



# Updates to Storage Requirements for the Upstream Petroleum Industry

Discussion Document on *Directive 055*

July 2009

**ENERGY RESOURCES CONSERVATION BOARD**  
**Report 2009-A: Updates to Storage Requirements for the Upstream Petroleum Industry—**  
**Discussion Document on *Directive 055***

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## 1 Updates to Storage Requirements for the Upstream Petroleum Industry

The Energy Resources Conservation Board (ERCB) *Directive 055: Storage Requirements for the Upstream Petroleum Industry* sets out the requirements for the storage of materials produced, generated (including wastes), and used in the upstream petroleum industry. It addresses primary containment devices, such as aboveground and underground tanks, containers, lined earthen excavations, and bulk pads, as well as the need for these devices to have secondary containment systems, leak detection systems, and weather protection systems. The Alberta Energy and Utilities Board (EUB) (predecessor to the ERCB) last revised *Directive 055* in 2001.

The ERCB is finding repeat noncompliances with some of the requirements in *Directive 055* and has been responding to numerous queries from industry and consultants seeking clarifications. The purpose of this discussion document is to communicate potential updates and clarifications to *Directive 055* in the following areas:

- excluded material types and storage systems
- alternative storage systems
- permanent storage devices not requiring secondary containment
- temporary storage
- dike and tank integrity verification requirements for pre-1996 sites
- dike size and capacity
- schedule for repeat integrity testing of tanks
- secondary containment for small aboveground storage tanks
- use of open-topped, nonmetallic tanks with an internal volume less than 30 cubic metres (m<sup>3</sup>)
- construction and installation factors for aboveground storage tanks with an internal volume  $\geq 5$  m<sup>3</sup>
- weather protection for steel aboveground storage tanks with an internal volume  $\geq 5$  m<sup>3</sup>
- design of double-walled aboveground storage tanks
- monthly leak detection requirements for underground storage tanks
- inspection, monitoring, and record keeping
- on-site storage of small volumes of oilfield waste
- revision of surface discharge criteria for collected surface run-on/run-off waters

This discussion document also identifies when the clarifications or updates are applicable to requirements set out in *Directive 058: Oilfield Waste Management Requirements for the Upstream Petroleum Industry*. The ERCB is in the process of consolidating *Directive 058* with requirements set out in publications released subsequent to it. The consolidation of *Directive 058* will also incorporate changes that result from this process.

Tentatively, the updates and changes resulting from this process will be inserted directly into *Directive 055* and a bulletin will be issued identifying the sections updated. In the past, updates or new areas of a subject matter were typically issued as a new publication (i.e., directive, interim directive, informational letter), which then required the user to cross-reference the updates or new information to the applicable section of the main regulatory

document for the subject matter. Consolidation of changes into the directive will reduce the number of publications that need to be searched for a subject matter and hence alleviate confusion.

## 2 Excluded Material Types and Storage Systems

Section 2.4 of the 2001 edition of *Directive 055* identifies that aboveground and underground pressurized vessels that are part of an active process (e.g., flare knockouts and amine surge/drain tanks) and pipeline drip vessels are not within the scope of the storage requirements, provided that they have been designed for a working pressure of 103.4 kilopascals (kPa) (15 pounds per square inch [psi]) and are registered with the Alberta Boilers Safety Association (ABSA). All aboveground and underground nonpressurized storage vessels not registered with ABSA are subject to *Directive 055*. Similar direction was also set out in the 1995 edition of *Directive 055*.

It has been identified that the direction on flare knockouts and pipeline drip vessels in the above paragraph is ambiguous; the ERCB and ABSA hereby provide the following clarification respecting pipeline drip vessels:

- In accordance with the *Pressure Equipment Exemption Order AR 56/2006*, dust pots, gas drips, pig launchers, pig receivers, indirect-fired heating coils, and odorizer tanks are exempt from the *Pressure Equipment Safety Regulation* and, therefore, are considered under the jurisdiction of the *Pipeline Act and Regulation*.

Further information on flare knockouts is in *Directive 060: Upstream Petroleum Industry Flaring, Incinerating, and Venting*, Section 7.6: Liquid Separation. Points 1 to 9 in Section 7.6 detail design and operational requirements for liquid separation equipment (including flare knockouts), and point 10 identifies that flare knockouts used for liquid storage must be designed and be in accordance with *Directive 055*.

The primary purpose of the flare knockout is to drop out liquid hydrocarbons, water, and other liquids and to prevent their carryover to the flare stack. Flare knockouts are often part of a pressure-relieving system, and the systems are designed to handle worst-case emergency scenarios, but the flare knockouts typically are not operating under pressure and are not registered with ABSA. Therefore, Section 2.4 of *Directive 055* and the *Directive 060* referral back to *Directive 055* become very circular.

True to the primary purpose of the flare knockout, it will contain liquids. The majority of new flare knockouts are aboveground (mounted such that complete sides and bottoms are aboveground), and overflow or overfilling would result in the fluids carrying over to the flare stack. Secondary containment for aboveground flare knockouts is deemed not necessary, as *Directive 060* requires incorporation of measures to prevent fluid carryover and the exterior of flare knockout can be visually examined for integrity.

However, the exterior of underground flare knockouts cannot be examined for integrity; therefore, secondary containment and leak detection are required as environmental mitigative measures. The use of double-walled designs that allow monitoring of the interstitial space between the two walls is acceptable. Single-walled systems installed prior to 1996 must be tested for integrity at least every three years.

Through facility inspections, it has come to the attention of the ERCB that in some situations liquids that are separated out from other parts of a facility are directed to a flare knockout for storage. Note that Section 8.080(5) of the *Oil and Gas Conservation Regulations* states that no flare pit or open end of a flare line shall be located within 50 m of an oil storage tank.

While the closed nature of flare knockout vessels should only allow ignitable vapours to go up the flare stack, there is a need to ensure that protective equipment and operations are in place during fluid removal from the vessel (e.g., a backflash flame arrester to prevent fire being drawn down to the vessel; truck loading not occurring within 50 m of the stack). While it may be appropriate to direct stock tank vapours or drain line liquids to a flare knockout, there are concerns with sending large volumes of high pressure hydrocarbon liquids to flare knockouts (e.g., fire balls or black smoke emitting from the flare stack when condensate from a separator dumps to a flare knockout).

The aforementioned paragraph in Section 2.4 of *Directive 055* will be modified to the following:

- Aboveground and underground pressurized vessels that are part of an active production process, have been designed to a working pressure greater than 103 kPa and are registered with ABSA are not within the scope of *Directive 055*. In addition, *Directive 055* does not apply to flare knockouts and pipeline drip vessels. Refer to Section 7.6 of *Directive 060* for requirements regarding flare knockouts and to the *Pipeline Act* and *Regulation* for pipeline requirements.

It is further recommended that Section 7.6 of *Directive 060* be updated to remove point 10 and to include the following:

- Underground flare or incinerator separators or knockouts installed after January 1, 1996, must be designed with double walls and interstitial space monitoring capabilities.
- Any single-walled underground flare or incinerator separators or knockouts installed prior to 1996 must have an established integrity monitoring system that verifies integrity at a minimum frequency of every three years. (For information on integrity tests for underground storage tanks, see Appendix 2 of *Directive 055*.)
- Liquid hydrocarbons separated out from other parts of a facility must not be directed to flare or incinerator separators or knockouts for storage. The use of these vessels for storage of other liquids separated out from other parts of a facility is acceptable if this was contemplated when designing the system and the design and operational procedures provide for safe removal of the stored liquids.

### 3 Alternative Storage Systems

Section 2.5 of the 2001 edition of *Directive 055* identifies that applications must be submitted for storage systems alternative to the requirements in *Directive 055* and that the application must contain sufficient information to substantiate that an equivalent level of environmental protection and safety will be achieved by the proposed storage system. It identifies that if the application is made pursuant to *Directive 056: Energy Development Applications and Schedules*, it must be filed as nonroutine, but no direction is provided on filing an application when it does not involve *Directive 056*. Section 2.5 will be modified to include the following:

- Applications for new energy developments requiring licensing pursuant to *Directive 056* that are proposing to incorporate alternative storage systems must describe the storage system and be filed as nonroutine.
- Applications for modifications to *Directive 056*-licensed energy developments that are proposing to incorporate alternative storage systems must describe the storage system and be filed as nonroutine. Note that implementation of an alternative storage system on an

existing licensed energy development on its own does not trigger the need to submit a *Directive 056* amendment application.

- Applications for approval to incorporate an alternative storage system on an existing licensed or approved upstream petroleum site must be submitted to the ERCB Environment Group in situations when the proposed alternative storage system is not part of a modification to the energy development that requires its license/approval to be amended. For example, alternative storage applications have been submitted as part of corrective action plans developed to remedy noncompliances found through ERCB inspections.

#### 4 Permanent Storage Devices Not Requiring Secondary Containment

Section 3.4.1 of *Directive 055* identifies the types of storage devices that do not require secondary containment. Clarification is being provided for two of the storage systems identified:

- aboveground and underground tanks containing fresh water, and
- wash water collection systems from floor drains.

The 1995 and 2001 editions of *Directive 055* identify that aboveground and underground tanks storing water meeting the surface water discharge criteria are not required to have secondary containment. These criteria are being updated (see Section 16), and the updated criteria will not be used for determination of secondary containment.

The criterion specified in the 2001 edition of *Directive 055* for surface water discharge will remain the determining criteria for secondary containment, and Section 3.4.1 will be modified as follows:

- aboveground and underground tanks storing fresh water do not require secondary containment, provided that the water meets the following criteria: chloride  $\leq$  500 milligrams per litre (mg/L), pH 6.0 to 9.0, no visible hydrocarbon sheen (roughly equates to less than 10 mg/L), and no other chemicals in concentrations that would be harmful to environment (e.g., a release would not result in exceedances of soil guideline values set out in the Alberta Tier 1 Soil and Groundwater Remediation Guidelines for the applicable land-use category).

The 1995 edition of *Directive 055* identified that systems collecting wash waters from floor drains did not require leak detection and secondary containment, provided that they were managed properly (e.g., were not overfilled, were emptied on a regular basis, and were inspected regularly to verify integrity).

Section 3.4.1 of the 2001 edition of *Directive 055* identifies that wash water collection systems from floor drains do not require secondary containment, provided that they are used to infrequently store fluids for very short durations, are emptied immediately after use, and are regularly inspected after use to verify their integrity.

The 2001 edition of *Directive 055* removed the option to use concrete as primary containment (effective January 1, 2002) in situations where liquids are being stored or where there is potential for leachate to be generated. Specifying that concrete is not suitable for primary containment in specific circumstances does not remove obligations for industry to meet the *Alberta Building Code* and *Plumbing Code*.

ERCB staff have identified situations where facilities constructed after January 1, 2002, have wash water collection systems that continuously store fluids, do not have secondary containment, and are constructed of concrete. Situations have also been identified where facility modifications, including the wash water collection systems from floor drains, were done after January 1, 2002, but do not meet the requirements of *Directive 055*.

Section 3.4.1 will be modified to include the following:

- For facilities constructed prior to January 1, 2002, the wash water collection systems from floor drains must be tested for integrity if they cannot be totally emptied after use and they do not have secondary containment or leak detection. A visual inspection will not suffice unless the complete sides and bottom can be thoroughly examined. At a minimum, integrity must be verified every three years. If the integrity of these systems cannot be verified, licensees must repair and then retest the systems. Alternatively, licensees can upgrade the system to include appropriate primary containment, secondary containment, and leak detection.
- For facilities constructed or modified after January 1, 2002, the wash water collection systems from floor drains are not to be constructed of concrete and do not require secondary containment, provided that the systems are only used infrequently, for short durations, and emptied immediately after use. If the systems are constructed of concrete or cannot be totally emptied after use, the systems must be tested for integrity. A visual inspection will not suffice unless the complete sides and bottom can be thoroughly examined. At a minimum, integrity must be verified every three years. If the integrity of these systems cannot be verified, licensees must repair and then retest the systems. Note that systems constructed with secondary containment must incorporate a leak detection system. Alternatively, licensees can upgrade the system to include appropriate primary containment, secondary containment, and leak detection.
- For facilities constructed after January 1, 2010, concrete is not acceptable as primary containment for wash water collection systems from floor drains. Secondary containment and leak detection must be incorporated, unless the systems are only used for emergency situations or plant upset conditions and are emptied as quickly as reasonably possible after getting the emergency or plant upset conditions under control.
- Inspections of all wash water collection systems from floor drain systems must be incorporated into the monthly inspections. This is a visual inspection for abnormal circumstances and, where applicable, monitoring of associated leak detection systems.

## 5 Temporary Storage

Section 3.5 of *Directive 055* identifies specific operations that can require temporary storage of materials produced, used, or generated from those operations. Although temporary storage should typically not exceed three months, the maximum storage duration of oilfield wastes and empty barrels must not exceed one year.

Section 3.5 identifies that temporary storage of sludges and solids in steel-fabricated solids-storage bins does not require diking or secondary containment. However, contaminated soils being excavated during remedial work are often temporarily stored on synthetic liners.

Section 3.5 will be modified to state the following:

- Contaminated soil excavated during spill cleanup or remediation activities can be temporarily stored in a bermed and synthetically lined area. The synthetic liner must be

impermeable, compatible with the soil contaminant, and a minimum of 15 mils. The liner must extend over the berm and be keyed into the berm on its outside wall. The berm must be a minimum height of 15 centimetres (cm). The temporary storage area must be managed appropriately to prevent any overflow of any generated leachate, including precipitation that may come in contact with the contaminated soil. Although it is preferred to have the contaminated soil removed within three months, it must be removed within one year.

## 6 Dike and Tank Integrity Verification Requirements for Pre-1996 Sites

Prior to the first publication of *Directive 055*, in 1995, Section 8.030(2) of the *Oil and Gas Conservation Regulations (OGCR)* required each tank or group of tanks containing oil or fluids other than fresh water to be surrounded by a dike or firewall of a net capacity greater than that of the largest tank. This regulation came into force January 1, 1975. Following the implementation of *Directive 055*, Section 8.030 of the *OGCR* was amended, making reference to *Directive 055* for storage requirements.

The 1995 edition of *Directive 055* upgraded the secondary containment requirements for single-walled aboveground tanks to

- consist of a liner and dike, and
- be of a capacity of 110 per cent of the tank volume when the diked area contained one tank, or when the diked area contained more than one tank, be 100 per cent of the volume of the largest tank plus 10 per cent of the aggregate volume of all other tanks.

The 1995 edition of *Directive 055* provided licensees and approval holders of upstream petroleum sites in operation prior to January 1, 1996, the option to retrofit aboveground storage tanks to meet the secondary containment requirements (i.e., install a liner and adjust dike capacity) or to test or inspect the tanks to verify integrity. The retrofit or initial integrity test was to be completed by October 31, 2001.

The 2001 edition of *Directive 055* readjusted the dike capacity for sites constructed or modified on or after January 1, 2002, to be

- not less than 110 per cent of the capacity of the tank when the diked area contains one tank, or
- when the diked area contains more than one tank, not less than the sum of
  - the capacity of the largest tank located within the diked area, and
  - 10 per cent of the greater of
    - the largest tank, or
    - the aggregate capacity of all other tanks located in the diked area.

The 2001 edition of *Directive 055* also dropped the option to verify the integrity of small aboveground tanks (internal volume greater than 1 m<sup>3</sup> but less than 5 m<sup>3</sup>) on pre-1996 sites if the total combined volume of fluids stored in small tanks exceeds 5 m<sup>3</sup> per site. In these situations, licensees and approval holders had until October 31, 2004, to provide secondary containment, as stated in Section 5.3 (see *Directive 055*, Section 1.4.4 and Appendix 2, Section 2.3). Appendix 2 of *Directive 055* details the requirements for sites in operation prior to January 1, 1996.

When checking for compliance with *Directive 055*, ERCB staff have identified single-walled aboveground tanks on pre-1996 sites that were not surrounded by a dike even though the tanks contained fluids other than fresh water. It has been suggested that because the option to

verify integrity did not explicitly identify the requirement for the tank to be surrounded by a dike, verifying tank integrity demonstrated compliance with *Directive 055*. The need to qualify the tank dike requirements for the integrity verification option was not identified in *Directive 055*, as it was deemed implicit through the regulations in effect prior to the release of *Directive 055*.

To provide clarification on this matter, Section 2 of Appendix 2 will be modified to state:

- Prior to *Directive 055* coming into effect, the *OGCR* required aboveground tanks storing fluids, other than fresh water, to be surrounded by a dike having a net capacity greater than that of the largest tank within the dike. *Directive 055*, 1995 edition, required licensees of sites that were in operation prior to 1996 to either integrity test tanks or to upgrade the secondary containment to include a dike and liner. The option to verify the integrity of aboveground tanks in use prior to 1996 requires the tanks to be surrounded by a dike meeting the regulations (Section 8.030(2) of the *OGCR*) that were in effect prior to the implementation of *Directive 055*.

## 7 Dike Size and Capacity

As described in Section 6, dike capacity requirements have changed over time:

- prior to January 1, 1996, they were set out in Section 8.030(2) of the *Oil and Gas Conservation Regulations*;
- between January 1, 1996, and December 31, 2001, they were set out in the 1995 edition of *Directive 055*; and
- on or after January 1, 2002, they are set out in the 2001 edition of *Directive 055*.

A minimum dike capacity has been established, but not a maximum capacity. During the development (1995 edition) and technical review (2001 edition) of *Directive 055*, the need to establish this was not identified, nor was it identified that a berm around the perimeter of a lease and a dike around a single tank or group of tanks needed to be differentiated. It has been suggested that a lease berm serves as a tank dike. The purpose of a dike is to contain fluids in a localized area in the event of a breach of or release from a tank and to prevent the fluids from spreading across the site. This serves to limit the extent of contamination caused by the release and to prevent the spread of fire should the liquids be flammable or combustible.

*Interim Directive (ID) 91-03: Heavy Oil/Oil Sands Operations* set out in Section 3.4(1) that the area surrounding a tank or group of tanks may be contoured to contain the volume of the largest tank in lieu of constructing a dike or firewall. The 1995 edition of *Directive 055* did not identify this secondary containment option, but Section 5.3.2.1 of the 2001 edition of *Directive 055* superseded Section 3.4(1) of *ID 91-03* and stipulates that as of January 1, 2002, for in situ oil sands operations where a conventional dike interferes with operations, the secondary containment system must be lined and graded to collection area(s) so that the system meets the capacity requirements of a conventional dike.

If it has been identified that a dike or contoured area has not been constructed around a tank or group of tanks, including tanks on heavy oil and bitumen sites, and the site is configured in such a manner that it would be difficult to implement the dike or contoured area, the ERCB has considered alternative approaches proposed by the licensee. The alternative approaches have typically been a combination of modified secondary containment with operational procedures to provide an equivalent level of environmental protection and safety. Some of these situations were found through ERCB inspections, while others were self-disclosed by licensees.

The ERCB encourages licensees to evaluate their sites and to self-disclose noncompliant situations. The ERCB reminds licensees that, as set out in *Directive 019: ERCB Compliance Assurance—Enforcement*, a self-disclosure includes taking appropriate steps to correct/address the noncompliance, which could include submission of a plan identifying the steps to be taken to bring the site into compliance or identification that an application for approval of an alternative storage system has been submitted pursuant to Section 2.5 of *Directive 055*. Single-walled aboveground tanks without secondary containment found through ERCB inspections or audits are a High Risk noncompliance event.

*Directive 055* does not explain how to calculate dike capacities and, unlike the *Alberta Fire Code* or National Fire Protection Association (*NFPA*) *Flammable and Combustible Liquids Code*, it does not specify spatial separations between tanks and dike walls and does not address piping passing through dike walls. *Directive 055* does state that a dike wall must not have openings in it, such as dike drains, to the surrounding area. It is interesting to note that *NFPA 30* is applicable to the upstream petroleum industry throughout the United States and British Columbia.

To better harmonize *Directive 055* with the *Alberta Fire Code* and *NFPA 30*, the following modifications will be made to *Directive 055*:

- Expand Section 5.3.2.1: Secondary Containment and Section 2 of Appendix 2 to provide the following clarifications:
  - For environmental protection and fire safety purposes, a lease berm on an oil and gas site cannot be used in place of a tank farm dike.
  - For in situ oil sands operations constructed between 1991 and 2001, an acceptable alternative to a dike involves contouring the area surrounding a tank or group of tanks to contain the volume of the largest tank. For sites constructed after January 1, 2002, the capacity must be equivalent to the applicable diking requirements. The contoured area must be lined for sites using this option that were constructed after January 1, 1996.
  - Variances to secondary containment systems require ERCB approval (see Section 2.5).
- Include the following in Section 5.3.2.1(a): Dikes:
  - The capacity of a diked area containing a single tank does not require calculating the displacement volume of the tank.
  - To allow for volume occupied by tanks in a diked area containing more than one tank, the calculated dike capacity must be adjusted by subtracting the displacement volume of all tanks, excluding the largest tank, below the height of the dike.
  - For tank farms (constructed after January 1, 2010) containing combustible and flammable liquids, there must be a minimum separation distance of 1.5 m between a tank shell and the toe of the interior dike wall and of 1 m between tanks within a diked area.
  - Only piping for product, utility, or fire protection purposes directly connected to a tank or tanks within a diked area may be routed through the dike. Piping passing through dike walls must be designed to prevent excessive stresses as a result of settlement or fire exposure.
  - Combustible materials or empty or full drums or barrels must not be stored within the diked area.

The ERCB acknowledges that as spatial separations between tanks and dike walls have not previously been specified, it will implement them on a go-forward basis. However, these are good engineering practices that are in accordance with the *National Fire Code*, *Alberta Fire Code*, and *NFPA 30*. In this regard, the ERCB encourages licensees to evaluate existing sites to determine risk factors for those not meeting the spatial separations. The definitions of combustible and flammable liquids will be adopted from the *Alberta Fire Code* and *NFPA 30*.

## 8 Schedule for Repeat Integrity Testing of Tanks

Licensees and approval holders that chose to verify the mechanical integrity of pre-1996 tanks were to complete the initial test/inspection by October 31, 2001, and then were to repeat the integrity test/inspection every five years for aboveground tanks and every three years for underground tanks. Appendix 2 of the 2001 edition of *Directive 055* clarified that the date of the initial integrity test/inspection was to be used to set the frequency for the repeat tests/inspections, acknowledged that the intent was not stated clearly, and provided a schedule (see Sections 2.1.2 and 2.2.2 of Appendix 2) to eventually get all tanks into compliance with the applicable frequency.

Sections 2.1.2 and 2.2.2 of Appendix 2 will be updated to identify that

- the schedule for the next integrity test must be based on the previous integrity test such that the time interval between integrity tests for aboveground tanks must not exceed five years and for underground tanks must not exceed three years.

## 9 Secondary Containment for Small Aboveground Storage Tanks

Section 5.1 of *Directive 055* identifies that up to 5 m<sup>3</sup> of fluids may be stored in small aboveground tanks without secondary containment. A small aboveground tank is one that has an internal volume greater than 1 m<sup>3</sup> but less than 5 m<sup>3</sup>. All small tanks that exceed the total combined volume of 5 m<sup>3</sup> require secondary containment. To provide further clarity, the following example will be added to Section 5.1.

- For a site with five 2.5 m<sup>3</sup> tanks, two of these tanks do not require secondary containment, while three of these tanks require secondary containment.

The intent of these requirements is to provide licensees and approval holders with flexibility to strategically place smaller volumes of materials (e.g., chemicals or solvents) near the equipment requiring the materials, but to limit liability with a volume restriction that prevents excessive use of small tanks to avoid the secondary containment requirements.

## 10 Use of Open-Topped, Nonmetallic Tanks with an Internal Volume Less Than 30 m<sup>3</sup>

Section 5.2 of the 2001 edition of *Directive 055* explains that *Informational Letter (IL) 99-05: The Elimination of Surface Release of Produced Water* ended the exemption that allowed shallow gas producers in the southeastern portion of Alberta to release produced fluids and solids to the well site surface. Open-topped, nonmetallic tanks are identified as a suitable storage option for produced fluids from those well sites affected by *IL 99-05*.

As such, the use of these tanks is meant to be on the shallow gas well site and not on a central location receiving trucked-in fluids from the gas wells.

The first sentence of Section 5.2 will be modified to include the bolded part of the sentence below:

- The storage of produced water from shallow, low-pressure gas wells in only the Milk River, Medicine Hat, or Second White Specks pools is allowed in open-topped, nonmetallic tanks, provided that the tank volume is less than 30 m<sup>3</sup> **and the tank is located on the well site producing the fluids (i.e., single-well use).**

## 11 Construction and Installation Factors for Aboveground Storage Tanks with an Internal Volume ≥ 5 m<sup>3</sup>

It has come to the attention of the ERCB that aboveground storage tanks are being placed on wood foundations or supports. The ERCB notes that the *Alberta Fire Code* and *NFPA 30* identify that tanks must rest on the ground or on foundations, supports, or piling made of concrete, masonry, piling, or steel.

It is further noted that the *Alberta Fire Code* identifies that supports for storage tanks must provide a fire-resistance rating of not less than 2 hours and that every tank must be supported in a manner that will prevent the allowable design stress of the tank from being exceeded. *NFPA 30* identifies that tank foundations must be designed to minimize the possibility of uneven settling of the tank and to minimize corrosion in any part of the tank resting on the foundation. It also identifies that single wood timber supports (not cribbing) laid horizontally can be used for outside tanks if not more than 0.3 m high at their lowest point.

To better harmonize *Directive 055* with the *Alberta Fire Code* and *NFPA 30*, the bulleted paragraph below will be added to Section 5.3.1:

- Tanks must rest on the ground or on foundations made of concrete, masonry, piling, or steel. Tank foundations must be designed to minimize the possibility of uneven settling of the tank and to minimize corrosion of any part of the tank resting on the foundation. Supports for tanks must be of concrete, masonry, or protected steel, with the following exception:
  - Single wood timber supports (not cribbing) laid horizontally is permitted to be used for outdoor tanks if not more than 0.3 m high at their lowest point.

## 12 Weather Protection for Steel Aboveground Storage Tanks with an Internal Volume ≥ 5 m<sup>3</sup>

Section 5.3.1 of *Directive 055* specifies that steel aboveground tanks with an internal volume ≥ 5 m<sup>3</sup> must be externally coated (e.g., painted, galvanized).

- The ERCB will expand this requirement to clarify that external corrosion or rust is not an acceptable external coating for weather protection.

The ERCB is not aware of construction standards or regulatory documents for steel aboveground storage tanks that allow external corrosion to serve as weather protection. Licensees and approval holders must work with a national or international recognized writing organization (e.g., American Petroleum Institute [API], American Society for Testing Materials [ASTM], National Association for Corrosion Engineers [NACE], American Society of Mechanical Engineers [ASME], Underwriters Laboratory of Canada [ULC]) and the regulatory community to develop requirements in this area should they wish to be allowed to use this mechanism for weather protection.

## 13 Design of Double-Walled Aboveground Storage Tanks

Section 5.3.3 of the 2001 edition of *Directive 055* introduced the option to use double-walled aboveground storage tanks (DW ASTs) as an alternative to a single-walled aboveground tank using a secondary containment system consisting of a liner and a dike.

During the development of this section, the only reference documents found for DW ASTs were standards published by the ULC, and the scope of these standards is for the storage of flammable and combustible liquids, such as gasoline, fuel oil, or similar products with a relative density not greater than 1.0.

Section 5.3.3 requires the primary tank to be separated from the secondary containment system so as to provide continuous interstitial space below and around the primary tank. The words “continuous interstitial space below and around the primary tank” were intended to prevent intrusions (such as manways and piping) through the tank walls below the liquid level within the primary tank. The ERCB acknowledges that this intent was not clear.

ERCB inspectors are finding numerous DW ASTs configured with manways (the majority are single walled) and piping through the walls of the tanks. It appears that single-walled tanks typically used in the upstream petroleum industry, which are designed with cleanouts, have been reconfigured with a second wall. Cleanouts described in API Specification 12D and 12F are typically 24 inches by 36 inches and are located in the tank wall such that the bottom of the cleanout is flush with the bottom of the tank.

ERCB release reporting data indicate that the majority of releases from tanks are the result of operational issues (e.g., overfilling, leaks and drips from valves and fittings, and spillage associated with inventory movement), not catastrophic tank failures or releases that would be contained by the second wall of a DW AST.

The question arises as to whether DW ASTs used in production scenarios provide a level of environmental protection and public safety equivalent to single-walled aboveground tanks placed in a dike and liner system. To date, the ERCB has not found construction and design specifications from a recognized standards writing organization for DW ASTs for storage of production liquids; therefore, the ERCB deems that a standard of this nature should be developed. The ERCB recommends that licensees and approval holders, as well as tank manufacturers, work with a national or international recognized writing organization (e.g., API, ASTM, ULC) and the regulatory community to develop requirements in this area.

The ERCB has consulted with British Columbia and Saskatchewan regarding the use of DW ASTs in these jurisdictions and has been told it is fairly limited. British Columbia requires DW ASTs used in production services to be surrounded by a dike.

The ERCB believes that the use of DW ASTs in the Alberta upstream petroleum industry requires review pertaining to applicable services and construction and design requirements. The ERCB acknowledges that the development of design and construction standards will take time and also that the Canadian Association of Petroleum Producers (CAPP) has provided some very preliminary information from fifteen of its member companies regarding their use of DW ASTs in Alberta.

CAPP has proposed that a “best practice document” be developed to allow the continued use of existing DW ASTs for the interim period during the development of design and construction standards. The focus of the best practice document would be to implement a combination of operational practices with tank construction details (e.g., high-level alarms, automatic shutdown devices) to achieve an equivalent level of environmental protection and safety.

While the ERCB views the development of a best practice document as being positive, there remain no construction and design standards from a recognized standards writing organization. Hence, the ERCB will

- require all double-walled aboveground tanks installed after January 1, 2010, to be surrounded by a dike meeting the requirements specified in Section 5.3.2.1(a) of *Directive 055*. (Note that installation of a liner will not be required.)

An exception to the above will be those double-walled aboveground tanks used in nonproduction services to store products, such as solvents or chemicals, provided that the design and construction of the tanks meet a published standard from a national or international standard writing organization.

The ERCB will not be in a position to comment on implementation of “best practices” to allow continued use of existing DW ASTs in production scenarios until further discussions with CAPP and other industry members have taken place. The ERCB encourages licensees and approval holders to evaluate existing sites where DW ASTs are used and to voluntarily surround the tanks with dikes where environmental protection and safety may be compromised by their use. In addition, the incorporation of antisiphoning equipment on any piping going through tank walls below the liquid level should be considered.

The ERCB notes that use of a tank as secondary containment or a tank-in-a-tank assembly is not categorized as a double-walled aboveground tank, provided that the construction, secondary containment, and leak detection requirements of Section 5.3 of *Directive 055* are being satisfied and the tank has been designed by a professional engineer practicing in Alberta. (Note that the tank-to-tank and tank-to-dike spatial separations do not apply to these systems.)

#### **14 Monthly Leak Detection Requirements for Underground Storage Tanks**

The 1995 edition of *Directive 055* provided licensees and approval holders of sites in operation prior to 1996 the option to upgrade underground storage tanks to incorporate secondary containment and leak detection or to verify the mechanical integrity of the tank. Either the upgrade or the integrity verification was to be completed by October 31, 2001. Licensees and approval holders that chose the integrity verification option are required to reverify integrity at least every three years.

The 2001 edition of *Directive 055* dropped the opportunity for the secondary containment to consist of a liner or impermeable subsoils and specified that underground tanks installed after January 1, 2002, had to be double walled, with interstitial space monitoring.

The 2001 edition of *Directive 055* also set out monthly monitoring requirements for all leak detection systems; for underground tanks this would be the interstitial space between double walls, the tank and a liner, or the tank and impermeable soil. It did not include direction respecting monthly inspections of the areas in which the underground storage tanks are located for visual indicators of problems.

Sections 6 and 10, as well as Section 2.2 of Appendix 2, will be modified to state:

- Licensees and approval holders must incorporate into monthly leak detection and inspection programs a visual inspection of the area in which underground storage tanks are located for any evidence of abnormal circumstances. Investigation and corrective actions must be initiated as required by the circumstances; abnormal circumstances and corrective actions must be documented.

## 15 Inspection, Monitoring, and Record Keeping

Section 10 of *Directive 055* identifies that licensees and approval holders must document, and retain documentation for a minimum of five years, any abnormal circumstances identified from monthly visual inspections of aboveground storage tanks and the monthly interstitial space monitoring of double-walled aboveground tanks and underground tanks, as well as any corrective actions taken to remedy the situation and prevent it from recurring.

Section 10 of *Directive 055* will be modified to include the following:

- Licensees and approval holders must have documentation to verify that monthly visual inspections and interstitial space monitoring are being conducted.

Section 10 also identifies that licensees and approval holders must investigate situations and implement corrective actions if required if a storage device has overflowed or its leak detection system indicates a potential problem. The corrective actions include implementing cleanup activities as required, which could involve assessing the soil for contamination. Reference is made to *Informational Letter (IL) 98-02: Suspension, Abandonment, Decontamination, and Surface Land Reclamation of Upstream Oil and Gas Facilities*.

Section 10 of *Directive 055* will be further clarified to include the following:

- When conducting assessment and remedial activities associated with releases from storage systems on active upstream oil and gas sites, the goal is to reduce soil contaminant levels to below the industrial land-use guideline values set out in the Alberta Tier 1 Soil and Groundwater Remediation Guideline. Contaminated soil excavated during the assessment and remedial activities must be managed as an oilfield waste and cannot be used as fill material unless it has been treated to remove or reduce the contaminants to appropriate levels as follows:
  - Alberta Tier 1 industrial land-use guideline values, if the soil is being placed back into the excavation and there is residual soil contamination at concentrations at or below industrial guideline values; and
  - Alberta Tier 1 guideline values for the surrounding land use (e.g., natural area or agricultural land use) or background soil conditions, whichever is higher, if the soil is being used as fill on another part of the lease site.

## 16 On-Site Storage of Small Volumes of Oilfield Waste

The 1995 edition of *Directive 055* provided a notification process for the development of storage areas on existing ERCB-regulated oil, gas, and oil sands sites for the purpose of collecting oilfield and oily wastes from one or more of a company's facilities in a local geographical area. Section 12.2 of *Directive 058* also sets out a notification process for storage areas.

The 2001 edition of *Directive 055* removed the opportunity to develop a storage area through notification, and Section 12.2 of *Directive 058* was superseded by the direction set out in *ID 2000-04: An Update to the Requirements for the Appropriate Management of Oilfield Wastes*. *ID 2000-04* provides licensees and approval holders the opportunity to store or manage oilfield wastes on the site of origin without additional ERCB approval, provided that applicable ERCB requirements are followed. It also identifies that licensees and approval holders can manage and store oilfield wastes using an on-site waste management component if the wastes are generated in the same production system.

The same production system is defined as an interconnected system of upstream petroleum production facilities (e.g., wells, batteries, pipelines). An oil/gas production site receiving oilfield wastes for on-site management or storage must be in the same interconnected system of upstream production facilities as the oil/gas production site from which the oilfield wastes originated. Both the receiving and the originating site must have the same licensee or approval holder.

*ID 2000-04* does not provide for the opportunity to store small volumes of oilfield wastes in bin or bag systems without being constrained to only wastes generated within the same production system. In a February 12, 2007, letter, CAPP requested that the Alberta Energy Utilities Board (EUB; predecessor of the ERCB) reconsider this. The September 10, 2007, EUB response communicated that the following direction would be included in the consolidation of *Directive 058* and updates to *ID 2000-04*, Section 12.2 of the 1996 edition of *Directive 058*, and Section 3.4 of *Directive 055*:

- Bin or bag systems can be established on active ERCB-licensed upstream oil and gas sites and used for storage of oilfield wastes, such as filters, rags, and contaminated soil, without notification to or approval from the ERCB, provided that
  - the licensee of the sites from which the oilfield wastes are generated and the licensee of the site on which the bin or bag system is located are the same (i.e., first-party waste only);
  - systems used to store oilfield wastes that contain free liquids or that may potentially contain entrained liquids, such as filters or rags, must consist of a bag and bin system with a lid or an alternative system that provides both primary and secondary containment; the primary containment system must be compatible with the waste;
  - steel-fabricated solids storage bins (e.g., lugger bins, drilling rig tanks) used to store contaminated soil do not require an internal bag system (or secondary containment), but must have a lid;
  - the lids of the bin or bag systems must be kept closed to prevent the accumulation of precipitation in the systems;
  - the volume of oilfield wastes being brought in from other sites for purpose of storage in the bin or bag systems must not exceed 10 m<sup>3</sup>, and documentation to demonstrate compliance with this limit must be made available to the ERCB upon request;
  - the site on which the bin or bag system is located may be used as the consolidation point for oilfield waste tracking purposes, pursuant to Part C of *Directive 058*; and
  - disposition of the oilfield wastes stored in the bin or bag systems must be in accordance with the requirements of *Directive 058* and subsequent updates to it.
- The receipt and storage in bin or bag systems of more than 10 m<sup>3</sup> of oilfield wastes from off-site sources require approval from the ERCB Environment Group as
  - an oilfield waste management component, provided that the oilfield wastes are generated from sites within the same production system, or
  - an oilfield waste management facility, if any of the oilfield wastes being received are generated from sites that are not part of the same production system. (Applications for oilfield waste management facilities must be made pursuant to *Directive 058*.)

## 17 Revision of Surface Discharge Criteria for Collected Surface Run-On/Run-Off Waters

Section 11 of *Directive 055* and Section 11.6.2(b) of *Directive 058* set out criteria for the surface discharge of collected surface run-on/run-off waters onto adjacent lands. A maximum chloride content of 500 mg/L and a pH range of 6.0 to 9.0 are set out in both directives. In June 2007, Alberta Environment published the *Alberta Tier 1 Soil and Groundwater Remediation Guidelines*, and then in August 2008 and again in February 2009 released updates to it. The *Alberta Tier 1 Soil and Groundwater Remediation Guidelines* states that all groundwater uses are applicable at Tier 1. The ERCB does not limit the number of times collected surface waters may be released to adjacent lands; hence, the maximum chloride content and the pH range are being adjusted to align with the Tier 1 values.

The following is an update to the maximum chloride content and pH range set out in Section 11 of *Directive 055* and Section 11.6.2(b) of *Directive 058*:

- pH 6.5 to 8.5 (e.g., test strips and/or metre readings); and
- 230 mg/L chloride or background surface water chloride concentrations for the area, whichever is higher.

Section 11 of *Directive 055* and Section 11.6.2(b) of *Directive 058* will also be updated to identify that

- landowner consent is not required to surface discharge collected surface run-on/run-off waters onto the site of origin (i.e., well or facility site), but all other criteria must be met.