogenated	The product of incorporating a halogen (i.e., fluorine, chlorine, bromine, or iodine) into a chemical compound.
impervious liner	Refer to section 4.1 of *Directive 055*.
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.
leachate	As defined in *Directive 055*.
leachate collection system	As defined in *Directive 055*.
leak detection system	As defined in *Directive 055*.
materials requiring special handling	Material that may pose an extra risk to the environment, public, or worker safety, such as NORMs and PCBs.
mobile thermal treatment unit	Thermal treatment equipment with an AEPA approval that does not restrict the equipment to one location and that can be moved to different locations.
non-oilfield waste	Waste that has similar characteristics to oilfield waste but was generated by industries in Alberta other than upstream petroleum geothermal or brine-hosted mineral resource development.

oilfield waste	As defined in section 1.020(12.1) of the *OGCR*, section 1(1) of the *GRDR*, and section 1(1) of the *BMR*.
oilfield waste generator	The duty 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 management component	Located on a licensed site subject to remediation and reclamation certification and accepts first-party oilfield waste for management (i.e., waste generator and receiver have the same BA code) from within the same production system. Excludes wells or facilities licensed under *GRDR* and *BMR*.
oilfield waste management facility	As defined in the *OGCR*.
oilfield waste receiver	A duty holder, as defined by the records of the AER, that accepts or receives oilfield waste for storage and transfer, consolidation, treatment, disposal, or waste minimization.
qualified person	A licensee-appointed technical person who has the necessary training, expertise, and technical knowledge of the subject matter to ensure licensee adherence to the requirements of this directive. The qualified person is expected to be a member in good standing of an association regulated by a professions or societies act of Alberta or be certified in Canada, including for contamination management and reclamation work, appropriately trained and experienced members of the following: • Alberta Institute of Agrologists (AIA) • Alberta Society of Professional Biologists (ASPB) • Association of the Chemical Profession of Alberta (ACPA) • Association of Professional Engineers and Geoscientists of Alberta (APEGA) • Association of Science and Engineering Technology Professionals in Alberta (ASET) • Association of Alberta Forest Management Professionals (AAFMP)
residuals	The material left after a treatment process, which can include ash, solids, water, and recovered contaminants.

same production system	An interconnected system of infrastructure that shares the same duty holder (i.e., first party) for the following: • upstream petroleum production (e.g., wells, facilities, pipelines, batteries) • geothermal development (e.g., wells, facilities, pipelines, heat distribution systems) • brine-hosted mineral development (e.g., wells, facilities, pipelines)
sludge	Semisolid material typically consisting of hydrocarbon, water, and inorganic sediments (e.g., sands, silts) where the basic sediment and water exceeds 0.5%.
small incinerator	Thermal treatment equipment burning no more than 10 tonnes of waste per month (referred to as a "small batch feed incinerator" in the 2006 edition of *Directive 058*).
substance	As defined in section 1 of *EPEA*.
suspended	An approval status for an oilfield waste management facility or oilfield waste management component that has undergone suspension as defined in the *OGCA*.
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 *OGCR*—such as produced water, flowback, and leachate—that is used as an alternative to high-quality nonsaline water in hydraulic fracturing operations.

Appendix 2 Waste Names and Waste Codes

Table 3. Oilfield waste codes: general

Waste name	Waste code	Additional details
absorbents	ABSRAG	Oil rags and oil absorbents
acid solutions	ACID	Used for neutralized, unneutralized, and spent acids
activated carbon	ACTCRB	
batteries (wet and dry cells)	BATT	See *Alberta User Guide for Waste Managers* or *Transportation of Dangerous Goods Regulations* concerning wet and dry batteries
boiler blowdown water	BLBDWT	See *Directive 051* for deepwell disposal options
catalyst – non-sulphur	CATNS	
catalyst – sulphur	CATSU	• See *Guidelines for Landfill Disposal of Sulphur Waste and Remediation of Sulphur Containing Soil* • Includes impacted daylighting soil (hydrovac) material
caustic solutions	CAUS	Includes neutralized, unneutralized, and spent
cement – drilling	CEMENT	• For construction demolition debris, refer to [CONMAT] • Manage following *Directive 050* or *Directive 058*
construction and demolition material	CONMAT	Decontaminate and reuse
desiccant	DESICT	
garbage/domestic waste	DOMWST	• E.g., garbage including office waste from licensed well, pipeline, facility site • Excludes sewage (see *Wastewater and Storm Drainage Regulation* and *Domestic Wastewater Management Guideline for Industrial Operations* for more details)
drilling waste – hydrocarbon	DRWSHC	• Drill cuttings and fluids (invert): hydrocarbon, oil based • Manage following *Directive 050* or *Directive 058*
drilling waste – water based	DRWSWB	• Advanced gel chemical • Gel chemical • Water-based drill cuttings and fluids: brine, gel chemical, advanced gel chemical • Manage following *Directive 050* or *Directive 058*

Waste name	Waste code	Additional details
empty containers	EMTCON	• Aerosol cans • Barrels and pails • Crude oil sample bottles • Cutting oil tubes • Grease cartridges • Mud sacks – drilling • Paint cans/brushes • Pipe dope containers/brushes • Pesticide/herbicide containers • See *Alberta User Guide for Waste Managers* concerning containers (i.e., “empty” and “triple rinse”)
filter – media	FILMED	• Used for filtering (e.g., walnut husks) • Water treatment
filters	FILTER	• Air pollution control • Raw/fresh water • Glycol • Lube oil (waste type 201) (see *Alberta User Guide for Waste Managers* regarding drained or underdrained filters) • Methanol • Raw/fuel gas, NGLs • Produced/process water • Gas sweetening (MEA, DEA, MDEA, sulphinol) • Other
filter – backwash water	FLBWTR	• Filter backwash liquids – gas sweetening • Filter backwash liquids – water treatment
frac sand – non-radioactive	FRCSND	
frac fluid – hydrocarbon based	FRFLDH	
frac fluid – water based	FRFLDW	• Recycle/reuse in hydraulic fracturing operations • Not to be confused with produced water
residual formation fines after treatment and settlement	FRMFNS	• Used for swabbing low-pressure wells to remove produced water from the wellbore provided no additives/materials (e.g., acids, chemicals, solvents, surfactants/soaps) are introduced during the activity • Recovered swab fluids are produced water [WATER] with entrained wellbore fines [FRMFNS]. Also see [HSPWTR] • Manage on site, separate the solids, manage the solids as [FRMFNS], liquid as [WATER]
glycol solutions	GLYCOL	• May or may not contain heavy metals • For waste type 202, see *Alberta User Guide for Waste Managers*

Waste name	Waste code	Additional details
high solids produced water	HSPWTR	• Used for swabbing low-pressure wells to remove produced water from the wellbore provided no additives/materials (e.g., acids, chemicals, solvents, surfactants/soaps) are introduced during the activity. Recovered swab fluids are produced water [WATER] with entrained wellbore fines [FRMFNS]. • Manage on site, separate out the solids, manage the solids as [FRMFNS], liquid as [WATER] • Send for waste processing if the fines content is too high for disposal
hydrotest fluids	HYDFLD	See *Code of Practice for the Release of Hydrostatic Test Water from Hydrostatic Testing of Petroleum Liquid and Gas Pipelines*
hydraulic and transmission oil	HYDOIL	See *Code of Practice for Energy Recovery*
hydrovac material – nonimpacted	HYDVNI	• Clean soil from daylighting (vacuum truck must be clean and not contain residual waste or product) • Waste code may be used when clean hydrovac material is sent to a waste management facility • Not contaminated and can meet next intended land use if reused in originating location
ion exchange material (resin / regenerant liquids)	IEXMAT	
incinerator ash	INCASH	See *Guide to the Code of Practice for Small Incinerators*
iron sponge	IRNSPG	See *Guidelines for Landfill Disposal of Sulphur Waste and Remediation of Sulphur Containing Soils*
lead-based products – pipe dope/greases	LDDOPE	Used on drill collars and drill pipe to resist H_2S and drilling fluids
lead-based products – H_2S sensing tape	LDTAPE	
lubricating oil – hydrocarbon and synthetic	LUBOIL	See the *Alberta User Guide for Waste Managers* and the *Code of Practice for Energy Recovery*
pigging waste	PIGWST	Highly viscous material, including wax and liquids removed from the pipeline
process chemicals	PROCHEM	• Corrosion inhibitor/ oxygen scavenger solutions • Chemicals – inorganic or organic • Solvent/residues – non-halogenated aliphatic or aromatic
process water	PROWTR	• Water – process (with heavy metals) • Water – process (with organic chemicals)
pesticides/herbicides	PSTHRB	

Waste name	Waste code	Additional details
produced sand	SAND	Commonly produced from heavy oil operations
sludge – hydrocarbon	SLGHYD	Tank or vessel bottoms (sludge), including the following: • emulsion • hydrocarbon • flare pit • process
sludge – other	SLGOTH	Tank or vessel bottoms (sludge), including the following: • cooling tower • glycol/gas drying • lime • gas sweetening systems
sludge – sulphur	SLGSUL	See *Guidelines for Landfill Disposal of Sulphur Waste and Remediation of Sulphur Containing Soil*
salt heat medium	SLTMED	Waste salt solution from heaters and boilers, also referred to as bath heater salt
metal – scrap	SMETAL	Decontaminate (if a DOW) and recycle via a scrap metal dealer
contaminated debris and soil – hydrocarbon	SOILHYD	• Crude oil/condensate • Emulsion • Refined fuels/oils • Includes contaminated daylighting soil (hydrovac) material
contaminated debris and soil – other	SOILOTH	• Chemical/solvent • Pesticide/herbicide • Mercury/metals, produced/salt water • Includes contaminated hydrovac (daylighting) material
contaminated debris and soil – sulphur	SOILSU	• See *Guidelines for Landfill Disposal of Sulphur Waste and Remediation of Sulphur Containing Soil* • Includes contaminated daylighting soil (hydrovac) material
solvents/residues – halogenated	SOLHAL	
surface water – impacted	SWTRIM	• Contaminated surface run-off water or snow/ice • Leachate (e.g., liquid that has been in contact with waste) • Does not meet *Directive 055* surface water discharge criteria
sweetening agents	SWTWST	• Sweetening agents – liquids • Sweetening agents – solids • Dimethyl disulphide solutions
thread protectors – casing/tubing	THPROT	
treater hay	TRTHAY	Treater cleanouts

Waste name	Waste code	Additional details
produced water (including brine solutions)	WATER	• Produced water managed as a waste (e.g., sent to oilfield waste management facility or class 1b disposal well) • Storage of produced water for reuse in hydraulic fracturing operations at a waste management facility
wood – chemically treated / cooling tower	WOODCT	
paints	WPAINT	• Paints (lead based, oil based, water based), sandblast paint, brushes • Epoxy materials • See *Paint Waste Management: Acceptable Industry Practices*
wash fluids	WSHFLD	• Wash fluid – organic (e.g., includes cleaning solvents) • Wash fluid – water
crude oil/condensate emulsions (residuals after treatment)	WSTEML	• Residuals after treatment that are predominantly oil and water emulsion or oil and water with minimal solids (interface between the oil and water that has not separated out; may contain chemical) • Intentionally sent to a waste facility for management to obtain a recoverable component • All reasonable measures are made to recover the oil prior to disposal (refer to *Directive 051* for deepwell disposal options)
well workover fluids	WWOFLD	• Fluids or mixed fluids that return to surface from well servicing, workovers, and completions, including acid jobs • Refer to [FRFLDH], [FRFLDR], and [FRFLDW] for fracturing operations

Table 4. Oilfield waste codes: other*

Waste name	Waste code
waste – compressed or liquefied gases	WSTCGS
waste – corrosive (liquid)	WSTCLQ
waste – corrosive (solid)	WSTCSO
waste – flammable (liquid)	WSTFLQ
waste – flammable (solid)	WSTFSD
waste – not otherwise defined*	WSTNOD
waste – oxidizing (liquid)	WSTOLQ
waste – oxidizing (solid)	WSTOSD

*Use only if no other code applies; may be subject to audit (refer to *Directive 047*).

Table 5. Oilfield waste codes: special (requires special handling)

Waste name	Waste code	Additional details
asbestos	ASBEST	• See *Guidelines for the Disposal of Asbestos Waste* • See *Disposal of Asbestos Waste: Acceptable Industry Practices*
frac fluid – radioactive	FRFLDR	Refer to the Canadian Nuclear Safety Commission for management
frac sand – radioactive (plus other radioactive diagnostic materials)	FRSDR	Refer to the Canadian Nuclear Safety Commission for management
naturally occurring radioactive materials	NORM	See *Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials.*
polychlorinated biphenyls	PCBWST	• Fluorescent light ballasts • Askarel liquids • Contaminated solids; contaminated solids ≥50 ppm and <1000 ppm; contaminated solids ≥1000 ppm • Direct to an approved hazardous waste disposal facility if PCB >50 ppm by mass • See *WCR* and *Alberta User Guide for Waste Managers*
waste – poisonous (liquid)	WSTPLQ	Applicable when no other code listed applies
waste – poisonous (solid)	WSTPSD	Applicable when no other code listed applies
waste – radioactive material	WSTRDM	• Refer to Canadian Nuclear Safety Commission • Applicable when no other code listed applies