

lieve that outsiders do not understand the dangers and the difficulty and, therefore, have little credibility inside the culture. For workers in these industries to learn from safety messages or trainers, the messages/trainers need to be perceived as being knowledgeable about and sympathetic to the culture.

Gatekeepers can be both formal and informal leaders. For this project, the formal leaders provided access to worksites and to other insiders. Initially, contacts were safety directors or supervisors, who were generous with their time and were willing to spend days in the field, visiting different rigs in the area.

On a rig site, visitors must check in with the site manager (the tool pusher). Some sites also had a company man who represented the energy company's interests. He was also concerned with safety, but the drilling operations were the tool pusher's responsibility.

On the rig floor, the driller was generally the first-line supervisor and in charge of the safety of the work team, which was made up of a motor man, a derrick man (who also was responsible for checking on drilling fluid, or mud), and one or more floor hands. This is a hierarchical team, with workers breaking out as floor hands and moving into other positions when ready and as positions become available. More experienced workers often have performed all of these jobs and can fill in for others as necessary.

When a new hire first breaks out, he is known as a *worm*, a position he will hold for several months until he reaches a level of knowledge and expertise at which point he can be a floor hand. Worms usually wear hardhats of a different color (e.g., green or orange) so that other workers can immediately identify them and can watch out for and teach them.

Informal leaders are almost always present on high-risk worksites. These individuals have earned the respect and admiration of peers, usually by mastering aspects of the job with which others struggle. They may have many years' experience or may have a special talent for performing a certain task. They may also have survived an incident that gives them authority to speak about specific hazards and what can happen if safety precautions are ignored.

It is easy to identify these people. Others on the team may tell stories about them (the "hero stories" that include information about valued attributes in the culture) and they are usually the go-to people when someone needs advice or information. Workers may hang back when asked to do something, waiting to see what the masters do.

These people can be powerful gatekeepers into

occupational cultures. If they refuse to cooperate for whatever reason, it is unlikely that other members will cooperate. They are also excellent choices to be spokespersons or informal trainers if one is producing safety training products. They are trusted insiders and will command others' attention, while outsiders have yet to establish any credibility and could be viewed with skepticism if not disdain.

As information was gathered, the author talked to workers with only a few days experience to those who had been there nearly 40 years. Believing that roughnecks were similar to miners and would appreciate hardhat stickers, several stickers were designed. Workers were asked to provide input on which stickers they thought would work in their industry. These designs used some "tribal language" encountered in the oil fields, including the term *worm* for an inexperienced hand, and *patch dog* for those who had been in the oil patch and were tough enough to do the job (Photos 2 and 3). These were handed out at every rig visited, and were always enthusiastically accepted.

#### Creating Effective Training Videos in the Field

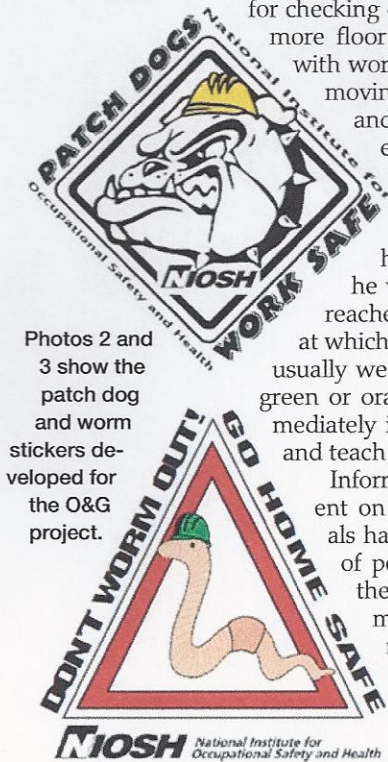
The underlying goal of the NIOSH ethnographic study was to learn enough about the culture of O&G drillers to develop safety and health training that would resonate with and be accepted by workers, and memorable enough to change how they think and act about safety hazards. NIOSH successfully used video to develop training for the mining industry, so this medium was selected for the oil fields.

#### Compelling Content Is Key

For new training to be effective, it must be interesting, credible and compelling. Lessons learned in the mining industry proved to be significant in the O&G industry. These include the following:

- Workers are all adults and must be trained as adults (using adult learning theories).
- They perform the job every day and are familiar with the dangers and challenges.
- They are good at what they do and proud of it.
- Not everyone has what it takes to be a roughneck. Those who do are admired and accepted as members of the work culture.
- Roughnecks can be transient, moving from rig to rig, or oil field to oil field.
- Work culture controls, to a large degree, how they do their jobs.
- Workers value safety and understand that one wrong move by anyone can put everyone in danger.
- This is a macho culture, with few (if any) women.
- Roughnecks are proud of their ability to solve unexpected problems.

Any training product developed must respond to these norms to be accepted. Like mining, construction, commercial fishing or other high-risk industry, O&G drilling includes many hazardous operations that would be good candidates for safety training.



Photos 2 and 3 show the patch dog and worm stickers developed for the O&G project.

Unlike mining, however, no federally mandated standard regulates which topics must be presented nor establishes a minimum number of hours of safety training required before people can start work.

The U.S. mining industry has access to a comprehensive incident/injury database because MSHA mandates that every injury or incident be reported. Penalties for failure to do so are severe, so the database includes a wealth of information a trainer or training developer can use to identify specific areas where additional safety training would be valuable.

No such database exists for the land-based O&G industry. Data are gathered by agencies at state and federal levels, or by associations and individual companies, but no comprehensive database captures injuries occurring in the upstream O&G industry. Fatality data are available, but comprehensive injury data are not. Therefore, a systematic review of incident/injury information was not possible.

As a result, the best way to learn what topics to include in training was to ask the workers themselves. Tool pushers and drillers are responsible for training rig workers in most cases. During site visits, they were asked to identify topics about which they would like to have more training materials.

Based on their responses, the NIOSH team developed a potential list of topics. After further questioning about dangerous operations, the team decided to make a training/hazard recognition video on rig moves. It is important to note that while new hires can benefit from safety training, people who have performed this work for long periods are often disdainful of training.

Research conducted in the mining industry shows that experienced workers are insulted by traditional training, particularly if it is provided by people who do not perform the work they do each day. However, the need to remind them about hazards remains. Stories can bridge the knowledge gap between new employees and experienced ones.

Drill rigs can be massive pieces of equipment. When all necessary peripheral equipment is added (which could include mud tanks, the dog house, mixing sheds, diesel engines, fuel tanks, tool sheds, offices and house trailers), these operations are similar to small towns. Photo 4 shows an overview of a drill site. Equipment on these sites must be dismantled and moved quickly to the next site when the hole is finished. Workers agree that taking rigs down and reassembling them in a new location is dangerous work, with a high potential for injury.

#### Identify the Players

Before moving to the development phase of the project, the NIOSH team had to take several steps:

- Find an industry partner who would allow filming of the rig move operation.
- Identify a master who would act as narrator for the video, describing what was going on and what the hazards might be.



- Interview the identified expert at length to identify topics to cover.

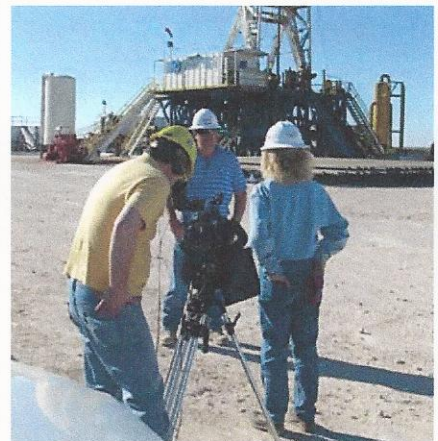
- Schedule a shoot on location, using a professional videographer.

Another step in the development phase was to capture as many stories as possible during shooting (Photo 5) while being mindful that those who did not wish to participate would not be required to do so. The most valuable training stories often fall in the “fool stories” category (Cullen, 2008). These usually result in near misses, but can also include injuries to the storyteller or others. These stories must be respected and used in the spirit in which they are shared—to prevent someone else from suffering similar consequences. If people are punished for disclosing these stories, they will never share them and valuable occupational wisdom will be lost.

The video on rig moves was filmed in west Texas in November 2009, and in western Colorado in March 2010. Devon Energy provided excellent support and access to several sites in the Midland-Odessa, TX, area, and EnCana did the same for the Colorado shoot. McVay Drilling and Bandura Drilling were the drilling contractors on the Texas segment, while Patterson-UTI was the drilling contractor in Colorado.

Sterling Crane was also present on the Colorado site; this contractor placed the different pieces of the rig, tanks and man camp as they were brought up the mountain. These contrac-

**Photo 4: Drill rigs can be massive pieces of equipment. When all necessary peripheral equipment is added these operations are similar to small towns.**



**The research team gathered as many stories as possible while filming (Photo 5, above). Willie Stephenson (Photo 6, left), a tool pusher on a McVay rig, was the primary narrator.**