

# Company initiatives show drilling industry is taking environmental commitment to heart

By Jerry Greenberg, contributing editor

BEING ENVIRONMENTALLY friendly is a great catch phrase, but it doesn't mean much if companies and people don't take that commitment to heart. This means not only making a commitment to protect the environment by using the best resources and programs available to reduce environmental hazards but also winning the hearts and minds of employees who take the commitment seriously. In that respect, there is perhaps no industry more aware of the environmental consequences of its actions and does more to mitigate environmental hazards than the oil and gas industry.

Sometimes it seems that the environmental bandwagon hasn't been rolling very long, but some drilling contractors have been protecting the environment with rig-based initiatives and programs for at least two decades. Closed-loop mud systems result in pitless drilling operations in Alaska, New Mexico and West Texas, for example.

**Noble Drilling** was the world's first to receive DNV's environmental 14001 certification in 1999, with the Noble Lynda Bossler jackup. Today, the company's entire 50-plus rig fleet is 14001-certified. The company also installed low-emission engines in its newest semisubmersible, the Noble Clyde Boudreaux, years ahead of the mandate requiring such clean-burning engines.

Drilling contractors include environmental training as part of safety training for new employees. IADC's RIG PASS training includes an environmental module that most contractors utilize. But many go beyond that. Some contractors have established a "Spill Champion" on rigs whose job is to check for spills, leaks or potential spills/leaks. Noble has two Spill Champions on each rig, one per shift.

## ENVIRONMENTAL PLAN

Aside from pioneering ISO 14001 certification among offshore drilling contractors, Noble Drilling has created a greenhouse gas emissions inventory for its global rig fleet. Performance and emission levels of rig engines are continually monitored. In 2001, Noble became the first drilling contractor to measure and



In 2006, Noble's participation in the Recycle the Gulf program resulted in more than 100 tons of recyclable materials being gathered from its Gulf rigs.

report greenhouse gas emissions based on fuel consumption as well.

The company also initiated a program to replace its existing diesel engines as needed with the best available technology for the particular application. For example, in 2006 the company utilized the **Caterpillar** C280 diesel engine on the Noble Dave Beard semisubmersible, the first such application in a marine power generation capacity. The engine exceeds the relevant US Environmental Protection Agency (EPA) and European Union environmental requirements for engine emissions.

Low-emission diesel engines also are used on its newest semisubmersible, the Noble Clyde Boudreaux. "Part of our mandate is to minimize our environmental footprint wherever possible, starting with rig selection and design," said **Peter Bridle**, director of HSE & quality for **Noble Drilling Services**.

"We take a hard look at all the products and services that get built into the rig,

and ask, 'What is the environmental footprint of that particular component or appliance or equipment?'"

The company also has an extensive recycling program aboard most of its rigs. In 2006 (the most recent year with full figures), six of its seven divisions had active recycling programs. The divisions recycled more than 668,000 gallons of oil and lubricants and approximately 3.3 million lbs of paper products, glass, aluminum, plastic and metal.

In 2002, it began participating in the Recycle the Gulf program, donating its recyclables to Arc of New Iberia, La. In 2006, Noble's Gulf Coast Division collected more than 100 tons of recyclable materials from its Gulf rigs.

## FROM TRAINING TO AWARENESS

**Grey Wolf Drilling Co's** environmental management system assures that it meets all regulations and guidelines of

state and federal governments. It has implemented a spill response plan, uses IADC's RIG PASS program, and conducts monthly on-site training that includes environmental awareness.

"Whenever we talk about our safety culture, we also discuss our environmental culture because both are related," said **Drew Davis**, Grey Wolf HSE manager. "Environmental protection is part of safety because if something happens to harm the environment, it is usually because of a safety-related incident.

"We also conduct quarterly inspections on our rigs that include environmental compliance," Mr Davis said.

The company's spill response plan, developed by a third party but implemented by Grey Wolf, provides guidelines and procedures in case of a spill. It also includes information about the volume of hydrocarbon-bearing tanks, such as diesel tanks. "Those levels are reported and kept on-site in our manual as part of our spill response plan so everyone knows how much volume is on each rig," he said.



**For Grey Wolf, "environmental protection is part of safety because if something happens to harm the environment, it is usually because of a safety-related incident," said HSE manager Drew Davis. Above, Grey Wolf's Rig 841 is seen operating in Sublette, Wyo., in the Rocky Mountain Division.**

The company's environmental initiatives also apply to its trucking division. Because it transports not only rigs but also fuel and oil, hazard awareness training is conducted to help workers recognize potential problems. "We are moving equipment over public high-

ways so we have to make sure we meet Department of Transportation regulations," he said.

"We make sure that equipment with oil and other fluids have drip pans and that they are also cleaned out and have

**H&P encourages all incidents to be reported, no matter how small, said HSE vice president Warren Hubler. At right, H&P Rig 271, a FlexRig4, is seen working near Parachute, Colo.**



the proper containment,” he continued. “That is the normal way of doing this business.”

Grey Wolf also assures that its equipment meets Tier 2 regulations, in part because some of its rigs are operating in highly sensitive Bureau of Land Management (BLM) acreage. “We make sure that proper emission controls are in place,” Mr Davis explained. “We have also conducted noise surveys to make sure that we can minimize noise pollution.”

## SPILL PREVENTION

“We encourage open reporting of all incidences, no matter how small, without fear of personal negative consequences,” said **Warren Hubler, Helmerich & Payne** vice president, HSE.

The company uses its offshore environmental operations as the benchmark for environmental stewardship across its entire fleet. The objective is for land-based drilling contractors to get their crews to report all instances, no matter how small. That is in addition to its normal safety and environmental awareness training for its rig crews.

“Our environmental training for our crews is based around the contents of the SPCC plan,” Mr Hubler said.

“Those plans are written by professional engineers, signed by the line management of the operations staff and delivered to the crew in the form of training,” he continued. “(The crew) is aware of the potential environmental threats on their rig, and the emergency response steps and the spill containment and cleanup materials located on-site.”

Spills are incorporated into an HSE database that is used to identify trends and improvement opportunities. For example, the data might show that a repeated hose failure resulting in a spill is tied to a particular brand of hose, and the company may change suppliers to mitigate future spills.

H&P has identified two primary sources for volume spills, however, and both are human error. One is leaving fluid transfers unattended, Mr Hubler noted, and the other is improper line-up of valves. One initiative to reduce those risks is the integration of environmental concerns into the job safety analysis (JSA). “Some operations therefore change the JSA to JSEA,” he explained.

“For example, if a JSA involves a fluid transfer, the identification of the proper sequence of valve line-ups is involved. Some rigs will carry it a step further and create a line diagram and/or a valve checklist to ensure we have the proper valve line-ups.”

Other initiatives include continued training, education and internal safety alerts to share lessons learned. Safety alerts include topics such as OSHA recordable injuries and environmental spills that might have occurred and are shared across the company’s rig fleet.

Another initiative is the use of a single resource for disposal of fluids “to avoid multiple handlers and eliminate the possibility of spills occurring from one source to another,” Mr Hubler said. “For example, one company does our oil changes, and we also buy our fuel from them. We also return our used oil to them for recycling or disposal.”

## ALASKA PITLESS DRILLING

**Nabors Alaska** and other drilling contractors in the region utilize what is termed pitless drilling, or using a closed-loop mud system to drill development wells. Nabors has been using this type of mud system for at least two decades. Fluids are re-circulated into the system while the cuttings are discharged into 400-bbl tanks. Since the cuttings are relatively dry, the tanks are emptied by a truck called a Super Sucker that then transports them to a mill to be ground, then injected into a disposal well.

Exploratory drilling in the region is conducted during a 5-6 month period in the winter when the ground is frozen enough to support the rig. During exploration drilling, the cuttings are discharged into 10-bbl tanks and spread on ice pads in an area similar to a berm where they freeze. The cuttings are then transported to a ball mill for grinding and injecting.

Most of the grinding and injection facilities are owned and run by operators, although Nabors owns some portable units where it can grind and inject the cuttings at the rig site.

The company also has an extensive preventive maintenance system that is one of its main processes for checking for leaks and spills. “We have a program in place for testing and checking all of our hoses,” said **Randy Bovy**, assistant HSE manager for Nabors Alaska.



**Nabors Alaska Rig 2-ES is working for BP on Prudhoe Bay, Alaska. Red Super Sucker trucks can be seen left of the rig vacuuming cuttings into the truck for disposal.**

The company also modifies rig floor and doorway openings to prevent spills and fluids from dripping off of the rig and onto the soil. “There is a 4-in. lip around our flooring and our doorway openings, and all of our rigs’ floor seams are welded, so if there are leaks or spills in the pump room or the pits, the welded seams will prevent fluids from leaking through the floors.

“We also have an extensive drip pan system below the rig floor that captures all of the fluid and returns it back into the pits,” Mr Bovy explained. “It doesn’t go into the cellar and doesn’t leak onto the BOP stack and then down to the tundra.

“We have a lot of preventive spill equipment there,” he added.

The company also utilizes IADC’s RIG PASS program. “It’s a pretty extensive training,” Mr Bovy said, “with a lot of emphasis on safety, which is our number one priority, but right next to it is environmental training.

“We talk about spill prevention, waste minimization, recycling, and we emphasize reporting, from the smallest spill. We document all of that information and then pass that information to our other rigs to help prevent incidences.”

The company also created a Spill Champion position on its rigs for each shift, and twice a day the rig is checked for spills, leaks or potential spills/leaks. “It has been a huge success in preventing environmental incidents,” he said.

Because going through the checklist is considered to be a form of training, Mr Bovy noted, the company tries to rotate different people on the rig through the position so eventually every hand will become a Spill Champion.

Another program Nabors Alaska recently implemented is a computerized reporting system established by the employee and position on a rig. The system emails to that particular employee a list of items that must be completed in order to maintain compliance with state and federal environmental regulations and guidelines.

“The database will send out notices to our rig employees,” Mr Bovy explained. “If they are not completing the list of items, the database will also send notices to their supervisors that the checklist is not being completed.”

The company also has designed the “green book,” which has been in use for 10 years. It lists every conceivable waste product on a rig, from paper cups to mud products, and gives the correct way to handle that waste. “The book is handy for making sure we put our waste where it belongs,” Mr Bovy said. “We segregate our wastes by different waste products, and the book is constantly being updated.”

## CLOSED-LOOP SYSTEM

M-I SWACO’s de-watering, or closed-loop drilling, has been used successfully in New Mexico and West Texas, where



**In the closed-loop system, dried cuttings are the only waste products generated. No significant amount of fluids is removed except contaminated mud and cement returns.**

federal regulations and rules prohibit mud pits. The chemical and mechanical process removes and treats drilled solids from the mud system, and the waste is collected in a modified steel tank. The de-watering system efficiently processes water-base muds at the rig site with relatively low fluid retentions and removed cuttings. With the removal of the pit area, the rig site's footprint is significantly smaller.

The system also is equipped with a mud de-watering system with a chemically enhanced centrifuge package.

When the solids and liquids are separated, a front-end loader removes the waste, and it is stacked on a specially

prepared pad comprising clay dirt over a plastic liner to prevent infiltration of draining liquids into the ground. Recovered drilling fluid is stored in 500-bbl tanks and re-used in active mud systems. As a result, drilling fluid is no longer a disposable waste product and is used from well to well. Any contaminated fluids are reconditioned by the de-watering equipment and mud products.

Bureau of Land Management (BLM) regulations can be as fluid as the mud that M-I SWACO's closed-loop system cleans, and the company works to stay up with them — sometimes even staying ahead of them regarding disposal or use



**Double horseshoe reserve pits retain cuttings for their eventual disposal. They also hold various fluids such as brines and fresh water. Breached liners can result in contamination of the subsoil or underground aquifer.**

of the cuttings. "We are looking at beneficially re-using the cuttings instead of having to haul them for disposal or burying them and leaving a potential problem later," said Gary Fout, M-I SWACO senior executive account manager. "We are looking at some processes that would remove the contaminants from the cuttings."

Removing contaminants could mean allowing the cuttings to be land formed on location, used as a sub-base for building new locations or roads or perhaps being donated to highway departments for their projects, according to Mr Fout. One problem, particularly in New Mexico, is the cuttings' high salt content, which prevents them from being recycled for land use. However, the company is working to reduce that to acceptable BLM levels or even completely eliminate the salt content.

In some areas of New Mexico, for example, near rivers, springs and agricultural areas, salt content is regulated at about 250 ppm. In those areas, the cuttings are typically hauled off and disposed. In West Texas, however, the BLM acceptable salt content is around 3,000 ppm, according to Mr Fout. The company is working to reduce the salt content to below 3,000 ppm.

Other areas of Texas — for example, the Barnett Shale near Fort Worth and Dallas — use closed-loop mud systems for a different reason. "There is such a large number of wells, and there is a finite space," Mr Fout explained. "The cuttings are clean, but you can't dig a hole and bury them on location so (the operators) pay farmers to haul the cuttings to their area, dump them on their land and plow them in."

While the cost of using a closed-loop system is basically the same as using a mud pit, in some areas, as mentioned above, pitless drilling is a state and/or federal requirement. The primary difference, Mr Fout emphasized, is that the closed-loop system is environmentally friendly.

There's that catch phrase again. However, Mr Fout explains that operators can use a closed-loop system for about the same amount of money that they are spending on opening and closing reserve pits and disposing of liquids. "We showed them that if they recycled fluids and didn't have to spend the money on pits but rather spend it on surface equipment, then you can effectively drill the well at least for the same amount of money and do it in an environmentally friendly way." ♪