

# The ENVIROCENTER Process



## APPLICATIONS

Onshore and offshore drilling and completion projects that require proven support for drilling waste reduction programs; fluids reuse, recycling and recovery; and drilling waste disposal.

## PROBLEMS

Regulatory restrictions against the disposal of, and the high costs of traditional treatments for:

- Oil-, synthetic- or diesel-base drilling fluids contaminated with water or brine
- Water or brine contaminated with oil-, synthetic- or diesel-base drilling fluids
- Oil-base drilling fluids sediment from boat-cleaning operations

## SOLUTIONS

M-I SWACO ENVIROCENTER\* facilities, located in strategic areas worldwide, provide a chemical and mechanical separation process for reclaiming and reusing drilling and completion fluids, processing for separated water, and boat-cleaning services.

## ECONOMICS

The ENVIROCENTER concept gives operators a way to optimize the economics of using expensive, premium drilling and completion fluids. In addition, zero-discharge limitations require support programs, such as those found at ENVIROCENTER facilities, in order to avoid costly fines.

## ENVIRONMENTAL

The ENVIROCENTER process provides an environmentally proven solution for operators working in highly regulated areas where zero discharge and waste minimization are high priorities.

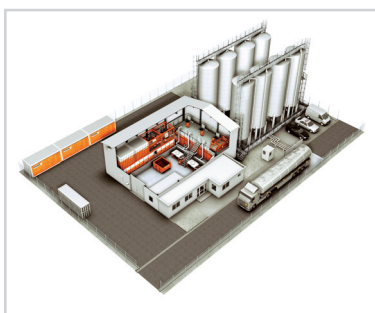


With ever-stricter environmental regulations shifting toward true zero-discharge, drilling wastes are becoming an increasing liability. Even with careful well planning, friendlier fluid systems and excellent solids-control programs, we will still have some drilling wastes. The challenge then becomes how to manage the cuttings, fluids and other materials that are generated.

M-I SWACO has the solution to handle bulk fluid waste as a resource and recycle these components back as high-quality drilling fluids. This is the ENVIROCENTER concept.

## Not all drilling waste has to go to waste

Where some companies see drilling-fluids waste as something to be disposed of, M-I SWACO sees an opportunity to dramatically reduce our customers' waste



streams, disposal costs and environmental liability. Through our ENVIROCENTER facilities, customers can not only call on us to recover and treat contaminated drilling and completion fluids, but also recycle the reclaimed, reusable fluid constituents as raw material for producing fresh drilling and completion fluids.

The drilling-fluid-treatment process has a remarkable average of 90% reduction of the total waste volume and an average recovery of 36% of the total volume as high-quality drilling fluid. The 90% recovered includes reclaimed water, brine, drilling fluid and base oil that otherwise would be sent off for disposal. Depending on fluid type and value, level of contamination, cost of disposal and environmental regulations, the recovered drilling and completion fluids can be used anywhere in the world.

The ENVIROCENTER concept became a success when new processes and chemicals made reclamation of water- or brine-contaminated oil-base drilling fluids possible, similar to completion-fluids reclamation.

ENVIROCENTER facilities offer several services, all integrated with the overall goal of waste minimization, fluid reuse, increased operator profit and improved margins.

## Our waste minimization priorities optimize your environmental program

Very often, people confuse the terms “recycle,” “recover” and “reuse,” or they consider all of them simply as “recycling.” M-I SWACO ENVIROCENTER facilities consider and treat drilling wastes in very specific manners, according to a plan that can be illustrated with an inverted pyramid. We will always strive to manage wastes at the highest possible (widest) level of the pyramid.

The highest level of waste minimization works to *reduce* the waste at its source; the best kind of problem is the one you never have.

At the second highest level, we will help our customers *recycle* and *reuse* components as much as possible in their original form. If you can reuse a drilling fluid nearly as-is, with only a minor treatment for fines removal for example, we can help make that happen. We can *recycle* some components for uses other than their original purpose. For example, using recovered water for washing boat tanks.

Near the bottom, at the third-lowest level we *recover* components, and at the second-lowest level we *treat* fluids or components — trying to move them up the pyramid, perhaps to reuse them in formulating a fresh batch of fluid.

At the lowest level, we isolate the *residue* and dispose of this in a responsible manner, after we have exhausted all other possibilities.

Unfortunately, most so-called waste-management companies today are at the lowest level of waste minimization, acting merely as disposal companies rather than as waste managers.

## The advantages of ENVIROCENTER waste management over other processes

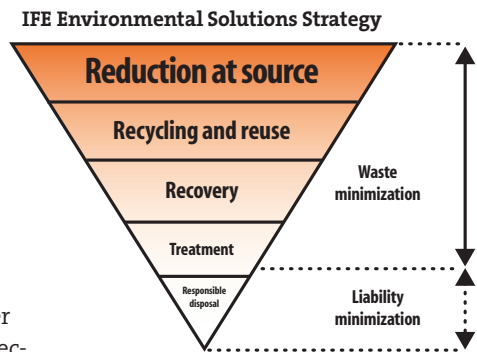
When oil- and synthetic-base drilling fluids become contaminated with water or brine, the economical consequences are substantial. Restoring the proper Oil-to-Water Ratio (OWR) and electrical stability often requires large adjustments to the base oil, emulsifier, wetting agents, organic clays, salt and other components. So what are the options?

Offshore discharges are out of the question because of environmental regulations. Thermal desorption is an alternative, but it is relatively costly to heat and evaporate large quantities of water in order to recover the oil phase. Incineration requires fuel to burn the fluids, and it recovers nothing: not a very good course where premium fluids are concerned. And while Waste Injection (WI) removes the fluid, there is no recovery for reuse and recycling.

The solution to these shortcomings found in other processes is the ENVIROCENTER method, a chemical and mechanical separation process with financial and environmental benefits to the operator.

## What can the ENVIROCENTER process treat?

**Oil-, synthetic- or diesel-base drilling fluids contaminated with water or brine.** The original oil- or synthetic-base drilling fluids will normally have a liquid phase with an OWR or Synthetic-to-Water Ratio (SWR) of 80:20. Drilling fluids typically become contaminated with excess water during low-efficiency



wellbore displacements to water or brine, or from a water-line valve left open and leaking into pits, etc., both of which take the drilling fluids far out of specification. After contamination, we typically receive 50 to 90% water and 10 to 50% drilling fluids.

**Water or brine contaminated with oil-, synthetic- or diesel-base drilling fluids.** Water or brine will become contaminated with drilling fluids during wellbore displacements when water or brine is used to displace the fluid. Contamination also occurs during deck and/or pit washing where large quantities of water are used. The water in the tanks will appear to have an oil film at its surface and small amounts of sediment on the bottom. This oil film is typically in the range of 1 to 10%, that is, more than 40 ppm of Total Petroleum Hydrocarbon (TPH).

## Oil-base drilling fluids sediment from boat-cleaning operations.

During cleanout of drilling fluids tanks (mud pits) on the drilling rig/platform or storage tanks on the supply/standby boat, the main constituent will be sediments and wash water. Depending on whether this is a manual-cleaning (low volumes) or automatic-cleaning (high volumes) process, the amounts of wash water may vary and therefore the percentage of sediments in the water will vary accordingly. The recovered sediments typically contain 70% weighting material and some small fraction of drill solids, with the heaviest particles settling faster. Usually, barite has a Specific Gravity (SG) of 4.2, and typical drill solids from clay formations have a 2.6 SG.

