Oil and Gas Extraction Meeting Kit

What’s At Stake

Oil and Gas Extraction is the exploration and production of petroleum and natural gas from wells. The industry generates wastewater from the water extracted from the geological formations and from chemicals used during exploration, well drilling and production of oil and gas.

EXTRACTION OF NATURAL GAS. Natural gas occurs in the outer layer of the Earth’s crust, i.e. the lithosphere. It was created as a result of the transformation of organic substances under different pressure and temperature conditions, which have been going on for many millions of years. Natural gas consists mainly of methane (CH4) and its homologs (C3-C4). Its composition is strongly dependent on the type of deposit from which it is extracted. Natural gas also contains a number of undesirable components, such as nitrogen, water, hydrogen sulphide or carbon dioxide.

What’s the Danger

Under natural conditions, gas can accompany crude oil or occur separately. It occurs mainly in two forms: as a gas freely dissolved in water or oil, or in the form absorbed in rocks or coal.

The biggest threats to Oil Rig Worker Safety are:

- Human Error
- Worker Culture
- Recklessness
- Negligence
- Lack of proper personal protective equipment (PPE)
- Miscommunication
- Misuse of equipment

HOW TO PROTECT YOURSELF

ONSHORE / OFFSHORE DRILLING

In **onshore drilling** facilities, the wells are grouped together in a field, ranging from a half acre per well for heavy crude oil to 80 acres per well for natural gas. Onshore production companies can turn on and off rigs more easily than offshore rigs to respond to market conditions.

Offshore drilling uses a single platform that is either fixed (bottom supported) or mobile (floating secured). Offshore drilling is more expensive than onshore drilling, and fixed rigs are more expensive than mobile rigs. Most production facilities are located on coastal shores near offshore rigs.

EXTRACTION OF OIL. Oil is recovered (extracted) using different methods, mostly depending on geology.

Conventional Oil. Conventional oil is a liquid at atmospheric temperature and pressure, so it can flow through a wellbore and a pipeline – unlike bitumen (oil sands oil) which is too thick to flow without being heated or diluted. It’s easier and less expensive to recover conventional oil and it requires less processing after extraction. Conventional oil development is both land-based and offshore.

Unconventional Oil. Unconventional oil cannot be recovered using conventional drilling and pumping methods. Advanced extraction techniques, such as oil sands mining and in site development, are used to recover heavier oil that does not flow on its own.

Step 1: Preparing the Rig Site. The aboveground infrastructure—pads and access roads—are built, setting up the land for the next step: drilling. From start to finish, everything from traffic plans and designated access roads to noise barriers and safety procedures is carefully planned and monitored according to all laws and regulations.

Step 2: Drilling. First the drill rig is brought to the

location—maybe 20 or 30 truck loads—and put together. Now It's time to build the infrastructure necessary to unlock the oil and natural gas trapped more than a mile below the ground. A well is drilled straight down into the ground beneath the pad. The first stage is to drill what is called the surface hole down to a depth of 100 feet below the deepest known aquifer.

Step 3: Cementing and Testing. Once the target distance is reached, the drill pipe is removed, and steel pipe is pushed to the bottom. This "well casing" is cemented in place. Rigorous tests are performed to ensure the pipe is impermeable before any production of natural gas or oil can occur.

Step 4: Well Completion. Before drillers can tap the oil and natural gas, a perforating gun is typically lowered into the ground and fired into the rock layer in the deepest part of the well, creating holes that connect the rock holding the oil and natural gas and the wellhead.

Step 5: Fracking. Now that the first stage of the well is open, it's time to unlock the oil and natural gas that has been trapped in the rock. Using specialized instruments to monitor pressure and data from the well in real time, fracking fluid, which is 99.5% water and sand and 0.5% chemicals, many of which are found in everyday household products, is pumped at high pressure through the perforating holes to create paper-thin cracks in the shale rock, freeing the oil and natural gas trapped inside.

Step 6: Production and Fracking Fluid Recycling. Once fracking is completed, production begins. Oil and natural gas flows up from the well bore and fracturing fluid is then recovered and recycled and used in other fracking operations.

Step 7: Well Abandonment and Land Restoration. When all of the recovered oil and natural gas has been produced, the land is returned to the way it was before the drilling operations started. The land can then be used for other activities and there is no sign that a well was once there.

BEST OIL AND GAS SAFETY EXTRACTION PRACTICES

- Mobile construction equipment requires backup alarms to alert workers of their movements. Workers need high visibility clothing and good communication with the driver.
- Only trained and certified operators should use a crane or hoist. This equipment should be inspected before each shift and maintained regularly. Don’t exceed equipment capacity. Know how to rig the load for stability and security. Keep communication between the crane/hoist operator and workers on the ground. Don’t lift loads over workers.
- Use assistive lift devices or additional help whenever possible. Otherwise keep a straight back and lift strongly with the legs to prevent strains and sprains. Keep your body parts away from rotating equipment and chains.
- Prevent slips, trips, and falls during construction and use of the rigging. Wear steel-toed shoes with a slip resistant sole. Keep work areas clean of debris, tools, mud, and oil. Apply slip resistant surface treatments to walking surfaces. Install guardrails, handrails, and safety barriers around areas that could lead to falls and slips.
- Wear light layers and stay hydrated when working outdoors. Wear a hard hat, coveralls, and well-fitted gloves for protection. Monitor weather forecasts to prepare for storm conditions. Tools and equipment require frequent inspections. Hazardous and flammable gases may be released during drilling and extraction.

FINAL WORD

Oil and gas extraction provides fuel and raw materials for plastic and synthetic material manufacturing. Surveys are conducted to find oil and gas deposits, wells are drilled to extract them, then pipeline and storage facilities collect oil and gas at land and at sea.