

TYPES OF E&P WASTES

Oil and gas wastes are quite varied. The industry itself spans the drilling, completion, production, workover, pipelining and marketing trades. Each phase of the industry has its own unique waste management concerns. To understand the regulatory structure, one must comprehend the types of wastes generated by the industry.

An understanding of the type of wastes generated by the oil and gas exploration and production industry is necessary before embarking upon an analysis of the applicable waste management practices.. Exploration and production wastes (“E&P Wastes”) can be classified as (1) drilling wastes; (2) production wastes; (3) completion and workover wastes; or (4) gas plant wastes.

2.1 Drilling Wastes

Wastes generated during the drilling of a well may be cataloged as (1) equipment wastes; (2) chemical, fluid, and mud wastes; (3) maintenance wastes; and (4) personnel wastes.

Equipment wastes consist of the waste engine oil filters, waste **engine** lubricating oils, and fuel spillage.

Chemical wastes include additives to drilling muds, acidizing and treatment wastes, and perforation gun wastes. Fluid wastes include salt water and fresh water produced from the downhole formation. This brine material is extremely salty (as high as 64,000 jparts per million salt). Mud wastes are used drilling muds. As the rotary bit turns, it cuts through the rock formation and drills the hole. The loose rock must be returned to the surface, or it would clog the hole.. The drilling mud carries the cuttings, which sometimes bear natural chemicals, oil, salt or other materials.

A drilling rig must be maintained. Maintenance wastes are the chemicals, solvents and paint used to keep the rig clean and rust free. Routine washing of the rig generates rigwash water. Also vacuum trucks delivering material may need to wash out. Excess cement and chemicals may be left by the service company add to the maintenance wastes.

Personnel wastes consist of sewage and routine garbage. Absent strict controls, the “trash pit” can become an eyesore to proud landowners.

2.2 Production Wastes

Most people think of the drilling process as generating the E&P Wastes. However, field production activities also generate an ongoing waste stream which is not considered E&P exempt. The most common activity is the storage of material in order to allow the formation and drilling solids to settle to the bottom of a tank, thereby yielding a commercial grade of product. The settled solids (called “sludge”) when mixed with fluids, collects at the bottom of the tank. This is known as “tank bottoms.” Eventually the

tank bottoms must be removed, or the tank will fill up with bottoms. This process takes place in production storage tanks, separators, or heater treaters. A separator allows the produced liquids to separate from gases, and a heater treater separates emulsified oil and water. Sometimes a demulsifying agent is administered in the heater treater.

Oil wells often generate a wax or paraffin material. Paraffin inhibitors, dispersants, or outright cutting are employed to rid this problem. Paraffin also develops in pipelines. Pipeline pigs, something akin to a set of balls, are run through the line to a pig trap to push the paraffin out of the pipeline. At the pig trap, the paraffin and other solids are collected for disposal.

Compressors used to increase pressure to gas sales lines generate waste lubricating oils and filters. Because natural gas contains some water vapor, it must be dehydrated by contacting the gas with chemicals designed to heat the gas, thereby evaporating the water. Glycol filters, condensed water, and treating chemicals are generated as wastes.

2.3 Completion and Workover Wastes

After the well is drilled, it must be “completed” to prepare it for production. It must have production holes shot through the production pipe (perforation), the formation must be acidized to free the production cavities, and it may need to be fractured to enlarge the fractures through which the production will flow to the wellbore. Each of these operations generate waste materials (i.e., perforation yields waste shots; acidizing yields waste acids; fracturing yields wastes such as cotton hulls and chemicals).

A well is no different than an automobile: it must be serviced or it will fail. The pipe must be pulled, the formation acidized again, and equipment changed out. During the servicing of the well, hydraulic fluids from the equipment can be generated. Cleaning surfactant, produced formation fluids, inhibitors, gels, solvents and other materials are also formed.

2.4 Gas Plant Wastes

When natural gas is produced from the ground, it contains entrained solids, water vapor and some compounds such as hydrogen sulfide. Before the natural gas can be sold to a transmission carrier, it must be cleaned. A natural gas plant is a centralized field facility that removes the water vapor, sweetens the gas by removing the hydrogen sulfide, and compresses it to meet pressure requirements of the transmission pipeline.

Cleaning the gas produces waste. When the gas is first received, the produced waters are removed, resulting in filter media, corrosion inhibitor materials, pipe scale, rust and formation materials. When the gas is dehydrated, chemicals are added to cause a heating process that allows the vapor to evaporate. Glycol results from this process.

Natural gas is sweetened by removing hydrogen sulfide. During this process, carbon dioxide, or other compounds, amine, iron sulfides, iron sponge, or caustic

solutions may be administered. This spent material becomes a waste as it bonds with the material being extracted.

Compression engines generate filters, lube oil, paint, oily rags and other materials are also considered wastes.

In summation, the waste stream at an oil and gas production site is far broader than most people contemplate.¹

¹ A good resource for waste identification is the API Environmental Guidance Document for Onshore Solid Waste Management in Exploration and Production Operations (1989).