Directional drilling and hydraulic fracturing, or fracking; the unconventional oil and gas extraction from deep and expansive shale formations, have brought with them the opportunity to positively and significantly impact local, state, and even the federal economy. Also impacted by this modern-day oil and gas rush are the lives of the oil and gas workers, as well as the surrounding public.

From the Barnett Shale fields in Texas, to the Marcellus Shale natural-gas fields in New York, Ohio, Pennsylvania, and West Virginia comes the thriving industry of oil and gas exploration. Expansive natural-gas and oil deposits were known to exist throughout the United States for decades. In 1970, a horizontal well in the Marcellus Shale field may have taken three months to drill—now they may take 30 days. In 2002, the Marcellus Shale field was estimated to hold more than 1.9 trillion cubic feet (tcf) of natural gas. A recent study now estimates that this field may hold 500 tcf, with 50 tcf being recoverable with current technology. If this research is correct, this may be one of the largest, most valuable producing fields in the United States.

The recent increase in nationwide exploration and production of oil and gas is followed by the spike of midstream activities involving the construction of new pipelines, refining and fractionating facilities, as well as petrochemical facilities.

Now Chesapeake Energy Corporation, ExxonMobil, Range Resources®, Halliburton, Baker Hughes, and many other like-minded corporations are becoming common to the Appalachian area. But it is not just “big oil,” many smaller, local businesses are getting in on the action. Various coalitions and government acts strive for the involvement of small, local, and diverse companies into oil and gas exploration. With these opportunities to prosper in such an industry also come a number of challenges that are presented to both the small and large companies alike. Although the industry of oil and gas exploration is becoming more experienced, each geographical area may pose new and unique challenges. These challenges may vary from the terrain, to the temperature, to the availability of local work force and infrastructure.

A number of industrial standards and references exist that are applicable to the oil and gas extraction industry. The National Institute for Occupational Safety and Health (NIOSH) has begun an Oil and Gas Extraction Safety Program, due to the fatality rate within the industry. The Occupational Safety and Health Administration (OSHA) maintains jurisdiction over the safety and health of workers, including workers involved in upstream oil and gas operations. As such, employers must protect workers, and workers must comply with OSHA’s general industry standard (29 CFR 1910, Occupational Safety and Health Standards), OSHA’s construction standard (29 CFR 1926, Safety and Health Regulations for Construction), and The General Duty Clause of the OSH Act of 1970.

According to census data, during 2011, in excess of 450,000 employees were part of the oil and gas extraction and support industry. These, often specialized, work crews utilize unique techniques, processes, and equipment to successfully drill and service a well. From 2003 to 2010, 823 oil and gas extraction workers were killed on the job. This fatality rate is seven times greater than that of all other United States industries. Reports indicate the fatality rate to be highly variable; however, this rate correlates with the number of active drilling rigs and work-over rigs. The number of inexperienced workers, lack of training and supervision, longer work hours, rough terrain and the utilization of equipment not in-
tended for the purpose are suspected of impacting the number of workers injured in the industry.

Workplace safety and health hazards, and dangerous conditions that may contribute to these worker injury rates include, but are not limited to:
- Vehicle accidents
- Struck-by, caught-in, caught-between hazards
- Explosions and fires
- Falls
- Confined spaces
- Chemical exposures

The industry faces potential for vehicle accidents from the beginning, with four out of every 10 fatalities being related to a highway vehicular accident. Whether the hazards begin with traffic control due to seismic testing, or the transport of heavy equipment to begin site preparation for the drilling pad and associated pipelines, all of the resulting accidents are often newsworthy. Beyond exploration and site preparation, the oil and gas industry utilizes numerous over-the-road trucks to supply materials and equipment, often to remote areas. Rail and river barges are also utilized as transportation means of materials and equipment, each presenting their own unique hazards and challenges. The infrastructure of these rural areas are often not designed or constructed to support the weight or width of the traffic being introduced as a result of the boom.

Struck-by, caught-in, and caught-between hazards exist in most industrial settings; however, these hazards are quite recurrent in the oil and gas extraction industry. Three of every five fatalities for this industry result from struck-by, caught-in, and caught-between hazards. Often, the remoteness of the pad, the treacherous topography, and the transportation of large equipment present such hazards from the onset of site preparation, but are most common during the drilling activities, such as rigging-up, tripping out or in, and casing operations. Cautious, properly trained workers, following proper safety practices and procedures, significantly reduce such hazards.

Obviously the potential for fire and explosions exist throughout the industry. The presence of various gases, chemicals, and fuels, combined with numerous ignition sources, such as electrical and hot work/welding, yields an increased potential for fire and/or explosion. Fires and explosions in the proximity of a well site may prove to be catastrophic. Fires and explosions may be prevented in the beginning at the design and engineering stage, and as the well progresses, safe work practices and procedures may reduce the risk further.

The oil and gas extraction industry poses an increased potential for workers to fall from elevations. This is due to the nature of the work as well as the elevation of many of the working surfaces that the workers occupy. These falls often result in severe, or even fatal, injury. From rigging-up, maintenance and servicing, to well completion, fall hazards and associated liabilities may be reduced by maintaining a safe workplace and the application of safe work practices and procedures.

Unique confined spaces are also present in the oil and gas industry. From mud pits, to pipe trenches, and various storage tanks, the hazards associated with confined spaces are prevalent. As the confined spaces may be unique and numerous to the industry, so should the safe workplace procedures and practices be; such that properly trained employees may interact with such hazards safely.

Methane, hydrogen sulfide gas, benzene, toluene, xylene, and crystalline silica: these are just a few of the numerous chemical hazards that may be present during oil and gas extraction. Such chemical hazards may pose risks, such as illness or fatality of employees due to health issues, to the increased potential for fire and/or explosion. Environmental issues also become a concern near well and disposal sites. Contamination of groundwater and surface water, or the exposure of the public to pollutants, are all risk factors that need to be dealt with through proper planning and procedures.

The United States Environmental Protection Agency (EPA) identifies compounds related to air pollution in the Clean Air Act in 42 U.S.C. 7412. The EPA National Primary Drinking Water Regulations provide primary and secondary maximum contamination levels (MCL) for drinking water, but it should be noted that the EPA does not have authority to regulate private drinking water wells. State and local health departments, along with states’ Department of Natural Resources may dictate levels of contamination of waters not otherwise regulated by the EPA.

There are also a number of organizations striving to optimize the economic impact of the recent oil and gas exploration, as well as the safety and health associated with the extraction workers and those of the public surrounding such activities. These include the National Service, Transmission, Exploration & Production Safety (STEPS) Network; the American Petroleum Institute (API); and the International Association of Drilling Contractors (IADC) to name a few.

Even more vexing to the industry than dealing with the hazards, both present and future, is dealing with the presence of numerous contractors. Skilled contractors, trades, and workers, often working side-by-side under various contracts and agreements, or lack thereof, presents the potential for one or more entities to potentially have responsibility for incidences shared or experienced by other contractors or their employees. Analyzing such occurrences and assigning responsibility requires experience, knowledge, and the application of appropriate industrial standards and regulations.

The certain hazards of the oil and gas extraction industry are well documented. These hazards, if uncontrolled, can certainly cause injury, illness, and even death. Beyond controlling these certain hazards also comes the need to anticipate, understand, and control those latent exposures to the hazards, which may cause illness, injury, or contamination for years to come.