



KENTUCKY DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WATER
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PREVENTING GROUNDWATER POLLUTION: OIL/WATER SEPARATORS

PREVENTING GROUNDWATER POLLUTION IS EVERYONE'S JOB!

Even if our drinking water comes from rivers, lakes, or reservoirs, we need to be mindful of the things we do that may pollute groundwater. The groundwater beneath us may feed springs or wells being used for someone else's water supply, whether close by or even at a great distance.

THE GROUNDWATER PROTECTION PLAN REGULATION HELPS US PREVENT GROUNDWATER POLLUTION

Once polluted, groundwater is very difficult and expensive to clean up. It is always best to **prevent** groundwater pollution in the first place. That is the purpose of 401 KAR 5:037 the Groundwater Protection Plan Regulation. Section 2 of this regulation lists the activities that require a Groundwater Protection Plan (GPP). Should any of those activities, including oil/water separators, occur at your facility, you must develop a GPP.

OIL/WATER SEPARATORS HAVE THE POTENTIAL TO POLLUTE GROUNDWATER

Lack of knowledge about oil/water separators--their purpose, how they function, and how to properly maintain them--may result in groundwater pollution. This fact sheet will provide basic information and additional sources of information about oil/water separators that will help you to protect the groundwater under your facility.

401 KAR 5:037 Section 2(2)(f) and (o) identify activities associated with oil/water separators which require the development of Groundwater Protection Plans (GPPs).

WHAT FACILITIES NEED OIL/WATER SEPARATORS?

- Quick lube stations
- Transportation fueling stations
- Vehicle/heavy equipment maintenance and repair
- Railroads
- Military installations
- Airports
- Parking lots
- Petroleum handling facilities (refining and storage)
- Utilities
- Businesses using steam or pressure washers
- Fire stations where fire trucks are washed frequently.

WHAT ARE OIL/WATER SEPARATORS?

- Oil water separators are devices used to remove small amounts of oil and other petroleum products from industrial wastewater and/or storm water systems.
- Standard American Petroleum Institute oil/water separators are large capacity underground cement vaults installed between a drain and the connecting sewer pipe. Other brands, PSI for example, market steel single wall, double wall, and UL listed fiberglass jacketed secondary containment construction models.

HOW DO OIL/WATER SEPARATORS WORK?

Oil/water separators use several techniques, depending on the type and application or intended use of the separation system.

Gravity oil/water Separators (Figure 1)

The gravity system is based primarily on the relatively low solubility of petroleum products in water and the difference between the specific gravity of water and the specific gravities of petroleum compounds.

Oily wastewater influent enters the inlet of the separator. Water turbulence is stabilized by the first baffle and solids are settled and accumulated as sludge in the bottom of the separator. As the wastewater flows to the second chamber located at the center of the separator, oil droplets rise to the top of the water and are prevented from exiting by a second baffle. Thus, solid sludges heavier than water can be collected and oil droplets lighter than water can be accumulated on top of the wastewater and routed to a holding chamber or tank.

Gravity oil/water separators are not designed to separate other products such as solvents, detergents, or metals. Misuse of these systems can upset treatment plants, cause discharge permit violations, increase sludge disposal costs and/or eliminate beneficial reuse of wastewater or sludge.

Coalescing Oil/Water Separators (Figure 2)

Gravity type oil/water separators often don't remove enough oil to meet regulatory requirements. In these cases coalescing oil/water separators are needed to enhance separation. In a typical gravity type oil/water separator, an oil droplet must rise about 48 inches to reach the surface and be removed from the flow. Because of this, many of the smaller droplets pass through gravity type oil/water separators unaffected.

Coalescing (binding together) the smaller oil droplets makes them larger and more buoyant, causing them to rise faster. Many coalescing oil/water separators use inclined plates to reduce the distance the oil droplets have to rise to be removed from the flow, hence increasing the separation efficiency of a typical gravity type separator. The inclined plates will allow the droplet to separate after rising only $\frac{1}{4}$ inch before hitting the upper plate and being removed from the water flow. As the oil droplets slide upward along the coalescing plates, they combine with each other to form larger and larger droplets. By the time they reach the top of the inclined plate, they are large enough to rise to the surface quickly on their own.

WHAT SHOULD NOT GO THROUGH AN OIL/WATER SEPARATOR?

- Antifreeze, degreasers, and detergents. They will emulsify oil into small droplets, preventing the oil from floating to the surface.
- Fuels, alcohols, or solvents. They not only can emulsify the oil, but their vapors can pose a threat to line workers at the pump stations or treatment plant.
- Concentrated amounts of oily products. They can overload the baffles or plates and pass through to the sewer.
- Any emulsifiers. The smaller capacity of coalescing units may have more turbulent flows. This “flushing” action, combined with a concentration of any emulsifier, can wash off the residual oils clinging to plates and release large amounts of emulsified oils to the sewer.
- ANY metal finishing, plating, or metal recovery water. Oil/water separators are not designed to treat heavy metal-bearing wastewater. This type of discharge will require chemical treatment or special equipment for acceptable discharge. Examples of heavy-metal bearing wastewater are:
 - Hot tank and cabinet washer solutions from auto repair or machine shops
 - Pressure-wash water from ship and boat yards.
 - Water-soluble machine coolant.

OPERATION AND MAINTENANCE

The ability of oil/water separators to function properly depends upon routine service and maintenance. Operators need to understand the separation process and the components of the specific oil/water separator under their responsibility. The operator should make frequent inspections of all parts of the separator and its draining system to prevent failures caused by operations, breaks, and mechanical settings. The operator must also be familiar with the capacity of the separator and holding tanks, uses of the system, and its potential misuses to be able to determine periodic draining and cleaning requirements.

Maintaining an Oil Water Separator

- Recommended inspection frequency: at least every 6 months.
- Save maintenance costs by diverting oils and sludge out of the separator. The sooner the oils are removed, the less the chance they will become emulsified. Oils that are free-floating can be carefully vacuumed off with a wet/dry vacuum. This oil should be stored in a separate drum for proper disposal.
- Oil may also be removed by use of absorbent pads. These float on top of the water and attract only the oil. The pads should be placed in the inlet chamber to trap the oils before they get a chance to migrate. Pads should be checked often so they do not become saturated. These pads can be wrung out and reused if handled properly.
- Sludges (caked-on grease and oily dirt buildup on the bottom of the separator) are expensive to dispose of and difficult to clean out. A catch basin, installed before the separator, can be shoveled out and will trap solids before they wash into the separator. This can be very helpful to facilities cleaning muddy equipment.

The sludge should be collected in a drum and tested to determine proper disposal methods.

Sludge Disposal

1. Check the Yellow Pages under Tanks--Cleaning. Bulk liquid-sludge should be shipped to a licensed treatment facility where oils, solids, and heavy metals are separated from the water. Treated water then goes to the sewer.
2. Septic tank services should NEVER be used to clean an oil/water separator or catch basin!

FOR ADDITIONAL INFORMATION:

<http://www.westp2net.org/facts/USAF3.HTM> for fact sheet: Oil/Water Separators

<http://splash.metrokc.gov/wlr/indwaste/oilfact.htm> for Oil/Water Fact Sheet

Figure 1--American Petroleum Institute Oil/Water Separator

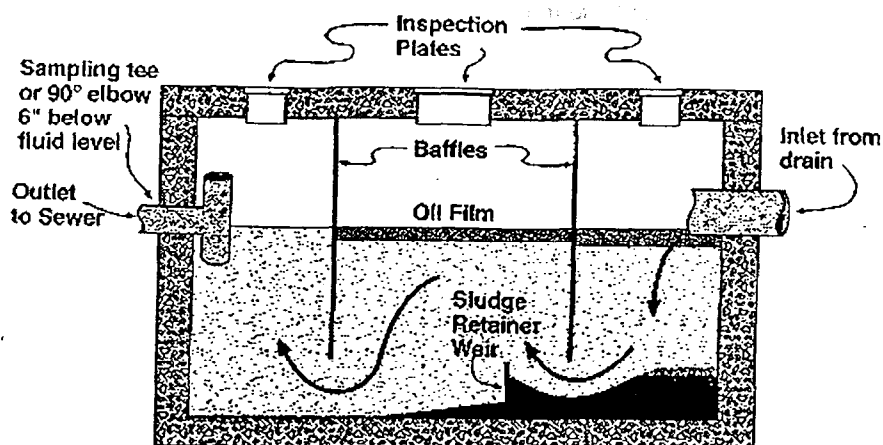


Figure 2--Coalescing Plate Separator (CPS)

