What Types of Spills Are Associated with Oil and Gas Production?

In North Dakota, oil- and gas-related spills are reported in three categories: hydrocarbon, saline, and other (in some cases spills are a combination of these categories). Hydrocarbon spills are typically crude oil; saline spills are primarily produced water; and fluids reported under the “other” category include drilling muds, fracture gels, and non-crude-oil fluids such as diesel fuel and hydraulic fluid.

In addition, spills are reported as either “contained” or “not contained.” Contained spills occur within an existing barrier such as a bermed area at an oil and gas location, while not-contained spills extend beyond an existing barrier and may impact the natural environment.

Putting Spills into Perspective

Based on a review of the North Dakota Department of Health Oilfield Environmental Incidents database (2001–2014), total oil- and gas-related spills have increased from 190 incidences in 2001 to 1904 incidences in 2013, and total spill volume has increased from 8550 barrels in 2001 to 162,889 barrels in 2013. Although the number of spills and spill volume have increased, the number of spills and the total spill volume as a function of oil production are the same as 2001 and have declined since 2007.

What Happens When a Spill Occurs?

The state of North Dakota requires immediate reporting of any spill or other incident that could adversely affect human health or the environment. The wellsite operator is responsible for making proper notifications to the state, but suspected leaks or observed spills needing immediate attention may also be reported by the public. Depending on the spill or incident, one of the following agencies should be notified and provided with relevant information:

- North Dakota Department of Emergency Services (800) 472-2121 (24-hour hotline)
- North Dakota Industrial Commission, Department of Mineral Resources, Oil and Gas Division (701) 328-8020
- North Dakota Department of Health (701) 328-5210 or (701) 328-5166
The North Dakota Department of Health (often with involvement from the North Dakota Oil and Gas Division) is typically the agency responsible for remediation and reclamation spills associated with oil and gas production that impact the environment off the drilling location. The North Dakota Oil and Gas Division is typically the primary agency when spills are contained on the well or facility location. In some cases, federal agencies will also be involved.

**How Are Spills Cleaned Up?**

There are two distinct phases of spill cleanup: remediation and reclamation. The remediation phase typically involves containment of the spill, recovery of fluids, and removal of impacted soils. The reclamation phase is focused on returning the impacted area back to original conditions and regrowing vegetation.

The method of remediation is determined by the type of spill—hydrocarbon, saline, or other—as well as site conditions and risk to receptors. Typically, liquids are collected by various methods and disposed of via permitted injection wells. Impacted solid materials such as gravel and scoria are typically excavated and disposed of at approved landfills. The impacted soils can be remediated by a variety of methods either in place (in situ) or after removal (ex situ). For hydrocarbon spills, the typical options for soil remediation include excavation and disposal, in situ bioremediation, and ex situ bioremediation. For saline spills, soil remediation will likely be accomplished with excavation and disposal or in situ remediation. Spills of "other" products will be remediated based on the specific product release.


Once remediation has been performed, surface reclamation is undertaken to reestablish vegetation and involves site evaluation, applying soil amendments (if needed), preparing the seedbed, reseeding an appropriate seed mix, controlling weeds, and monitoring.

More information on non-spill-impacted reclamation can be found in "Successful Reclamation of Lands Disturbed by Oil and Gas Development and Infrastructure Construction" (Sedivec, K.K. et al., North Dakota State University, May 2014).

**What Should the Public Know about Spills?**

Based on a review of the North Dakota Department of Health Oilfield Environmental Incidents database (2001 through 2014), which maintains an inventory of spills associated with oil and gas production, the following insights emerged.

- The number and volume of spills per million barrels of oil produced have trended down since 2007.
- The “contained” category represents 80% of all spills.
- In any given year, 75% of the spills are less than 100 barrels in size.
- In any given year, less than 10% of the number of spills account for greater than 50% of the spill volume.

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