

Collection and Treatment of Oily Wastewater: Regulations Governing Oil/Water Separators (OWS)

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Collection and Treatment of Oily Wastewater

Written by Gregory G. Aymong, Highland Tank

ABSTRACT

The public's increasing interest is the conservation of the nation's water resources, which has directly affected many industries. Impacted industrial facilities are facing increasingly more stringent regulations covering the treatment and discharge of oily wastewater and now risk costly penalties resulting from public pressure for the government to control harmful oil spills and pollutant discharges.

Treatment and spill control can be accomplished in several ways; with an oil/water separator, and in some cases, with the addition of an Advanced Hydrocarbon Filtration System. The method of treatment depends on the concentration and the type of contaminants in question as well as the location of the discharge.

INTRODUCTION

The public's increasing interest is the conservation of the nation's water resources, which has directly affected many industries. Impacted industrial facilities are facing increasingly more stringent regulations covering the treatment and discharge of oily wastewater and now risk costly penalties resulting from public pressure for the government to control harmful oil spills and pollutant discharges.

REGULATIONS GOVERNING OIL/WATER SEPARATORS (OWS)

In general, the federal regulations that may impact an oil/water separator system include:

- Clean Water Act (CWA) – The CWA establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. The CWA comes into play if an industrial facility:
 - discharges treated industrial wastewater to a publicly owned treatment works (POTW) or waters of the United States (including storm sewers).
 - discharges treated runoff to waters of the United States.

Under the CWA, the Environmental Protection Agency (EPA) has implemented pollution control programs such as:

- **National Pollutant Discharge Elimination System (NPDES) Permits** – The NPDES program is the basic regulatory mechanism for ensuring that discharges meet the CWA requirements. If an oil terminal, for example, discharges pollutants, like oil and grease, into bodies of water protected by the CWA, the facility must have a discharge permit. Even if the discharge is treated runoff, it may be controlled by a storm water discharge permit. The permit is like a contract. The permit that the EPA issues will state conditions that are necessary to satisfy water quality standards under the NPDES. The main objective of the permit system is to control and gradually end the discharge of harmful pollutants and all toxic materials into the nation's life sustaining water.
- **Sewer Pretreatment Regulations** - If the industrial facility discharges to a POTW, EPA's general pretreatment regulations, categorical industry pretreatment regulations, and/or a local sewer use ordinance may govern the discharge.

The CWA contains specific provisions that may be applicable to oily discharges to POTWs. These provisions prohibit the discharge of pollutants that:

- cause interference or pass through a treatment works; (This includes petroleum oil in concentrations that will cause interference or pass through; or that will cause the receiving treatment works to exceed effluent limitations.)
 - create a fire or explosive hazard in the sewer system; or
 - result in the presence of toxic gases, vapors, or fumes within the sewer system that may cause acute worker health and safety problems.
- **OPA (Oil Pollution Act)** - Under the authority of the CWA, this oil pollution prevention regulation sets forth requirements for:
 - the prevention of,
 - preparedness for, and
 - response to oil discharges at specific non-transportation-related facilities.

The goal of this regulation is to prevent oil from reaching navigable waters and adjoining shorelines, and to contain discharges of oil. The

regulation requires these facilities to develop and implement Spill Prevention, Control, and Countermeasure (SPCC) Plans and establishes procedures, methods, and equipment requirements.

- SPCC (Spill Prevention Control and Countermeasure) Plans - The SPCC plan states that any "non-transportation facility", with the "potential to discharge oil to waters of the U.S.", and who stores oil or petroleum products on-site in excess of "1,320 gallons (aboveground)/42,000 gallons (underground)", needs to prepare and implement a plan meeting the requirements and intent of the regulation.

General Applicability of SPCC Regulations:

- Applies to any owner/operator of a non-transportation related facility engaged in drilling, producing, gathering, storing, processing, refining, transferring, distributing, using or consuming oil or oil products.
- Facility has a total oil storage capacity greater than:
 - 1,320 U.S. gallons aboveground; or
 - 42,000 gallons U.S. gallons completely buried;
 - Only containers >55 gals apply;
 - Must meet the definition of an oil. Under the SPCC regulation, the term oil includes oil of any kind or in any form including, but not limited to:

<u>Petroleum-Based Oils</u>	<u>Non-Petroleum-Based Oils</u>	<u>Oil Containing Products</u>
Gasoline	Animal-based oil	Oil-based paint
Diesel fuel	Vegetable oil	Oil-based thinner
Motor oil	Biofuel	Oil-based ink
Heating fuel		Parts washer solvent
Jet fuel		Roofing tar
Aviation fuel		
Hydraulic fluid		

- Produced water tank volumes are included if any percentage of the tank contains oil and a skimming type system is not setup to consistently remove it.
- Permanently closed containers are exempt.

AND

- Has a reasonable expectation of an oil discharge into or upon navigable waters of the U.S. or adjoining shorelines.

Oil/water separators used to meet the SPCC requirements for facility drainage or secondary containment are subject to applicable SPCC rule requirements. When oil/water separators are used to meet SPCC requirements, they must be properly operated, maintained, and appropriately sized for the purpose for which they are intended. When oil/water separators are used to meet secondary containment requirements, their capacities do not count toward the facility's overall storage capacity. Furthermore, the SPCC rule does not require redundant secondary containment around oil/water separators used for secondary containment.

- Underground Storage Tanks – EPA's Underground Storage Tank (UST) regulations (40 CFR 280) exempt some underground oil/water separators from being defined as a UST. This exemption applies to separators (treatment tanks) that are regulated under NPDES or pretreatment regulations of the CWA. The states apply varying interpretations of the UST regulations to the oil/water separator and any associated "used oil" tank. Counties, cities, and townships have also initiated local regulations for more control over their respective domain. As a result, underground oil/water separators may be regulated USTs due to the oil contained in the internal holding reservoirs or compartments. This can impose stringent controls, management and reporting requirements, and includes physical requirements such as double-walled construction and electronic leak detection devices.

Whether it's the U.S. EPA, a state's or territory's environmental agency, a specific county's department of health, a city's fire marshal, or a township's sewer authority, you'll find that the stakes have been raised considerably with the enforcement of strict water pollution control laws and regulations that may impact an oil/water separator system.

HOW MUCH OIL IS TOO MUCH?

Federal, state, and some local regulations have established standards for the discharge of wastewater containing oil. These standards vary from finite quantities stated in milligrams per liter (mg/L) to qualitative standards requiring that the wastewater have no visible sheen. Although these standards, and the analytical methodology on which they are based, differ, their intent is clear; to control the discharge of oil into the environment.

More to the point, a harmful quantity of oil, by government definition, is an oil discharge that can "cause a film or sheen upon, or a discoloration of, the surface of the water" or a discharge that can cause a sludge or emulsion to

be deposited beneath the surface of the water or upon adjoining shorelines; more specifically, an oily waste having an average oil content greater than 15 mg/L (NOTE: sometimes written as 15 ppm). A navigable body of water includes just about any creek, stream, lake, river, estuary, bay ocean or adjoining body of water of the United states. The means of discharge may include discharge through a pipe, culvert, ditch, or storm sewer.

The effluent quality requirements for discharge to waters of the U.S. are listed in the facility's NPDES permit. Effluent quality requirements for discharge to POTWs are determined by local and municipal authorities and, therefore, may vary. A range of typical effluent quality requirements encountered (actual state or local limits may vary) are as follows:

DISCHARGE TO:

<u>PARAMETER</u>	<u>WATERS OF THE U.S.</u>	<u>POTW</u>
Oil and Grease, mg/L	15	50 – 100

NOTE: Individual state and local effluent quality requirements vary (e.g. O & G for Waters ≤ 10 mg/L; for POTW ≤ 300 mg/L)

SOURCES AND TREATMENT OF OILY WASTEWATER

The most common sources of wastewater requiring treatment for oil separation are associated with petroleum storage-dispensing and vehicle maintenance activities. Wastewater will commonly contain oil, grease, floating debris, and settleable solids including sand, soil, and mechanical components of vehicles. Cleaning aids such as detergents and solvents will commonly be present.

Wastewater from these facilities can be classified into two general types:

- Interior wastewater, specifically from:
 - Floor and Trench Drains (wastewater from floor spills, floor washing, snowmelt, and rainwater)
 - Vehicle Wash Racks (vehicle wash water and residues from engine steam cleaning)
 - Oil and Grease Lube Areas

Wastewater from these sources will commonly be intermittent in flow. Appropriate discharge would be to a sanitary sewer system if an

oil/water separator provided acceptable treatment, and there are no hazardous wastes present. The separator effluent will be subject to pretreatment requirements established by the POTW.

- Outdoor wastewater, specifically area drainage from:
 - POL (Petroleum, Oil, Lubricant) Storage
 - Fueling Islands
 - Hardstands and Vehicle Parking
 - Aboveground Storage Tank Dikes
 - Loading and Unloading Racks (spills and leaks collected by secondary containment)
 - Oil Containing Equipment Storage Areas

In most cases, oil and grease discharge regulations state that "any facility which discharges a harmful quantity of oil, or any petroleum product, and the oil enters a navigable body of water of the United states, by whatever means, is liable for significant penalties for cleanup costs and ecological damage". Any facility includes, but not limited to, this wide range of industrial applications:

- Airports & Aircraft Services
- Electric Utilities and Power Plants with Electric Switch Yards
- Environmental Remediation
- Industrial and Commercial Facilities
- Military & Government Facilities
- Municipalities
- Parking Areas
- Petroleum Refining, Transport, Storage, and Marketing Facilities
- Railroad Yards
- Service Stations and Convenience Stores with Fuel Islands.
- Trucking and Transportation Companies

Oil/water separators are usually located in vehicle service areas associated with each of these facilities, primarily at:

- Fueling Facilities
- Repair and Maintenance Shops
- Wash Areas

Storm Water Regulations impact many of these industrial facilities, especially trucking and transportation, petroleum storage, and marketing, airports, electric utilities, and municipal-private fleets. EPA regulations have specifically impacted "transportation facilities" with vehicle maintenance

facilities involved with vehicle rehabilitation, mechanical repairs, cleaning, fueling, and lubrication.

DEFINITIONS

OIL: Oil means oil of any kind or in any form, including, but not limited to: fats, oils, or greases of animal, fish, or marine mammal origin; vegetable oils, including oils from seeds, nuts, fruits, or kernels; and, other oils and greases, including petroleum, fuel oil, sludge, synthetic oils, mineral oils, oil refuse, or oil mixed with wastes other than dredged spoil.

See the "List of Petroleum and Non-Petroleum Oils" on the USCG Web site at:

https://homeport.uscg.mil/mycg/portal/ep/contentView.do?contentType=2&channelId=30565&contend=120944&programId=117833&programPage=%2Fep%2Fprogram%2Feditorial.jsp&pageType=13489&BVSessionID=@@@@1350455393.1250257064@@@@&BV_EngineID=cccdadehmkiifjkcfcgfdffhdghm.0

DISSOLVED OIL: The oil fraction that forms a solution with water; or oil that is ≤ 0.5 microns.

EMULSIFIED OIL: Small oil droplets (in the range of 1 to 20 microns diameter) that form a stable suspension in the water as a result of the predominance of interparticle forces over buoyant forces.

FREE OIL: Oil droplets that are of sufficient size (greater than 20 microns in diameter) so that they can rise as a result of buoyant forces to form a defined oil layer on top of the water in an oil/water separator.

RISE RATE: The velocity at which oil droplets move upwards toward the surface of the oil/water separator.

OIL INTERCEPTOR: A gravity oil/water separator designed to remove free oil (150 microns or greater) and some suspended solids. Interceptors are relatively simple, requiring nothing more than an underground, horizontal, cylindrical or rectangular vessel with influent and effluent tees and divided into compartments by a series of vertical baffles.

ENHANCED OIL/WATER SEPARATOR: A gravity oil/water separator that uses more technically sophisticated methods to remove oil globules as small as 20 microns. Enhanced coalescer technology combine the features of both a flat plate coalescer and a corrugated plate coalescer into a new "self-cleaning" design that performs better than traditional plate separators. Equipped with secondary, impingement coalescers, they meet the new Underwriter's Laboratories, Inc. UL SU2215 design, construction, and performance standards for engineered oil/water separators rated at 10-ppm oil and grease.

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ABOUT THE AUTHOR

Gregory G. Aymong is Vice President of Sales for Highland Tank, the largest producer of Storage and Wastewater Treatment Tanks and in the United States. He is also the inventor of the patented Highland Tank Oil/Water Separator and Corella® enhanced coalescer technology and has worked for Highland Tank for 34 years. His numerous equipment and process patents and designs are used extensively by petroleum, industrial, municipal, military and commercial facilities worldwide for the prevention of oil, grease, and hazardous materials spills into the environment.

Mr. Aymong has worked in the industry in the United States and overseas for 40 years and has authored numerous articles on oil/water separators and storage tanks and vessels. Gregory has lectured on "Water Storage Tanks: From Construction to Rehabilitation" for Lorman Education Services. He has spoken about storage and wastewater treatment tanks at many Petroleum Equipment Institute (PEI), National Petroleum Management Association (NPMA), National Institute for Storage Tank Management (NISTM), American Society of Plumbing Engineers (ASPE), American Society of Sanitary Engineering (ASSE), Construction Specifications Institute (CSI), Water Environmental Association (WEA), American Society of Civil Engineers (ASCE), and American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) chapter meetings in the United States and Canada.

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