

Emulsifiers and dispersants

What happens when oil spills into water or on the ground?

- Oil and water do not readily mix, most of the oil will float on the water as a layer of “free product.”
- Oil floating on water will begin to dissolve into water at part per million concentrations.
- The surface of an oil puddle emits vapor into the air. This vapor may be very ignitable as in the case of gasoline, or not very ignitable as with asphalt.
- Oil spilled onto water can cause a fish kill, oil birds, or otherwise wildlife harm. Petroleum products are toxic. The degree of toxicity of an oil generally follows its flammability, from highly toxic gasoline through less toxic heavy oils.
- Oil spilled onto ground will kill or stress vegetation.
- Oil spilled onto ground will percolate through the soil, leaving oil-contaminated soil. If there is a large enough amount of oil or shallow groundwater, the oil will eventually reach the water table. Oil will then float on and dissolve into the groundwater and flow with it.
- Oil-contaminated soil can be naturally degraded by bacteria and microbes present in the soil. If microbes, oxygen, and the right nutrient mix are present, the petroleum will eventually be degraded.

How do emulsifiers and dispersants work?

An emulsifier or dispersant acts like detergent, dissolving the oil into the water. Instead of an oil layer on top of the water, there is dissolved oil and invisible oil droplets in the water. The dispersant dissolves the oil and disperses throughout the water column rather than allowing it to float on the surface.

Does an emulsifier or dispersant eliminate the fire hazard?

Research in Canada has revealed that emulsified oil generates more vapor in sewers than does oil floating in the sewer. This is because there is a tremendous amount of surface area from all the tiny oil droplets. That greatly increased surface area releases much more vapor than does the smaller surface area of a layer of floating oil.

What else does emulsified oil do?

The greatly increased amount of oil dissolved in the water is much more exposed to the living things in the water column and thus toxicity is greatly increased. For a land spill, the emulsified oil is much more mobile in soil, and will reach groundwater more quickly. Once in the groundwater, it will move more quickly and further than free-product oil.

Why does it sometimes okay to use dispersants on the ocean?

First, in the ocean, there is a tremendous amount of water available for dilution of the dissolved oil and the oil droplets. Secondly, many aquatic organisms can move out of the area of dissolved oil. Third, nobody drinks

ocean water. In addition, use of dispersants on any water is prohibited by federal law without the specific permission from the U.S. Environmental Protection Agency (EPA) or U.S. Coast Guard to use the dispersant on any particular spill.

What are the alternatives to using emulsifiers or dispersants?

Other response options for petroleum spills are using mechanical recovery, such as vacuum trucks, sorbents, such as sand, kitty litter, or synthetic pads or booms, or using solidifying agents.

Mechanical recovery is typically used if there is a substantial amount of oil to recover. If recovering the oil is difficult, such as in a sewer line, explosion-proof pumps and vacuum trucks are typical equipment used by an emergency response contractor. Some companies have the equipment and training to do their own mechanical recovery.

In any case, if large amounts of oil are spilled and need mechanical recovery, Minnesota Pollution Control Agency (MPCA) staff will direct and sometimes oversee the spiller's recovery of the oil. Usually, sorbent is used after mechanical recovery to collect any residual product.

Sand, kitty litter, ground corncobs, and other sorbents can control the spread of oils until it can be picked up and can be used to sorb the oil. These sorbent materials can be thin-spread on acceptable ground for bacterial degradation. Or, they can be sent to an asphalt plant or incinerator that has the proper air pollution controls and permits.

Synthetic sorbent pads and booms can be lowered into sewers, placed at sewer outfalls or placed across waterways to catch oil. These manufactured fabric sorbents can be disposed of in permitted incinerators. The MPCA maintains lists of permitted treatment facilities and incinerators in the state that can treat or dispose of contaminated sorbent.

Solidifying agents can be sprinkled or sprayed on a puddle of oil or spread in front of a stream of oil. These products will mix with the oil and make a thick, optimally rubbery compound which keeps the transformed oil in place until it is removed. The solidified oil can be disposed of at permitted incinerators.

How can the MPCA help?

The MPCA conducts fire department training that includes demonstration of sorbent and containment boom use and oil spill response strategies. Often, MPCA staff supply some sorbent and select response equipment to the department after the training.

If a fire department uses sand or other sorbents and collects a significant amount of it into barrels or other containers, the MPCA will make the spiller properly dispose of it or the agency will send a contractor to pick up and dispose of it.

For significant spills, the MPCA will direct the cleanup done by the spiller or, if the spiller does not or cannot act, the MPCA will send out one of the state's contractors to do the cleanup.

If a fire department has extraordinary expenses resulting from an oil or chemical spill, it can apply to the MPCA for partial reimbursement. See the [Reimbursement options for local responders fact sheet](#) available at <https://www.pca.state.mn.us/emu-publications> for more information.

For more information

For more information on spill reporting, prevention, cleanup and disposal, call the MPCA at 651-296-6300 or 800-657-3864 and ask for a member of the Emergency Management Unit or visit <https://www.pca.state.mn.us/waste/emergency-response>.

More information is also available on the website of the U.S. EPA at <http://www.epa.gov/oilspill/>.