Chapter 5 Oil/Water Separators

5.1 Introduction

The intended use of an oil/water separator(s) (OWS) determines whether the separator is subject to the SPCC regulations and, if so, what provisions are applicable. This chapter explains the applicability of the SPCC rule to OWS, and clarifies the exemption for certain uses, including equipment, vessels, and containers that are not specifically called "OWS" but perform oil/water separation, such as water clarifiers at wastewater treatment plants. This chapter also discusses the alternative compliance options for flow-through process vessels at oil production facilities.

Table 5-1 below outlines the SPCC rule applicability for various uses of OWS. Only OWS used exclusively to treat wastewater and not used to satisfy any requirement of 40 CFR part 112 are exempt from all SPCC requirements. OWS used in oil production, recovery or recycling and to meet the secondary containment requirements of the rule are not exempt.

Table 5-1: SPCC rule applicability for various uses of OWS.

Wastewater Treatment	Secondary Containment	Oil Production	Oil Recovery and/or Recycling
Separators are exempt from all SPCC requirements in accordance with §112.1(d)(6) and do not count toward facility storage capacity.	Separators that are used as part of a secondary containment system and are not intended for oil storage or use do not themselves require secondary containment and do not count toward facility storage capacity. However, they are subject to the design specifications (e.g., capacity) for the secondary containment requirements with which they are designed to comply.	Separators are bulk storage containers and are not exempt; they count toward the facility storage capacity. They are subject to the provisions of §§112.7 and §§112.9(c) or 112.11(b) and (d).	Separators are not exempt and count toward the facility storage capacity. Separators are oil-filled manufacturing equipment subject to the provisions of §112.7 and §§112.8(b) and (d) or 112.12(b) and (d), as applicable.[101]

[101] The §§112.8(c) and 112.12(c) provisions for bulk storage containers do not apply because oil/water separators at these facilities function as oil-filled manufacturing equipment and are not bulk storage containers.

The remainder of this chapter is organized as follows:

- ***Section 5.2*** summarizes applicable SPCC rule provisions to the four uses of OWS identified above.
- ***Section 5.3*** discusses the exemption for the use of an OWS as wastewater treatment.
- ***Section 5.4*** addresses applicable SPCC requirements for the use of an OWS as secondary containment.
- ***Section 5.5*** discusses applicable SPCC requirements for the use of an OWS at oil production facilities.
- ***Section 5.6*** discusses applicable SPCC requirements for the use of an OWS at oil recovery or recycling facilities.
- ***Section 5.7*** describes required documentation for OWS and the role of the EPA inspector in reviewing facilities with OWS.

5.2 Overview of Provisions Applicable to OWS

The following paragraphs briefly summarize the four uses of OWS and identify the SPCC provisions applicable to each. These requirements are discussed in greater detail in *Sections 5.3* through *5.6*.

5.2.1 Wastewater Treatment Facilities

Section 112.1(d)(6) of the SPCC rule addresses OWS used for wastewater treatment. Facilities or equipment used exclusively for wastewater treatment, and which do not satisfy any requirements of the SPCC rule, are exempt from the SPCC rule requirements. These OWS do not count toward facility storage capacity. Whether a wastewater treatment facility or part thereof is used exclusively for wastewater treatment or used to satisfy an SPCC requirement will often be a facility-specific determination based upon the activities carried out at the facility and upon its configuration.

5.2.2 OWS Used for Secondary Containment

OWS used to meet the SPCC requirements for general secondary containment, sized secondary containment, or facility drainage are subject to applicable rule requirements, but they do not count toward storage capacity. These include OWS that are used to meet the secondary containment requirements of §§112.7(c), 112.7(h)(1), 112.8(c)(2), 112.8(c)(11), 112.12(c)(2), and/or 112.12(c)(11). Drainage systems that satisfy the secondary containment requirements may use OWS to recover oil and return it to the facility (see *Chapter 4: Secondary Containment and Impracticability* for a description of secondary containment requirements). Additionally, the drainage provisions in §§112.8(b) and 112.9(b) set forth design specifications for secondary containment at a facility.

5.2.3 Oil Production Facilities

Production, recovery, and recycling of oil are not considered wastewater treatment and, thus, are not eligible for the wastewater treatment exemption. For purposes of §112.1(d)(6), such activities also include recovery and recycling of crude oil at facilities associated with, and/or downstream of, production facilities, such as saltwater disposal (produced water) and injection facilities.

OWS associated with oil production activities are subject to §112.7 and applicable provisions of §112.9 for onshore oil production facilities or §112.11 for offshore oil production facilities. Examples of OWS associated with oil production, separation, and treatment include free water knockouts, two- and three-phase separators, and gun barrels.

5.2.4 Oil Recovery and/or Recycling Facilities

Oil recycling and recovery activities that collect and consolidate production fluids from multiple oil production facilities in an effort to further recover and treat oil prior to the disposal of production fluids are not eligible for the wastewater treatment exemption because the operations focus on oil treatment rather than wastewater treatment. These operations typically specialize in the treatment of production fluids and other oil recovery activities, and may include disposal and injection of production fluids. Other oil recycling operations include waste oil recyclers not associated with oil production operations (e.g., motor oil recyclers) and facilities engaged in the recovery and/or recycling of animal fats and vegetable oils (AFVO).

Figure 5-1 to *Figure 5-4* illustrate rule requirements or exemptions based upon the use of OWS at SPCC-regulated facilities.

Figure 5-1: OWS subject to wastewater treatment exemption.

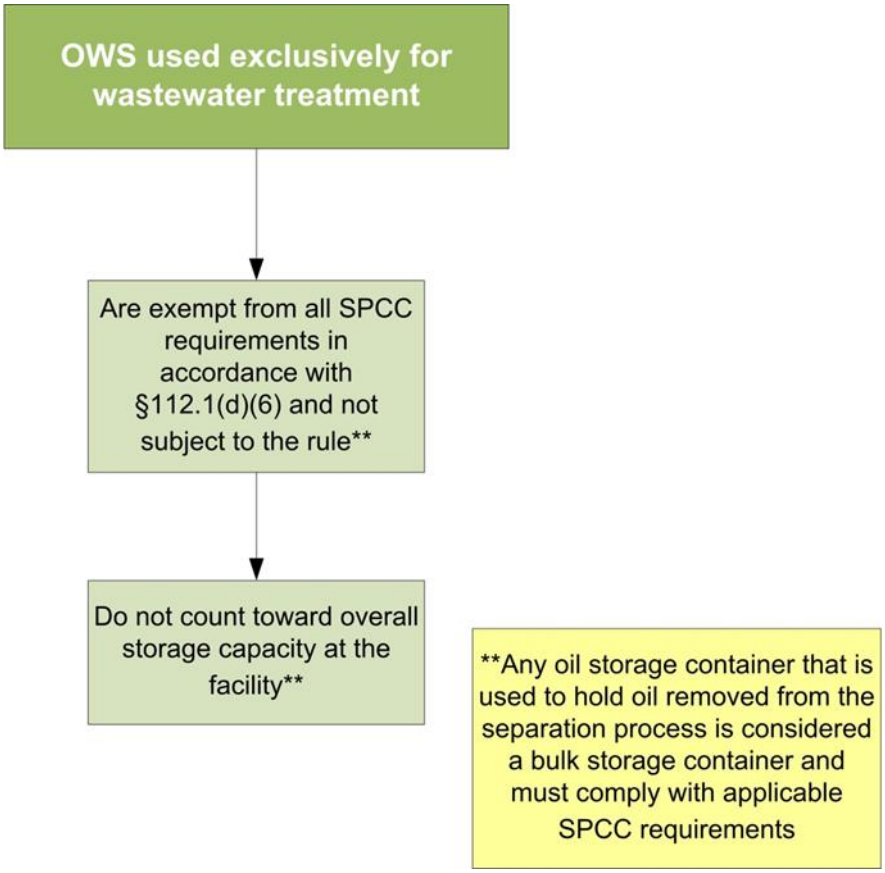


Figure 5-2: OWS used to satisfy SPCC rule requirements.

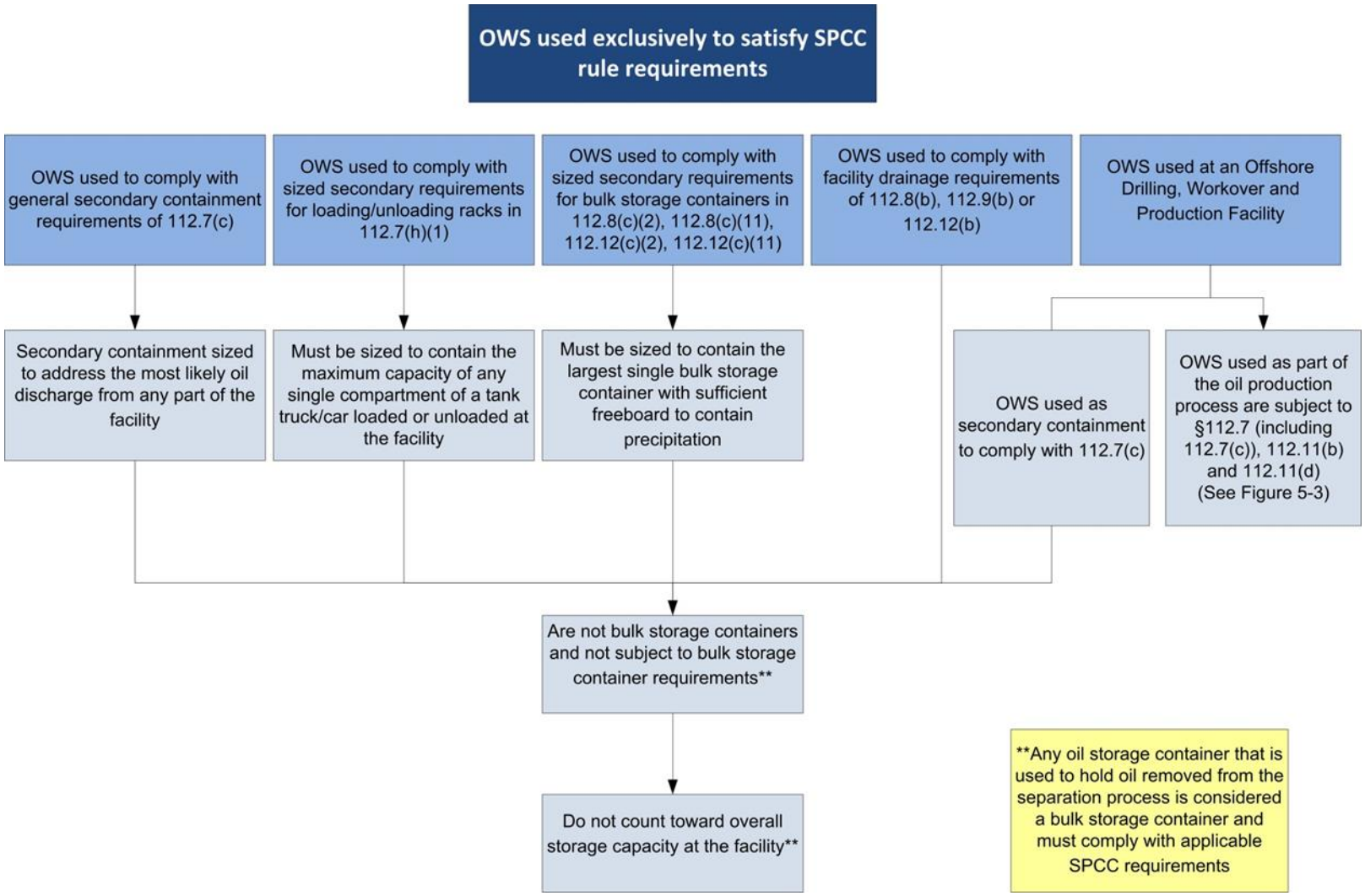


Figure 5-3: OWS at oil production facilities.

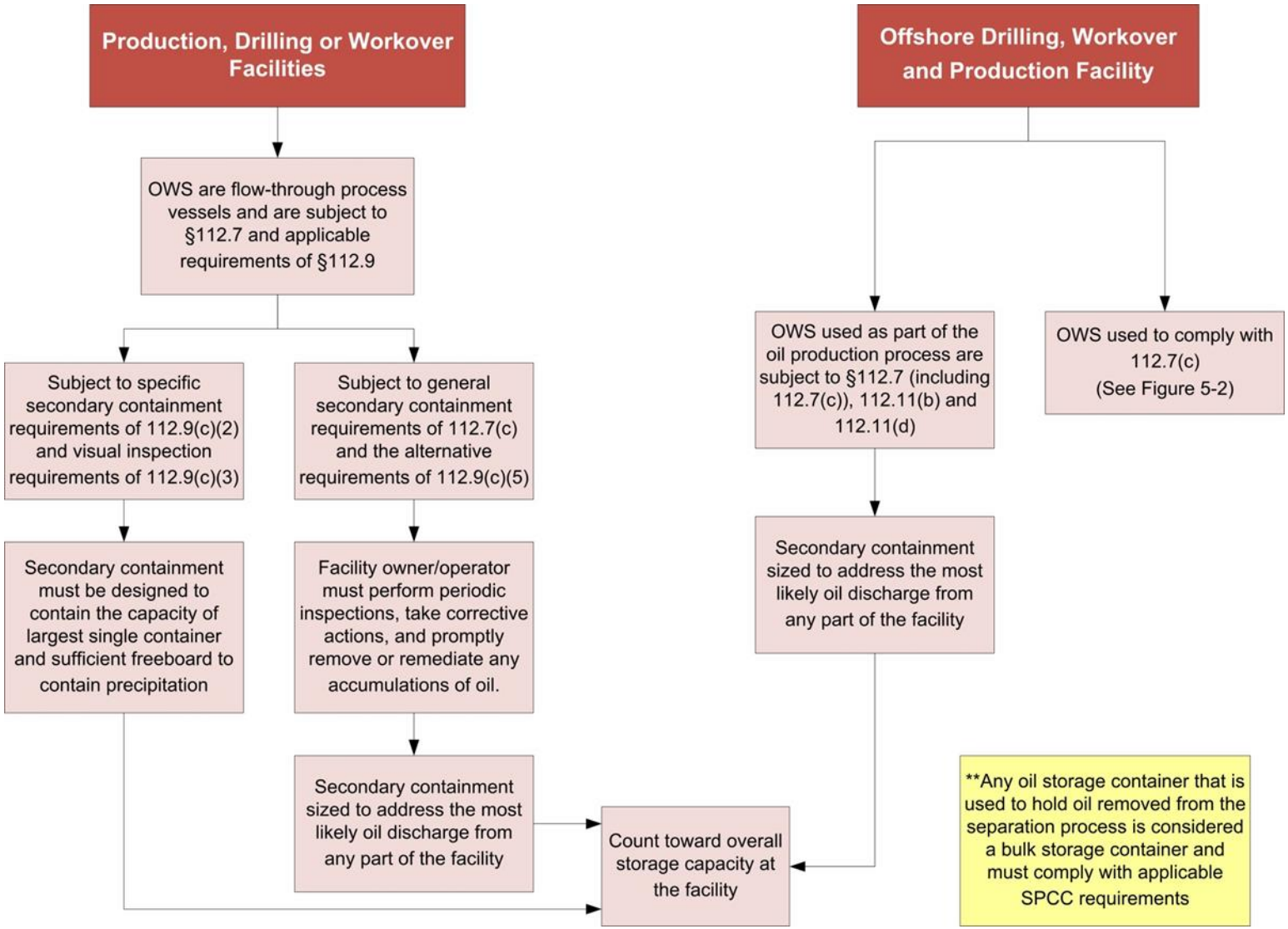
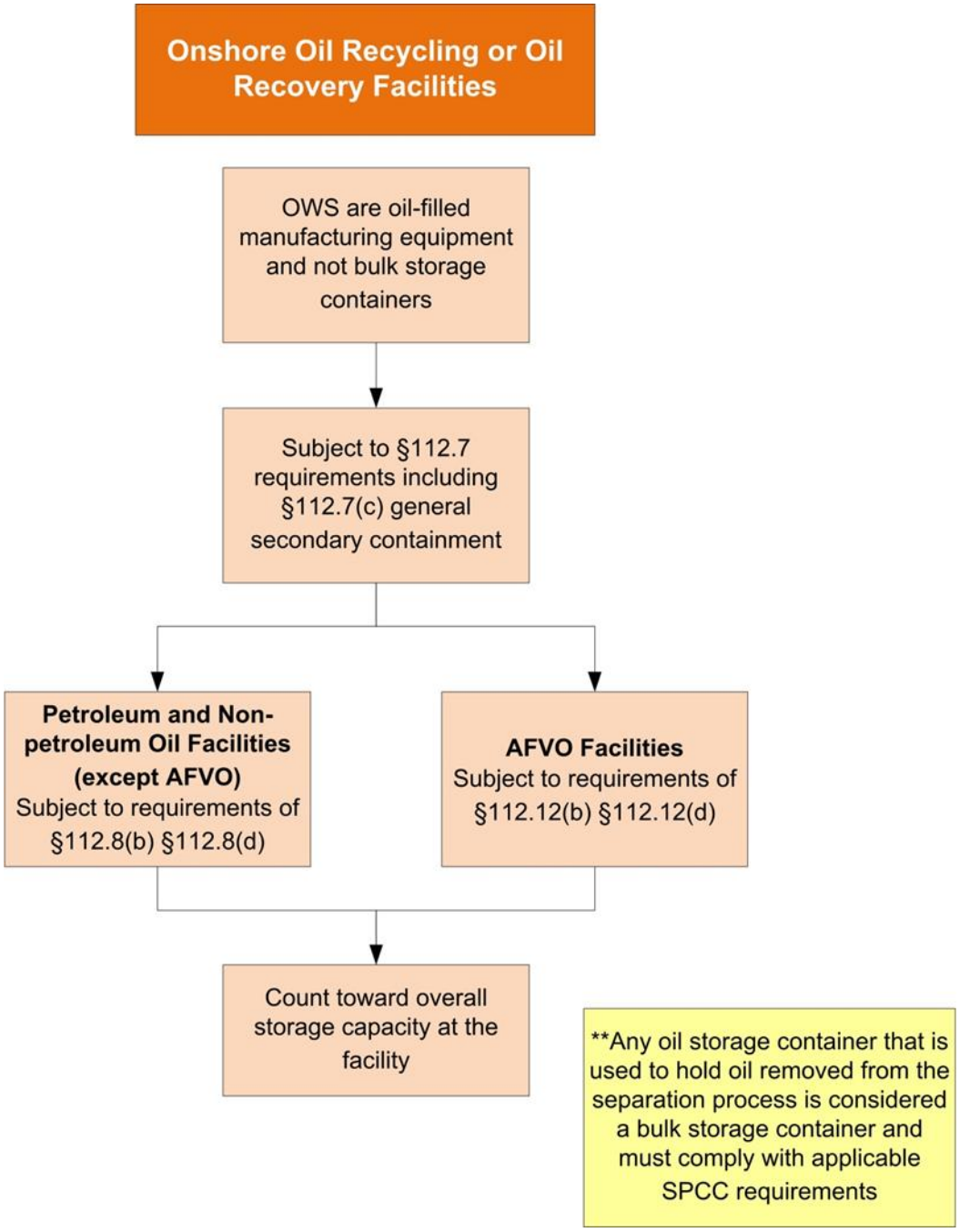


Figure 5-4: OWS at oil recovery and/or recycling facilities.

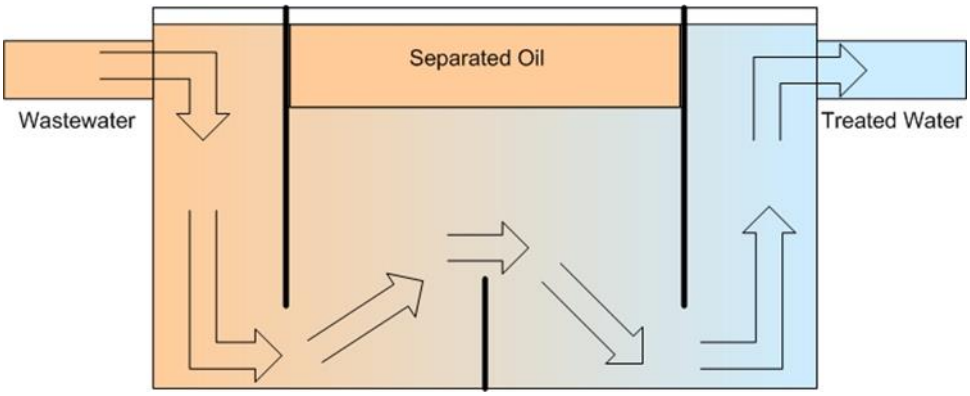


5.3 OWS Used for Wastewater Treatment

5.3.1 OWS Used for Wastewater Treatment

OWS used to pre-treat wastewater are typically standard gravity or enhanced gravity separators.[102] Standard gravity separators, as illustrated in *Figure 5-5* (separator designs may vary), are liquid containment structures that provide sufficient hydraulic retention time to allow oil droplets to rise to the surface. The oil forms a separate layer that can then be removed by skimmers, pumps, or other methods. The wastewater outlet is located below the oil level so that water leaving the separator is free of the oil that accumulates at the top of the unit. The inlet is often fitted with diffusion baffles to reduce turbulent flow that might prevent effective separation of the oil and might re-suspend settled pollutants.

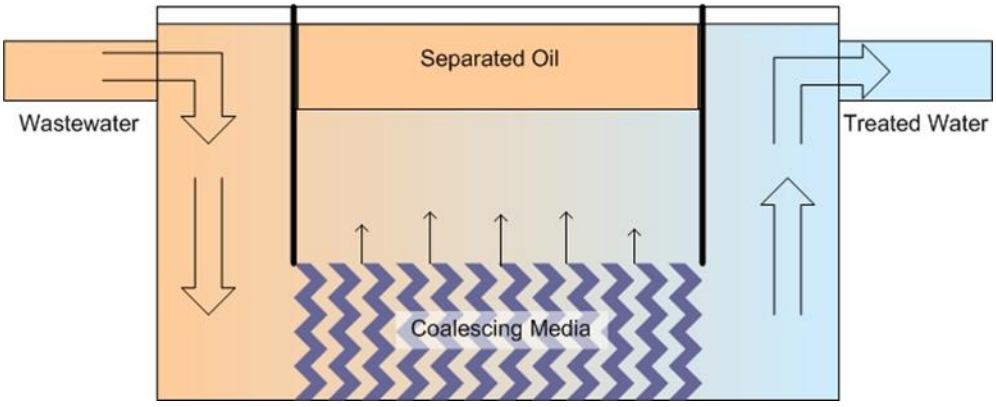
Figure 5-5: Standard gravity oil/water separator.



Enhanced gravity separators allow the separation of smaller oil droplets within confined spaces. These separators use a variety of coalescing media and small diameter cartridges that enhance laminar flow and separation of smaller oil droplets that accumulate on the separator surface for removal. *Figure 5-6* shows coalescing plates in the middle compartment (separator designs may vary).

[102] Other types of separators include vortex separators, which combine gravity with centrifugal forces.

Figure 5-6: Enhanced gravity oil/water separator.



OWS are flow-through equipment in which wastewater enters the separator and treated water exits the separator typically on a continual basis. To be effective, the OWS is sized appropriately in order for the unit to separate and contain the intended oil capacity, in addition to the flow-through wastewater quantity. Also, the design flow rate of the OWS is carefully considered when specifying a wastewater treatment system, as a flow rate above the maximum rate of the separator will cause the discharge of accumulated oil and/or untreated wastewater. The specifications from OWS manufacturers typically outline these and other design factors and considerations, along with operation and maintenance requirements, to ensure that the OWS is correctly constructed and operated for its intended use.

5.3.2 Applicability of the SPCC Rule to OWS Used for Wastewater Treatment

Section 112.1(d)(6) exempts "any facility or part thereof" that is used *exclusively* for wastewater treatment *and* is not used to meet any other requirement of the rule (excluding oil production, recovery, and recycling facilities). There are components of wastewater treatment facilities, such as treatment systems at publicly owned treatment works (POTWs) and industrial wastewater treatment facilities treating oily wastewater, that likely meet the two criteria for this exemption. OWS used exclusively for wastewater treatment are flow-through separators and are not engaged in a static process in an isolated container. For example, the presence of a water sump in a bulk storage container does not constitute wastewater treatment.

POTWs and other wastewater treatment facilities may have bulk storage containers and oil-filled equipment, as well as exempt OWS. The capacities of the bulk storage containers and oil-filled equipment are counted to determine whether the facility is subject to the requirements of the SPCC rule. The presence of an OWS at an otherwise regulated facility does not exempt the entire facility from the SPCC rule requirements. Such OWS capacity does not count toward the overall storage capacity of the facility, and only that equipment used for oil/water separation is not subject to any rule provisions. At wastewater treatment facilities, storage capacities to be counted include bulk storage containers, hydraulic equipment associated with the treatment process, containers used to store oil that feed an emergency generator associated with wastewater treatment, and slop tanks or other containers used to store oil resulting from treatment. All separate containers used to

store oil recovered by the separation process and all other equipment or containers at a regulated facility that do not qualify for the wastewater treatment exemption are required to meet the applicable SPCC requirements (67 FR 47069, July 17, 2002).

Examples of wastewater treatment OWS that may be eligible for the exemption of §112.1(d)(6) include:

- OWS at a wastewater treatment facility;
- OWS at an active groundwater remediation site;
- Grease traps that intercept and congeal oil and grease from liquid waste; and
- OWS in landfill leachate collection systems.

A separate container storing oil removed from an exempt separator is considered a bulk storage container and is subject to the SPCC rule requirements. Furthermore, OWS exempted from the SPCC rule may be subject to other federal, state, and local regulations. For example, many exempted wastewater treatment OWS are within wastewater treatment facilities or parts thereof subject to the National Pollutant Discharge Elimination System (NPDES) requirements under section 402 of the Clean Water Act (CWA). NPDES (or an approved state permit program) ensures review and approval of the facility's wastewater treatment plans and specifications, as well as operation/maintenance manuals and procedures, and requires a Storm Water Pollution Prevention Plan, which may include a Best Management Practice (BMP) Plan.[103]

Additionally, some facilities may be subject to pretreatment standards promulgated under §307(b) of the CWA. Pretreatment standards apply to "indirect discharges" that go first to a POTW via a collection system before being discharged to navigable waters. The General Pretreatment Regulations for Existing or New Sources of Pollution, found at 40 CFR part 403, prohibits an indirect discharger from introducing into a POTW a pollutant that passes through or interferes with treatment processes at the POTW, and also sets the framework for the implementation of categorical pretreatment standards. Specifically, 40 CFR 403.5(b)(6) prohibits the introduction into a POTW of "petroleum, oil, non-biodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through."

[103] BMPs are operational conditions that may supplement or constitute effluent limitations in NPDES permits. Under §402(a)(2) of CWA, BMPs may be imposed in addition to effluent limits when the EPA Administrator determines that such conditions are necessary to carry out the provisions of the Act. See discussion of authority for NPDES and BMP provisions in the preamble to the 2002 final SPCC rule, 67 FR 47068.

Example of SPCC Rule Applicability and Secondary Containment Requirements: Kitchen Grease Trap

A kitchen grease trap at a facility otherwise subject to the SPCC rule and that is used solely for the pretreatment of wastewater is eligible for the wastewater treatment exemption. However, the transfer of oily wastewater and sludge from this exempt grease trap, using a vacuum truck, is subject to the general containment requirements of §112.7(c) if the transfer area does not meet the definition of a "loading/unloading rack." Sufficient secondary containment for a grease trap unloading area may be provided by active containment measures deployed either prior to transfer (e.g., placement of a drain cover over a storm water drop inlet) or in reaction to a discharge as long as the certifying PE determines that the active containment measures are sufficient and can be reliably deployed in time to prevent the spilled material from reaching navigable waters or adjoining shorelines.

5.3.3 Wastewater Treatment Exemption Clarification for Dry Gas Production Facilities

A dry gas production facility is a facility that produces natural gas from a well (or wells) from which it does not also produce condensate or crude oil that can be drawn off the tanks, containers or other production equipment at the facility. Since no oil is being "produced" at these dry gas facilities they may be eligible for the wastewater treatment exemption because they are not "oil production, oil recovery, or oil recycling facilities." Produced water containers used exclusively for wastewater treatment at dry gas production facilities are not excluded from the wastewater treatment exemption (69 FR 29728, May 25, 2004). These produced water containers are eligible for the wastewater treatment exemption and therefore do not count toward oil storage capacity and are not subject to the rule's requirements.

It should be noted that in the 2008 amendments to the SPCC rule (73 FR 74236, December 5, 2008), EPA added the term "condensate" to the definition of production facility. The purpose of this amendment was to clarify that certain gas facilities (i.e., wet gas facilities) that produce oil in the form of condensate are oil production facilities and may be subject to the SPCC rule. As oil production facilities, wet gas facilities are not eligible for the waste water treatment exemption.

At 69 FR 29730, EPA stated that

"...[in] verifying that a particular gas facility is not an 'oil production, oil recovery, or oil recycling facility,' the Agency plans to consider, as appropriate, evidence at the facility pertaining to the presence or absence of condensate or crude oil that can be drawn off the tanks, containers or other production equipment at the facility, as well as pertinent facility test data and reports (e.g., flow tests, daily gauge reports, royalty reports or other production reports required by state or federal regulatory bodies)."

5.4 OWS Used to Meet SPCC Secondary Containment Requirements

5.4.1 OWS Used to Meet SPCC Secondary Containment Requirements

Properly designed, maintained, and operated OWS may be used as part of a facility drainage system to meet the secondary containment requirements of the rule in §§112.7(c), 112.7(h)(1), 112.8(c)(2), 112.8(c)(11), 112.12(c)(2), and/or 112.12(c)(11). Additionally, §§112.8(b), 112.9(b), and 112.12(b) set forth design specifications for drainage associated with secondary containment provisions at the facility. See *Chapter 4: Secondary Containment and Impracticability* for a detailed discussion of secondary containment requirements.

Standard gravity and enhanced gravity separators (*Figure 5-5* and *Figure 5-6*), or other types of OWS, may be used to meet secondary containment requirements. In this application, the separators are expected to have oil and water present in the system when there is an oil discharge or oil-contaminated precipitation runoff within the drainage area. These separators should be monitored on a routine schedule and collected oil should be removed as appropriate in accordance with procedures described in the SPCC Plan.

When designing OWS to be used as secondary containment, the SPCC Plan preparer should consider:

- The drainage area that flows to the separator;
- The corresponding anticipated flow rate of the drainage system to the separator; and
- The appropriate capacity of the OWS for oil and for wastewater.

Many OWS used for secondary containment are installed in areas where they may receive considerable flow from precipitation. If the precipitation flow rate exceeds the maximum design rate of a separator, it may discharge accumulated oil and/or untreated wastewater to navigable waters or adjoining shorelines. In this case, the separator may be an inappropriate choice for secondary containment. The specifications from OWS manufacturers outline these and other design factors as important items to consider when determining the use of a given OWS for a given application. Additionally, the manufacturer specifies the maintenance requirements to ensure proper operation of the separator.

When OWS are used to meet SPCC requirements, they must be properly operated and maintained to ensure they will perform correctly and as intended under the potential discharge scenarios it is aimed to address (e.g., §§112.7(c), 112.8(c)(2), and 112.12(c)(2)). Required OWS capacities should always be available (i.e., oil should not continually accumulate in the separators over a period of time such that the required storage capacities would not be available if an oil discharge were to occur within the drainage areas).

The use of OWS as a method of containment may be risky as they have limited drainage controls to prevent a discharge of oil and their reliability rests heavily on proper maintenance. This is particularly true when using a separator to meet the sized secondary containment requirements for large bulk storage containers, as separators are not typically designed to accommodate a worst case discharge of oil. EPA inspectors noting this containment configuration should closely inspect the device and review records associated with documenting the design criteria of the equipment and the routine maintenance performed on such equipment.

FYI – Oil/water separators used for secondary containment

When oil/water separators are used for secondary containment:

- Oil contained in the separator ***does not*** count toward facility total oil storage capacity
- Do not require additional secondary containment (i.e. tertiary containment) for the separator

Remember to observe the effluent treatment systems associated with bulk storage containers to prevent discharges to navigable waters or adjoining shorelines.

5.4.2 Applicability of the SPCC Rule to OWS Used to Meet Specific SPCC Secondary Containment Requirements

Section 112.7(c) requires "appropriate containment and/or diversionary structures or equipment to prevent a discharge as described in §112.1(b)." OWS may be used to satisfy this requirement for onshore or offshore facilities. These separators must be constructed to contain oil and prevent an escape of oil from the system prior to cleanup in order to comply with the secondary containment provision for which it is intended (§112.7(c)). A description explaining how the OWS complies with secondary containment provisions, and how it is operated and maintained, should be included in the SPCC Plan. BMPs or operation and maintenance (O&M) manuals that detail operation and maintenance procedures for OWS used specifically for secondary containment may be referenced in the SPCC Plan and maintained separately.

FYI – Location of oil/water separators

Separators used as secondary containment would typically be located in ***undiked areas***, to supplement drainage systems. The requirements for secondary containment systems described in *Section 5.4* apply.

Separators associated with a ***diked area*** which are used exclusively for treating dike discharge effluent are subject to the wastewater treatment exemption, as described in *Section 5.3*.

Section 112.7(h)(1) requires "a quick drainage system" for areas where a tank car or tank truck loading or unloading rack is present. OWS may be used as part of a quick drainage system to meet this requirement. This containment system must hold at least the maximum capacity of any single compartment of a tank car or tank truck loaded or unloaded at the facility (§112.7(h)(1)).

Sections 112.8(b), 112.9(b), and 112.12(b) set forth design specifications for drainage systems associated with secondary containment at onshore facilities. Environmentally equivalent measures can be used to satisfy these requirements (see *Chapter 3: Environmental Equivalence*, *Section 3.3.1*). For example, facilities might use ponds, lagoons, or catchment basins as part of the design of facility drainage systems. Alternatively, OWS might serve as environmentally equivalent measures to the ponds, lagoons, or catchment basins required by §§112.8(b)(3) and 112.12(b)(3). In this instance, EPA recommends that these separators be designed to handle the expected flow rate and volume of oil and water generated by facility operations. When certifying a

facility's SPCC Plan, the PE must verify that OWS are adequately designed, maintained, and operated to provide environmentally equivalent protection (in accordance with §112.7(a)(2)) under the potential discharge scenarios they are aimed to address.

Sections 112.8(c)(2), 112.8(c)(11), 112.12(c)(2), and 112.12(c)(11) require that all bulk storage containers be provided with secondary containment for "the entire capacity of the largest single container and sufficient freeboard to contain precipitation." OWS may be used to meet these requirements, but *must be appropriately sized*. These separators must be capable of handling the oil and precipitation from the general drainage area and additional oil from any accidental discharge from the largest bulk storage container located within the drainage area for which the separator provides secondary containment. Good engineering practice would suggest that the use of OWS to meet the specific secondary containment provisions be on a very limited basis and typically with smaller capacity container storage areas. See the example scenario in *Figure 5-7* that calculates the required capacity of an OWS used as secondary containment for a drum storage area.

Sections 112.8(c)(9) and 112.12(c)(9) require that the facility owner/operator observe effluent treatment facilities frequently enough to detect possible system upsets that could cause a discharge as described in §112.1(b). Separators should be monitored on a routine schedule, and collected oil should be promptly removed, as appropriate, and in accordance with manufacturers' specifications and maintenance instructions as described in the Plan, in order to ensure the proper operation and capacity of the equipment.

When OWS are used to meet secondary containment requirements, their capacities do not count toward a facility's overall storage capacity. Any volume of oil that would flow into these separators would come from another source within the drainage areas and are already counted in the facility storage capacity determination. However, slop tanks or other containers used to store waste oil that is transferred out of these separators do count toward the facility's total storage capacity. Furthermore, the SPCC rule does not require redundant secondary containment around OWS used for secondary containment (i.e., tertiary containment is not required).

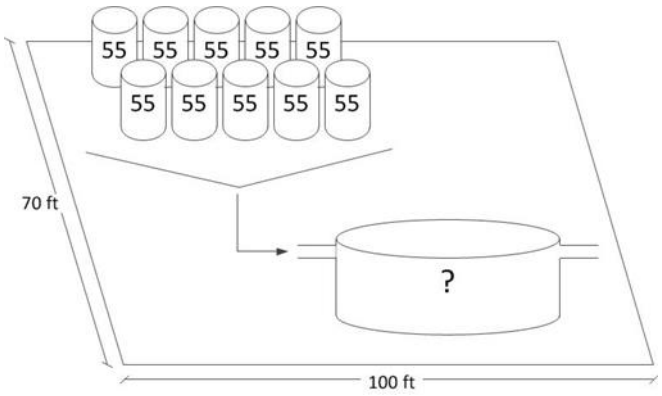
Figure 5-7: Example calculation of secondary containment for a drum storage area using an oil/water separator.

The following example includes an oil/water separator used to provide secondary containment for a drum storage area:

Scenario: An automotive facility stores up to 10 55-gallon containers of lubricating oil in its outdoor drum storage area. This undiked area drains to an oil/water separator. The total drainage area served by the oil/water separator is 70 feet x 100 feet.

Applicable secondary containment requirements: The 55-gallon containers are bulk storage containers, subject to the sized secondary containment requirements of §112.8(c)(2). In this case, the facility is using the oil/water separator to meet the secondary containment requirements. Therefore, the separator must be designed and sized to handle the capacity of the largest container in the area, plus sufficient freeboard to contain precipitation.

Note that because the drum storage area is undiked, the requirements at §112.8(b)(3) and (4) also apply.



Calculation of OWS capacity: After a review of historical precipitation data for the vicinity of the facility, the PE determined that a peak rainfall intensity is 0.6 inch per hour is the most reasonable design criterion for this undiked area, based on local conditions. The site is 100 percent impervious nd therefore the full volume of precipitation that falls on the drainage surface is expected to flow into the oil/water separator.

Volume of largest container in area = 55 gallons
Drainage surface area = 70 ft x 100 ft = 7,000 ft^2
Precipitation volume (per hour) = 7,000 ft^2 x (0.6 in /12 in=0.05 ft) = 350 ft^3
Precipitation volume (per hour) in gallons = 350 ft^3 x 7.48 gal/ft^3 = 2,618 gallons
Total volume = 55 gal + 2,618 gal = 2,673 gallons
Flow rate = 2,673 gallons / 60 minutes/hour = 44.6 gallons/minute

The OWS must be capable of handling a flow-rate of 44.6 gallons per minute. Additionally, the OWS must have sufficient oil storage capacity within the unit to provide storage for 55 gallons of oil plus a reasonable safety to account for oil accumulated from the drainage area itself.

Conclusion: Based on these calculations, the facility has specified a cylindrical separator sized to handle a flow rate of 55 gallons per minute and providing a total volume of 550 gallons, including an oil storage capacity of 110 gallons prior to the recommended pump out. The oil/water separator is maintained so as to preserve storage within the unit at all times under normal operating conditions (pump out is scheduled for 35 gallons). For additional protection, the outlet of the separator is equipped with an afterbay in which absorbent materials are placed.

5.5 OWS Used in Oil Production

5.5.1 OWS Used in Oil Production

OWS are used at both onshore and offshore oil production facilities. Separation and treating installations at an oil production facility typically include equipment whose primary purpose is to separate the well fluid into its marketable or waste fractions (e.g., oil, gas, wastewater, and solids), and to treat the crude oil as needed for further storage and shipping. Separators and other separation equipment, such as heater-treaters and gun barrels, are generally used for this purpose. These flow-through process vessels are considered bulk storage containers and are subject to both the general provisions of §112.7 and applicable requirements of §112.9 for onshore oil production facilities (including bulk storage container requirements of §112.9(c)) or §112.11 for offshore oil drilling, production or workover facilities.

A variety of production equipment is used to separate and treat produced fluids. Some types of equipment are operated under low pressure conditions, while others are operated at high pressure. A process called "free-water knockout" (Figure 5-8) is generally used to separate large volumes of water from oil and gas generated from the well. A two-phase separator separates the well fluids into a liquid (oil, emulsion,[104] or water) and a gas. The liquid exits the bottom of the separator and the gas exits the top (*Figure 5-9*). Gun barrels, also called wash tanks, are generally found in older or marginal fields and are used to provide quiescent conditions and retention time to allow produced water to settle out of the well fluids (*Figure 5-10*). Three-phase separators separate well fluids into oil/emulsion, gas, and water. Gas exits from the top, oil/emulsion from the middle, and water from the bottom of this type of vertical three-phase separator (*Figure 5-11*). Three-phase separators are generally used when there is free water in the well fluids. If there is little or no free water, a two-phase separator might be used instead. Another type of equipment used to separate produced fluids, especially fluid emulsions, is termed a "heater-treater." Heater-treaters use heat, electricity, and/or chemicals to reduce the emulsion viscosity and to separate out free oil, water, and gas in oil production. OWS designs may differ from the examples provided.

FYI – Flow-through process vessels

Flow-through process vessels, such as horizontal or vertical separation vessels (e.g., heater-treater, free-water knockout, gun barrel, etc.) primarily separate the oil from other fractions (water and/or gas) and send the fluid streams to the appropriate container. The intended use of this equipment is what differentiates flow-through process vessels from other bulk and end-use storage containers, such as produced water containers. Produced water containers store well fluids (which may also contain various amounts of oil) after they have been separated and/or treated, prior to disposal or reinjection. Produced water containers are not considered flow-through process vessels; they are considered bulk storage containers when oil is present.

104 An emulsion is a colloidal suspension of a liquid within another liquid. In this case, small droplets of oil are dispersed through water.

Figure 5-8: Low pressure free-water knockout.

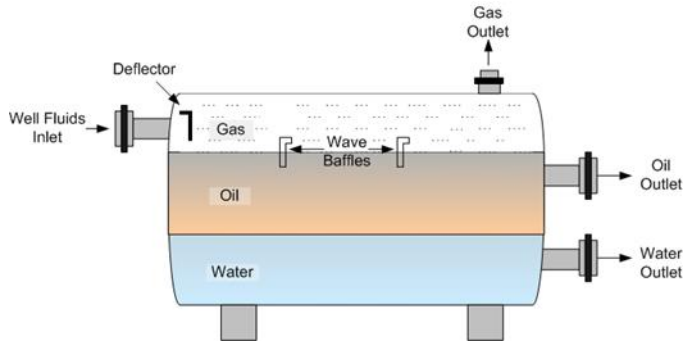


Figure 5-9: Two-phase oil/water separator.

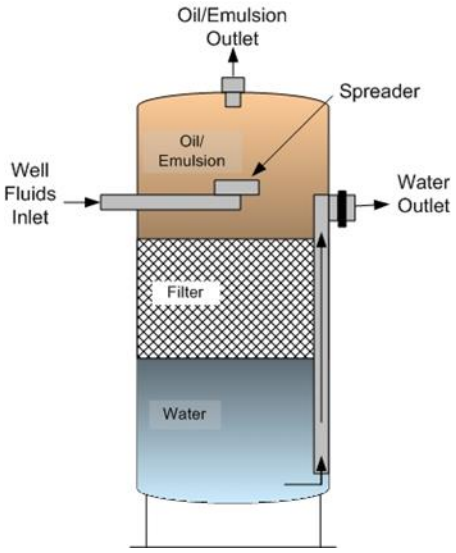


Figure 5-10: Gun barrel oil/water separator.

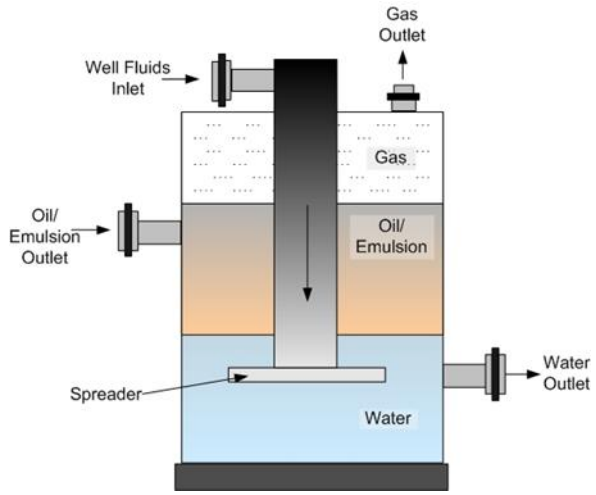
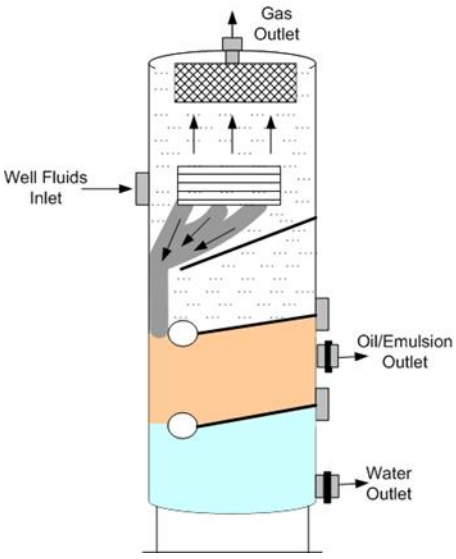


Figure 5-11: Three-phase oil/water separator.



In oil production separators, the momentum of the fluid flow is absorbed at the inlet, thereby reducing the fluid viscosity and allowing oil, gas, and water to separate out of solution. Gas then rises and flows out at the top of the separator, while oil and water fall to the lower portion of the vessel and coalesce in separate areas. With the appropriate settling time, the more dense free water settles beneath the less dense oil. Liquid levels are maintained by float-actuated control valves or dump valves. As the different pre-set liquid levels are reached, dump valves discharge water and oil from the separator to appropriate storage areas:

- Water is discharged from the bottom of the separator to a water tank;

- Oil is discharged out at a higher level to an oil storage tank; and
- Gas flows continuously out at the top of the separator to sales, a meter run, a flare, or a recovery system.

5.5.2 Applicability of the SPCC Rule to OWS Used in Onshore Oil Production

OWS used in oil production count toward the total storage capacity of the facility and must be considered when determining if a facility is regulated by the SPCC rule in accordance with §112.1(b) and (d)(2) and the definition of storage capacity in §112.2. In determining applicability of any container for calculating the total facility storage capacity, the preamble to the 2002 rule states:

> *The keys to the definition are the availability of the container for drilling, producing, gathering, storing, processing, refining, transferring, distributing, using, or consuming oil, and whether it is available for one of those uses or whether it is permanently closed. Containers available for one of the above described uses count towards storage capacity; those not used for these activities do not. Types of containers counted as storage capacity would include some flow-through separators, tanks used for "emergency" storage, transformers, and other oil-filled equipment. (67 FR 47081, July 17, 2002)*

Onshore oil production facilities with flow-through process vessel OWS (e.g., heater-treater, free-water knockout, and gun barrel) and other separation/treatment installations are required to follow the specific sized secondary containment requirements for bulk storage containers in §112.9(c)(2) and the inspection requirements of §112.9(c)(3). However, as an alternative to sized secondary containment, the facility owner or operator may provide general secondary containment in accordance with §112.7(c), and comply with the following §112.9(c)(5) provisions for flow-through process vessels at oil production facilities:

§112.9(c)(2)

Except as described in paragraph (c)(5) of this section for flow-through process vessels and paragraph (c)(6) of this section for produced water containers and any associated piping and appurtenances downstream from the container, construct all tank battery, separation, and treating facility installations, so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. You must safely confine drainage from undiked areas in a catchment basin or holding pond.

Note: The above text is an excerpt of the SPCC rule. Refer to the full text of 40 CFR part 112.

- Periodically and on a regular schedule, visually inspect and/or test flow-through process vessels and associated components (such as dump valves) for leaks, corrosion, or other conditions that could lead to a discharge, as described in §112.1(b)
- Take corrective action or make repairs to flow-through process vessels and any associated components as indicated by regularly scheduled visual inspections, tests, or evidence of an oil discharge; and

- Promptly remove or initiate actions to stabilize and remediate any accumulations of oil discharges.

It is important to note that the general secondary containment requirements under §112.7(c) still apply to flow-through process vessel OWS in addition to the alternative requirements described above. The secondary containment system must be designed to address the typical failure mode, and the most likely quantity of oil that would be discharged, and can be either active or passive in design (see *Chapter 4: Secondary Containment and Impracticability*, *Section 4.8.1*).

Furthermore, the owner/operator of the facility must install sized secondary containment and comply with bulk storage container inspection requirements (§112.9(c)(2) and (c)(3)) for flow-through process vessels within six months of a discharge(s) from flow-through process equipment as described below and a report must be submitted to the RA in accordance with the requirements of §112.4:

- More than 1,000 U.S. gallons of oil in a single discharge to navigable waters or adjoining shorelines, or
- More than 42 U.S. gallons of oil in each of two discharges to navigable waters or adjoining shorelines within any twelve month period.

This excludes discharges that are the result of natural disasters, acts of war, or terrorism. When determining the applicability of this SPCC reporting requirement, the gallon amount(s) specified (either 1,000 or 42) refers to the amount of oil that actually reaches navigable waters or adjoining shorelines not the total amount of oil spilled. EPA considers the entire volume of the discharge to be oil for the purposes of these reporting requirements.

FYI – Process equipment at non-production facilities

Similar flow-through process equipment at non-production facilities (i.e., oil-filled manufacturing equipment, such as reaction vessels, fermentors, high pressure vessels, mixing tanks, dryers, heat exchangers, and distillation columns) are not subject to the more stringent sized secondary containment and inspection requirements required for bulk storage containers; only the general secondary containment requirements at §112.7(c) apply.

Process equipment at a facility other than an oil production facility, such as at a manufacturing facility, is typically attended during hours of operation. Therefore, there is a greater potential to immediately discover and correct a discharge at non-production facilities than at oil production facilities, which are generally unattended. For this reason, EPA requires the inspection of flow-through process vessel components; prompt removal of any oil accumulations, and corrective action should a discharge occur.

See 73 FR 74277, December 5, 2008

5.5.3 Applicability of the SPCC Rule to OWS Used in Offshore Oil Production

Offshore production facilities are subject to requirements under §112.11 of the SPCC rule, which are tailored specifically for the offshore operating environment. Therefore, OWS used at off-shore oil production facilities are not eligible for the alternate compliance option in §112.9(c)(5) as described in *Section 5.5.2*. Flow-

through process equipment at offshore facilities are subject to the general requirements of the SPCC rule under §112.7, including the secondary containment requirement in §112.7(c).

OWS used in offshore oil production are also subject to the provisions of §112.11(b) and (d) to prevent a discharge of oil. However, if other provisions of the rule (except secondary containment) can be met through alternative methods that provide environmental equivalence for this equipment, then the Plan must include a description in accordance with §112.7(a)(2).

Vessels and equipment, such as glycol dehydrators and inline heaters that treat only gas and that do not separate, treat, or contain oil, are not subject to the SPCC rule.

§112.11(b)

Use oil drainage collection equipment to prevent and control small oil discharges around pumps, glands, valves, flanges, expansion joints, hoses, drain lines, separators, treaters, tanks, and associated equipment. You must control and direct facility drains toward a central collection sump to prevent the facility from having a discharge as described in §112.1(b). Where drains and sumps are not practicable, you must remove oil contained in collection equipment as often as necessary to prevent overflow.

§112.11(d)

At facilities with areas where separators and treaters are equipped with dump valves which predominantly fail in the closed position and where pollution risk is high, specially equip the facility to prevent the discharge of oil. You must prevent the discharge of oil by:

(1) Extending the flare line to a diked area if the separator is near shore;

(2) Equipping the separator with a high liquid level sensor that will automatically shut in wells producing to the separator; or

(3) Installing parallel redundant dump valves.

Note: The above text is an excerpt of the SPCC rule. Refer to the full text of 40 CFR part 112.

5.5.4 Wastewater Treatment Exemption and Produced Water

At oil drilling and oil production facilities, treatment units subject to the rule include produced water containers, open oil pits or ponds associated with oil production operations, OWS (e.g., gun barrels), and heater-treater units. Open oil pits or ponds function as another form of bulk storage container and are not used for wastewater treatment (67 FR 47068, 47069, July 17, 2002). Therefore, as a type of oil treatment equipment, oil water separators at production facilities are not eligible for the wastewater treatment exemption.

The SPCC rule's wastewater treatment exemption specifically states that the production of oil is not wastewater treatment for the purposes of §112.1(d)(6). The goal of an oil production, oil recovery, or oil recycling facility is to maximize the production or recovery of oil, while eliminating water and other impurities in the oil, whereas the goal of a wastewater treatment facility is to purify water. Neither an oil production facility nor an oil recovery or recycling facility treats water; instead, it treats oil. Treatment of produced water and oil mixtures is not considered wastewater treatment, and thus the wastewater treatment exemption does not apply.

Additionally, oil production facilities generally lack NPDES or state-equivalent permits or prevention requirements, and thus lack the protections that such permits provide. Underground Injection Control (UIC) permits do not have surface water prevention requirements for

§112.2

Produced water container means a storage container at an oil production facility used to store the produced water after initial oil/water separation, and prior to reinjection, beneficial reuse, discharge, or transfer for disposal.

Note: The above text is an excerpt of the SPCC rule. Refer to 40 CFR part 112 for the full text of the rule.

production facilities. Production facilities are normally unattended and therefore lack constant human oversight and inspection. Produced water generated in the production process normally contains saline water as a contaminant in the oil, which in addition to the toxicity of the oil might aggravate environmental conditions in the case of a discharge (67 FR 47068, July 17, 2002). In some areas of the United States, produced water is fresh and may be discharged for beneficial use (e.g., irrigation or water for livestock) in accordance with federal and state regulatory requirements.

Therefore, a facility that stores, treats, or otherwise uses produced water remains subject to the rule. Produced water containers at onshore oil production facilities are bulk storage containers and are therefore subject to the applicable requirements in §112.9(c), including the requirement for sized secondary containment. The SPCC rule includes an alternative compliance option for produced water containers at onshore oil production facilities in lieu of sized secondary containment.

For more information on the applicability of the SPCC rule as it relates to oil and water mixtures in produced water or produced water containers, *see Chapter 2: SPCC Rule Applicability*, *Sections 2.2.7* and *2.10.7*. For information on the secondary containment requirements that apply to produced water containers including the alternative regulatory requirements, see *Chapter 4: Secondary Containment and Impracticability*, *Section 4.8.2*.

5.6 OWS Used in Oil Recovery or Recycling Facilities

Oil recycling and recovery activities that collect and consolidate production fluids from multiple oil production facilities in an effort to further recover and treat oil prior to the disposal of production fluids are not eligible for the wastewater treatment exemption because the operations focus on oil treatment rather than wastewater treatment.

These include facilities that are typically discrete and not associated (co-located) with an oil production facility. Operations typically specialize in the treatment of production fluids or other oil recovery activities, and may include disposal, and injection of production fluids. A second type of oil recycling operation that is not eligible for the wastewater treatment exemption includes waste oil recyclers and facilities engaged in the recovery and/or recycling of motor oils, other petroleum oils, and AFVOs.

OWS located at oil recovery or recycling facilities are subject to the provisions of §112.7 and applicable provisions of §112.8(b) and (d) for onshore petroleum and non-petroleum facilities or §112.12(b) and (d) for onshore AFVO facilities. The §§112.8(c) and 112.12(c) provisions (such as sized containment, integrity testing and overfill prevention) for bulk storage containers do not apply because OWS at these facilities function as oil-filled manufacturing equipment and are not bulk storage containers. When OWS are part of a flow-through process, such as that found during oil recovery or recycling activities, OWS are considered oil-filled manufacturing equipment and are excluded from §§112.8(c) and 112.12(c) requirements because they are excluded from the definition of a *bulk storage container* as defined in §112.2 of the rule. However, containers used to store recovered or recycled oil collected from the OWS are bulk storage containers. These bulk storage containers must comply with the §§112.8(c) and 112.12(c) provisions and other applicable requirements.

For OWS used in oil recovery or recycling, the OWS are considered oil-filled manufacturing equipment and are subject to the provisions of §112.7 and applicable provisions of §112.8(b) and (d) for onshore petroleum and non-petroleum facilities or §112.12(b) and (d) for onshore AFVO facilities. The Plan must address the general requirements under §112.7 for the OWS including a description of how the facility complies with the secondary containment requirement under §112.7(c).

5.7 Documentation Requirements and the Role of the EPA Inspector

5.7.1 Documentation by Owner/Operator

OWS used exclusively for wastewater treatment are exempt from all SPCC requirements, and no documentation is required for this equipment in the SPCC Plan.

For OWS used to meet SPCC secondary containment requirements, the SPCC Plan should discuss the separator design capacity, configuration, maintenance, operation, and other elements of the drainage systems that ensure proper functioning and containment of the oil as required by §112.7(a)(3)(iii). Examples of elements that this discussion should include are:

- The presence and configuration of OWS outlets and the presence of other equipment to prevent the accidental release of oil;
- Routine visual inspection of the oil/water separator, its contents, and discharges of effluent;
- Preventive maintenance of facility equipment affecting discharge, including the removal of settled pollutants and collected oil;
- A drainage area that flows to the OWS and corresponding anticipated flow rate of the drainage system to the separator;
- Appropriate capacity of the OWS for oil, wastewater, and, if appropriate, precipitation;
- Provisions for adequate separate storage capacity (based on the containment sizing required by the rule) to contain oil recovered in the oil/water separator; and
- Documentation associated with the maintenance and inspection of OWS.

A separate bulk storage container used to store oil following separation in any OWS (i.e., wastewater treatment, secondary containment, or oil production) is subject to all applicable requirements of 40 CFR part 112, including §§112.8(c), 112.9(c), or 112.12(c) as appropriate.

For OWS used in oil production, the OWS are bulk oil storage containers to be included in the SPCC Plan. The location of these containers must be indicated on the facility diagram and discussed in the general requirements in accordance with §112.7(a)(3). For more information on facility diagrams, refer to *Chapter 6: Facility Diagram and Description*. The Plan must also include a discussion of sized secondary containment

provided for OWS (§112.9(c)(2)), or, in the case where the owner/operator elects to comply instead with the alternate requirements in §112.9(c)(5), include records to document implementation of the alternative measures, including periodic inspection and/or testing for leaks, corrosion, or other conditions that could lead to a discharge as described in §112.1(b); corrective action or repairs to flow-through process vessels and any associated components as indicated by regularly scheduled visual inspections, tests, or evidence of an oil discharge; and prompt removal or initiation of actions to stabilize and remediate any accumulations of oil discharges associated with flow-through process vessels. The Plan must also address the general requirements under §112.7 for OWS including a description of how the facility complies with the secondary containment requirement under §112.7(c).

5.7.2 Role of the EPA Inspector

As with other aspects of the SPCC Plan, the certifying PE will review the use of and applicable requirements for OWS at a facility and ensure that they are consistent with good engineering practice. In the case of a qualified facility, the owner operator will make a similar certification and ensure that the Plan is in accordance with accepted and sound industry practices and standards.

The EPA inspector will verify that any OWS at a facility that are not addressed in the SPCC Plan are in fact used exclusively for wastewater treatment and not to meet any requirement of part 112. This review considers how the OWS is being used at the facility. The EPA inspector should consider the intended use of the separator at the facility (e.g., wastewater treatment, secondary containment, oil production, recovery, or recycling), any flow diagrams illustrating the use of the separator, and the design specifications of the unit in evaluating whether the OWS is eligible for the wastewater exemption. The EPA inspector may also consider the flow-through capacity of the separator, the nature of the oil to be separated (e.g., whether it is an emulsion), and the design specifications of the unit in evaluating the use of the oil/water separator.

For each OWS used to meet SPCC secondary containment requirements, the EPA inspector will verify that the Plan includes a discussion of the separator design capacity, configuration, maintenance, and operation, as well as other elements of the drainage systems that ensure proper functioning and containment of the oil in accordance with §112.7(c), §112.8(c)(2), or §112.12(c)(2). Particularly large drainage areas served by an OWS to meet secondary containment requirements may raise a “red flag” given the large volume of precipitation that may need to be handled by the OWS concurrently with an oil discharge; the inspector should verify that the Plan adequately addresses the ability of the OWS to handle the expected precipitation (considering expected rainfall intensity) and discharge volume given the design treatment flow rate and OWS capacity.

EPA inspectors should note the risk associated with this form of containment and should review the information provided in the Plan regarding the design, maintenance, operation, and efficacy of OWS systems used for containment very carefully. These separators should be monitored on a routine schedule, and collected oil should be promptly removed as appropriate and in accordance with manufactures specifications and maintenance instructions as described in the Plan in order to ensure the proper operation and capacity of the equipment.

OWS (including those used in oil production) that are not eligible for the wastewater exemption must be included in the oil storage capacity calculations for the facility (§112.1(b) and (d)(2) and the definition of storage capacity in §112.2).

When an oil production facility Plan describes compliance with the alternative option for flow-through process vessels in accordance with §112.9(c)(5), then the EPA inspector should verify that the requisite records are included in the SPCC Plan (refer to *Section 4.8.1* and *7.2.9* for a summary of the information to be provided in the Plan).

If the owner or operator of the facility discharges into or upon a navigable water or adjoining shoreline more than 1,000 U.S. gallons of oil in a single discharge, or more than 42 U.S. gallons of oil in each of two discharges within a 12-month period from a flow-through process vessel, and is required to comply with §112.9(c)(2) and 112.9(c)(3), the SPCC Plan must then describe the sized secondary containment and inspection program provided for this equipment.

By certifying the SPCC Plan, a PE attests that the Plan has been prepared in accordance with good engineering practice and with the requirements of 40 CFR part 112, and that the Plan is adequate for the facility. Thus, if OWS uses are properly documented, they most likely will be considered acceptable by EPA inspectors. However, if the documented uses of the OWS appear inappropriate to prevent spills from reaching navigable waters or adjoining shorelines, appear to be incorrect, deviate from the use described in the Plan, are not maintained or operated in accordance with the Plan, or the separator appears to be malfunctioning or out of service, further follow-up action may be warranted. This may include requests for more information or for a Plan amendment in accordance with §112.4(d).