



Waste Streams Generated During the Exploration and Production for Oil and Natural Gas  
 Summary of Potential Regulatory Oversight  
 January 2013

**DISCLAIMER:** This chart is designed as a starting point to help companies identify the correct agency to contact regarding regulatory requirements related to management and disposal of wastes associated with oil/natural gas exploration and production from shale. It should not be the only source of information regarding the regulations or be used in place of assistance available from experienced consultants and/or legal counsel to help you fully understand and achieve compliance with Ohio's laws and regulations. Solid grey boxes indicate that, based on impracticability, unlikelihood based on regulatory experience or legal preclusions, the agencies do not envision scenarios in which the stated activity would take place for the waste stream in question.

	Activity/Location	Drill cuttings coming into contact with refined oil-based muds <sup>1</sup>	Spent refined oil-based muds <sup>2</sup>	Spent frac sands and sludges <sup>3</sup>	Brine <sup>4</sup> (including flowback water generated from hydraulic fracturing and produced water)	Pipe scale <sup>5</sup>
Any	On-site Management at an ODNR-Permitted Drill Site	ODNR—Oil and Gas Resources Management	ODNR—Oil and Gas Resources Management	ODNR—Oil and Gas Resources Management	ODNR—Oil and Gas Resources Management	ODNR—Oil and Gas Resources Management
Processing <sup>6</sup>	At a Solid Waste Landfill or Transfer Facility	Ohio EPA—Materials and Waste Management *ODNR—Oil and Gas Resources Management *Ohio EPA—Air Pollution Control	Ohio EPA—Materials and Waste Management *ODH—Bureau of Radiation Protection *ODNR—Oil and Gas Resources Management *Ohio EPA—Air Pollution Control	Ohio EPA—Materials and Waste Management *ODNR—Oil and Gas Resources Management *ODH—Bureau of Radiation Protection *Ohio EPA—Air Pollution Control		
	Off-site by Third Party at a Location Other than Solid Waste Landfill or Transfer Facility	Ohio EPA—Surface Water *ODNR—Oil and Gas Resources Management *Ohio EPA—Air Pollution Control	Ohio EPA—Surface Water *ODH—Bureau of Radiation Protection *ODNR—Oil and Gas Resources Management *Ohio EPA—Air Pollution Control	Ohio EPA—Surface Water *ODH—Bureau of Radiation Protection *ODNR—Oil and Gas Resources Management *Ohio EPA—Air Pollution Control		ODH—Bureau of Radiation Protection *ODNR—Oil and Gas Resources Management
Solidification <sup>7</sup>	At a Solid Waste Landfill or Transfer Facility	Ohio EPA—Materials and Waste Management *Ohio EPA—Air Pollution Control	Ohio EPA—Materials and Waste Management *ODH—Bureau of Radiation Protection *Ohio EPA—Air Pollution Control	Ohio EPA—Materials and Waste Management *ODH—Bureau of Radiation Protection *Ohio EPA—Air Pollution Control		
	Off-site by Third Party at a Location Other than Solid Waste Landfill or Transfer Facility	Ohio EPA—Surface Water *Ohio EPA—Air Pollution Control	Ohio EPA—Surface Water *ODH—Bureau of Radiation Protection *Ohio EPA—Air Pollution Control	Ohio EPA—Surface Water *ODH—Bureau of Radiation Protection *Ohio EPA—Air Pollution Control		
Disposal	At an ODNR-permitted Class II Underground Injection Control (UIC) Facility				ODNR—Oil and Gas Resources Management	
	At a Solid Waste Landfill	Ohio EPA—Materials and Waste Management	Ohio EPA—Materials and Waste Management *ODH—Bureau of Radiation Protection	Ohio EPA—Materials and Waste Management *ODH—Bureau of Radiation Protection		
	Disposal at a Low-Level Radioactive Waste Facility					ODH—Bureau of Radiation Protection
Other	Off-site Beneficial Use (e.g., road application, fill)	Ohio EPA—Materials and Waste Management *Ohio EPA—Surface Water			ODNR—Oil and Gas Resources Management <sup>8</sup>	
	Off-site Unlawful Disposal/ Open Dumping	ODNR—Oil and Gas Resources Management Ohio EPA—Materials and Waste Management Ohio EPA—Surface Water Ohio EPA—Environmental Response and Revitalization	ODNR—Oil and Gas Resources Management Ohio EPA—Materials and Waste Management Ohio EPA—Surface Water Ohio EPA—Environmental Response and Revitalization ODH—Bureau of Radiation Protection	ODNR—Oil and Gas Resources Management Ohio EPA—Materials and Waste Management Ohio EPA—Surface Water Ohio EPA—Environmental Response and Revitalization ODH—Bureau of Radiation Protection	ODNR—Oil and Gas Resources Management Ohio EPA—Surface Water Ohio EPA—Environmental Response and Revitalization	Ohio EPA—Materials and Waste Management Ohio EPA—Environmental Response and Revitalization ODH—Bureau of Radiation Protection
	Off-site Recycling <sup>9</sup>				ODNR—Oil and Gas Resources Management Ohio EPA—Surface Water	

Ohio Department of Natural Resources	Ohio Environmental Protection Agency		Ohio Department of Health
Oil and Gas Resources Management 2045 Morse Rd., Bldg F-2 Columbus, OH 43229-6693 (614) 265-6922 <a href="http://ohiodnr.com/tabid/23415/default.aspx">ohiodnr.com/tabid/23415/default.aspx</a>	P.O. Box 1049 Columbus, OH 43216-1049 <a href="http://epa.ohio.gov/MarcellusandUticaShale.aspx">epa.ohio.gov/MarcellusandUticaShale.aspx</a>	Materials and Waste Management (614) 644-2621 Air Pollution Control (614) 644-2270 Surface Water (614) 644-2001 Environmental Response and Revitalization (614) 644-2924	Bureau of Radiation Protection 246 North High Street Columbus, OH 43215 (614) 644-2727 <a href="http://www.odh.ohio.gov/odhprograms/rp/radprot/radprot1.aspx">www.odh.ohio.gov/odhprograms/rp/radprot/radprot1.aspx</a>

<sup>1</sup> Drill cuttings consist of rocks and soil that are brought to the surface during drilling activity. The first phase of drilling a borehole may be done using strictly air or water. Subsequent phases of drilling include the addition of refined oil-based muds, which help keep the drill bit lubricated and the borehole pressure stable during drilling. Cuttings generated during the phase of drilling that involves air, water, clay or other inert materials are considered earthen material. Drill cuttings that come into contact with refined oil-based muds are considered contaminated and are regulated as solid waste when shipped off-site for disposal. Cuttings are removed from the borehole prior to any hydraulic fracturing and, therefore, do not come into contact with chemicals used in the hydraulic fracturing process. Cuttings are excluded from the definition of a hazardous waste under federal and state law. Cuttings may contain low levels of naturally occurring radioactive materials (NORM) such as Radium 226 and Radium 228.

<sup>2</sup> Refined oil-based muds are fluids used in certain phases of drilling a borehole. Different fluids can be used as drilling mud, depending on factors such as the well type and rock formation that will be drilled. When passing the paint-filter test, refined oil-based muds are defined as solid waste. Drilling muds can also pick up low levels of NORM. When refined oil-based muds are continuously recycled or otherwise processed in a manner that concentrates NORM, these muds are considered technologically enhanced naturally occurring radioactive material (TENORM).

<sup>3</sup> Spent frac sands and sludge – may be separated from brine when exiting the well or may be separated during cleanout of frac water storage tanks and pipes. When passing the paint-filter test, spent frac sands and sludges are defined as solid waste. Spent frac sands and sludges may contain TENORM.

<sup>4</sup> Brine includes drilling fluids, flowback water, and production fluids obtained during the drilling, completion, stimulation (hydraulic fracturing) and production of oil and natural gas. The fluid contains a small quantity of chemical additives, naturally occurring metals, minerals and salts and possibly low levels of NORM. Produced water has the same naturally occurring compounds as flowback water and will also contain concentrations of naturally occurring dissolved hydrocarbons such as benzene, toluene, ethylbenzene and xylene (BTEX).

<sup>5</sup> Pipe scale is the build-up of minerals, rocks, oil and other substances that accumulate on the inside of metal casing and tubing used for the production of oil and natural gas. There is a possibility of NORM becoming concentrated in this piping or tubing. This pipe scale can be classified as TENORM.

<sup>6</sup> Processing includes activities such as evaporation, centrifuging or other methods that physically or mechanically separate liquids and solids. Liquids completely separated from drill cuttings or drilling muds and stored as liquids must be disposed of in accordance with ODNR’s regulations.

<sup>7</sup> Solidification means adding an absorbent material to a semi-solid waste stream to generate a solid waste.

<sup>8</sup> Only brine produced from a well during production operations may be authorized for road application. Fluids from the drilling of a well, flowback from the stimulation of a well and other fluids used to treat a well are prohibited for such use.

<sup>9</sup> Recycling of flowback water includes any process that removes impurities such that it may be reused at a permitted well site for its original purpose.

When (\*) provided, authorization may be required for the following activities: ODNR—Oil and Gas Resources Management - if brine is generated; ODH—Bureau of Radiation Protection - if TENORM concentrations for radium-226 and 228 exceed 5 picoCuries per gram above background; Ohio EPA—Air Pollution Control - if emissions trigger permitting requirements; Ohio EPA – Division of Surface water - if discharge to waters of the state or treatment of industrial wastes.