

US EPA ARCHIVE DOCUMENT

MEMORANDUM

SUBJECT: Review of State Oil and Natural Gas Exploration, Development, and Production (E&P) Solid Waste Management Regulations

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TO: File

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The following are summaries of state regulatory programs of oil and natural gas exploration, development, and production (E&P) solid waste management. This review was conducted by EPA personnel in the Office of Resource Conservation and Recovery (ORCR) within the Office of Solid Waste and Emergency Response (OSWER) between March 2013 and July 2013. EPA also followed up with each state in February and March 2014 to ensure that any changes in the interim were reflected in the summaries. The review reflects state regulations of oil and gas E&P solid wastes at the time of the review, current through February-March 2014. It should be noted that state regulations are updated with varying frequency and subsequently may change as state oil and natural gas programs and policy evolve.

The review was conducted using varying sources, including, but not limited to:

- State regulations and statutes
- State regulatory agency personnel
- State Review of Oil and Natural Gas Environmental Regulations (STRONGER) Board State Reviews
- 2009 Department of Energy (DOE) Report, "State Regulations Designed to Protect Water Resources"
- Department of Energy's Drilling Waste Management Information System, <http://web.ead.anl.gov/dwm/>

Executive Summary

Over the past decade, the United States has experienced considerable growth in oil and natural gas exploration, development, and production (E&P) activities. The varied environmental implications of these E&P activities are a major area of focus for the U.S. Environmental Protection Agency (EPA). EPA's Office of Resource Conservation and Recovery (ORCR), headquartered in Washington, D.C., oversees regulatory issues at the federal level regarding the generation, transportation, treatment, storage, and disposal of oil and natural gas E&P solid wastes under the Resource Conservation and Recovery Act (RCRA).

The current expectation throughout the energy sector is that oil and natural gas E&P activities within the United States will continue to increase in the years to come with developing technology, increased economic viability, and increased demand for reliable sources of domestic energy. The various formations currently or potentially being developed for such E&P activities – including from coal bed, shale, and tight sand formations – are frequently located in environmentally and ecologically sensitive areas.

The enclosed materials are intended to serve as a review of current state regulations for policy makers and the public focused on oil and natural gas E&P activity. The review details current state regulations of oil and natural gas E&P solid waste from major oil and natural gas producing states, specifically focused on surface storage and disposal facilities managing produced waters, drilling muds, drilling cuttings, hydraulic fracturing return fluids and various other waste streams intrinsically related to oil and gas E&P. These environmental regulations are concerned primarily with the technical requirements associated with the design, construction, operation, maintenance, closure, and reclamation of surface pits, ponds, lagoons, or tanks, as well financial assurance requirements associated with such facilities. The report includes information compiled from state regulations and statutes, state agencies, various independent regulatory reviews, and historical EPA publications.

Objectives Summarized

This review was conducted to assist EPA regulatory programs in assessing the strengths and weaknesses of state regulations concerning oil and natural gas E&P solid waste management. The review includes information from various entities, intended to provide a comprehensive overview of current state regulation in the sector of oil and natural gas E&P. The review's findings are intended to inform current and future Agency deliberations regarding onshore oil and natural gas E&P activities throughout the United States.

Through this review of state regulations, ORCR's intention is to provide EPA regulatory programs with an understanding of the spectrum of state regulatory requirements for management of E&P solid wastes.. By incorporating regulations from all major oil and natural gas producing states, it is EPA's goal to develop an understanding of regulations in the varying areas of E&P solid waste regulation that may inform future EPA actions.

Approach

Due to the varied nature from state to state of regulatory language concerning oil and natural gas E&P solid wastes, EPA identified that it was crucial to assess multiple sources of information concerning state regulation, in addition to the respective state regulations themselves. The inclusion of independent reviewing bodies and reports provided a detailed, comprehensive assessment of state regulations.

Respective state regulations were reviewed to determine exact regulatory language governing technical requirements for oil and natural gas E&P solid wastes. These state regulations were typically found in state administrative code under environmental protection regulation or natural resource conservation regulation. Also, state regulations were often codified in dedicated oil and gas statutes. Naturally, regulations ultimately represent the most succinct and accurate depiction of a state program.

To ensure cited state regulations were accurate and relevant, the personnel of ORCR followed up with individual state agencies charged with the regulation and enforcement of state oil and natural gas programs. Through contacting various state departments of environmental protection, natural resources, and oil and gas commissions, cited regulation was confirmed, altered, or enhanced based on the expertise of those individuals best suited to elaborate. A minimum of one contact per oil and gas producing state was contacted with regards to the respective states current oil and natural gas regulation. After the EPA's initial review between March and July 2013, EPA followed up with each of the state agencies in February and March 2014 to determine if any changes to the state regulations had been made in the interim.

The State Review of Oil and Natural Gas Environmental Regulations (STRONGER) is an independent body comprised of three major stakeholder groups: industry, state, and environmental groups. The group, created collaboratively by US EPA and the Interstate Oil and Gas Compact Commission (IOGCC), is a non-profit, multi-stakeholder organization whose purpose is to assist states in documenting the environmental regulations associated with the exploration, development and production of crude oil and natural gas. Through technical and policy recommendations developed in a common set of guidelines, STRONGER conducts reviews of existing state regulations and recommends amendments to state regulations to improve regulation in the exploration and production of oil and natural gas. Available STRONGER reports, from those states that volunteered for review, were included in the review of regulations.

In May 2009, the Department of Energy (DOE), in conjunction with the Groundwater Protection Council (GWPC) and the National Energy Technology Laboratory (NETL), issued a report which outlined state regulations concerning oil and natural gas exploration and production designed to protect water resources. The report, titled "State Oil and Natural Gas Regulations Designed to Protect Water Resources," outlined the state regulations existing in several areas related to E&P activities, namely: permitting, well construction, hydraulic fracturing, temporary abandonment, well plugging, tanks, pits, and waste handling and spills. The report considered 27 of the 33 states active in oil and natural gas exploration and production (accounting for 99.9% of all produced oil and natural gas within the United States.) The report provided reference to specific state regulations with regards to each of the aforementioned parameters. For the purpose of this review, the May 2009 DOE Report was used as a guideline, but not considered a

comprehensive assessment of state regulations current through July 2013, the period which EPA conducted this review. This DOE review was used by EPA to enhance EPA's efforts.

An additional source incorporated in the compiling of state regulations was the United States' Department of Energy's (DOE) Drilling Waste Management Information System. This online resource was utilized for technical and regulatory information on practices for managing drilling muds and cuttings, including current practices, state and federal regulations, and guidelines for optimal management practices. The Drilling Waste Management Information System also provided useful contact information for state agencies that regulate state oil and natural gas E&P activity.

Findings

Although no strictly quantitative criterion separates state programs into classifications of stringency, several common regulatory parameters could be found throughout state programs. In the same vein, the state programs also commonly lacked certain regulatory parameters that are typically found in other solid waste regulatory programs. Amongst these common characteristics was the presence of some liner requirements for pits or impoundments, secondary containment requirements for tanks, setback requirements for solid waste management facilities from critical infrastructure or inhabited development, minimum freeboard requirements for fluid levels in pits, impoundments, and tanks, various inspection, operation, and maintenance requirements, permitting of solid waste management facilities requirements, and closure and reclamation requirements. Some regulatory parameters that were not typically encountered were groundwater monitoring requirements for solid waste management facilities, leachate collection requirements, air monitoring of solid waste management facilities, and waste characterization requirements.

Basing the review on the presence or lack of these common regulatory items, EPA was able to develop an understanding of the spectrum of state regulatory programs that currently exists throughout oil and natural gas producing states.

Appendix AL-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

Alabama

- Regulations concerning technical requirements for waste pits and tanks are found in Rule 400 of the Alabama Rules and Regulations, as regulated by the State Oil and Gas Board of Alabama in the Alabama Department of Environmental Management (ADEM). These regulations are often referred to as the “Gold Book.”
- 400-1-1-.05(89) defines wastes as “materials to be disposed of or reclaimed that were generated by drilling, completion, workover, production, storage, treatment, processing, or injection operations associated with oil and gas wells, Class II injection wells, production facilities, processing facilities, plants, or underground storage Facilities.”
- 400-1-2-.03 details bonding requirements based on depth of well for oil and gas operations, including assurances against any pollution of the sea, and all surface and groundwater.
- 400-1-4-.10 details design and operation criteria for pits including the prior approval by the state, minimum freeboard of 2’, containment of runoff and prevention of run-on, and construction above high water table.
- 400-1-4-.11 details removal of all waste fluids within 30 of commencement of operations unless otherwise approved by the state. This section also details that pits must be filled and compacted within 90 days of commencement of operations unless the state is petitioned by the owner to allow for continued use of the pit.
- 400-1-4-.16 details the restoration of a location following commencement of activities, including the removal of all wastes from the site and restoration of pits to a manner approved by the state (“Supervisor”).
- 400-1-6-.07 details requirements for tank and tank battery sign posting.
- 400-1-6-.08 covers the requirement tank and tank battery secondary containment, which is specified as a dike which is lined and capable of containing 1.5 times the volume contained within the tanks. The dike must be a minimum of 2’ high. Tank must be elevated to allow drainage within the dike away from the tank.

- 400-1-6-.10 describes site maintenance, including the removal of unusable items, removal of rubbish, and removal of all wastes from the site.
- 400-1-6-.12 specifies requirements for the cleaning of tanks, including approval of the state and proper disposal of wastes within the tanks.
- 400-1-9-.03 details the requirements for the transportation of wastes associate with oil and gas E&P wastes, including transporter requirements, waste manifesting, and penalties for non-compliance.

Appendix AK-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

Alaska

- Regulation concerning technical requirements for oil field waste pits is found primarily in the **Alaska Administrative Code, Title 18, Chapter 60, Article 4** as regulated by the Alaska Department of Environmental Conservation (ADEC). Additional regulation can be found in the **Alaska Administrative Code, Title 20, Chapter 25, Article 1** and **Alaska Administrative Code, Title 20, Chapter 25, Article 5** as regulated by the Alaska Oil and Gas Conservation Commission (AOGCC).
- 18 AAC 60.430 details the criteria that must be met in the management of drilling waste. This includes submittal of a storage plan that must be submitted and approved by ADEC at least 30 days prior to the beginning of operations.
- 18 AAC 60.430 details design criteria of storage facilities, which includes:
 - Sizing to contain all waste and anticipated precipitation with minimum of 2' freeboard
 - Prohibition of leaking
 - Liner material which meets minimum acceptable standards
 - Account for high water table, surface water, permafrost, and proximity to populations
 - Appropriate closure requirements
- 18 AAC 60.430 details operating standards which include analysis of surface water and subsurface thermal monitoring in areas of permafrost.
- 18 AAC 60.430 details closure requirements which includes final site inspection with written notification of inspection, removal of all pumpable fluid, construction of a cap with minimum design requirements, and revegetate cap.
- 18 AAC 60.440 details corrective action plans that ADEC may deem necessary following the closure of the reserve pit.
- 20 AAC 25.025 details the bonding requirements that are necessary for any entity proposing to drill a well. This bonding is required for the issuance of a drilling permit.
- 20 AAC 25.033 details requirements for properties and equipment regarding reserve pits and drilling fluids.
- 20 AAC 25.025 details requirements for construction of reserve pits, including details for an impervious confining surface and preventing hazard to freshwater sources upon closure of operations.
- 20 AAC 25.172 details the removal of all materials and equipment from the site upon cessation of activities and the grading and filling of all pits and the site to a natural state or approved state by the AOGCC.

Appendix AR-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

Arkansas

- Regulation concerning technical requirements for oil field waste pits for the state of Arkansas are found primarily in the **Arkansas Code, Title 15, Chapter 72**, as regulated by the Oil and Gas Commission Rules and Regulations.
- Rule B-2 details the requirements for financial assurances in the exploration and production of oil and natural gas. Financial assurance is required for a permit to drill and is required throughout the lifetime of the well.
- Rule B-9 Subparagraph e details the requirements for plugging waste pits, which includes leak-free pit requirements, removal of all fluids following completion of plugging, removal of all equipment and debris, and regarding the site to prevent erosion.
- Rule B-17 contains the majority of regulations concerning waste pits and treatment of produced waters. Amongst these requirements are the technical requirements for particular designations of pits.
- Rule B-17 requires that mud pits be located a maximum distance from any surface waters and authorization for siting in wetlands. Reserve pits must maintain a minimum freeboard of 2' at all times, minimum of 2:1 (H:V) side slopes, construction with a liner material, and siting requirements.
- Rule B-17 contains regulation concerning operating requirements for pits, including the prohibition of disposal of miscellaneous waste, prohibition of placement of produced water, prohibition of discharges, prevention of deterioration, and segregation of fluids.
- Rule B-17 contains the requirements for the closure of mud pits, including the removal of pit fluids, removal of liner, filling with native soils, restoration of original surface contours, and return to grade of the pit.
- Rule B-26 contains much of the requirements for surface storage tanks. Amongst these requirements are:
 - Labeling of tanks
 - Siting restrictions
 - Containment or dike structures

Appendix CA-2

Summary of Regulations for Oil Field Waste Pits

California

- Regulation concerning technical requirements for oil and natural gas E&P for the state of California is found primarily in the **California Code of Regulations, Title 14 – Natural Resources, Division 2 – Department of Conservation, Chapter 4 – Development, Regulation, and Conservation of Oil and Gas Resources**, as well as **California Code of Regulations, Title 27 – Environmental Protection, Division 2 – Solid Waste, Chapter 3 – Criteria for All Waste Management Units, Facilities, and Disposal Sites** as regulated by the California Department of Conservation’s Division of Oil, Gas, and Geothermal Resources and Regional Water Quality Control Boards, along with various other regulatory bodies. Regulations can also be found in the California Laws for Conservation of Petroleum and Gas. Additional regulation can be found in the **California Integrated Waste Management Board, California Air Resources Board, and the Department of Toxic Substances**.
- Generally speaking, the primary authority for management of oil and gas solid wastes is divided between two regulatory bodies. Primary authority regarding solid wastes managed in tanks and underground injected is regulated by the California Division of Oil, Gas, and Geothermal Resources. Primary authority regarding oil and gas solid wastes managed in pits, also known as “sumps” or “surface impoundments” in the state, are managed by the Regional Water Quality Control Boards. See Appendix CA-4 for additional details.
- California regulates oil and natural gas E&P wastes under the CA hazardous waste regulations, as administered by the California Department of Toxic Substances Control (DTSC) if toxicity of a substance is determined based on criteria other than the Federal Toxicity Characteristic Leaching Procedure (TCLP) or the waste meets any of the other three characteristics of hazardous waste codified in 22 CCR Article 3 Sections 66261.20 (i.e., ignitability, corrosivity, and reactivity). E&P wastes are included in the exemption from regulation under Subtitle C of RCRA (22 CCR 66261.4(b)(2) and 66261.24(a)(1)) if the waste is hazardous solely by meeting the Federal characteristic for toxicity under the TCLP.
- 14 CCR § 1760 defines a “sump” as an open pit or excavation that receives fluids such as mud, hydrocarbons, or waste waters from oil and gas drilling and producing operations. 14 CCR § 1770 places restrictions on sumps, including location restrictions, enclosure by protective measures such as fences or gates, and removal of free fluids following cessation of operations. Regional Water Quality Control Boards maintain primacy over specifications for closure of sumps.
- 14 CCR § 1773.1 details requirements for facilities to have secondary containment, including tanks, to include adequate capacity, repair of damages, and exclusion of stormwater reservoirs.
- 14 CCR § 1773 details the requirements for the design and construction of tanks, including labeling, addressing of malfunctions such as leaks, installation of leak detection systems, secondary containment, foundation design, tank wall thickness, tank closure and removal.

- 14 CCR § 1775 details that oilfield wastes shall not be disposed of in such a manner to cause damage to life, health, property, freshwater aquifers or surface waters, natural resources, or be a menace to public safety. Drilling mud is restricted from permanent disposal in open pits.
- 14 CCR § 1776 defines the plugging and abandonment requirements for drilling sites, including the closure of sumps in accordance with Regional Water Quality Control Board and Department of Toxic Substances Control Requirements.
- 14 CCR § 1777 details the maintenance requirements for facilities, including specifications for inspections.
- 14 CCR § 1778 details the requirements for the securing of oil and gas E&P facilities by means of chain link fence, wire fence, gates, screens, or other types of materials based on the units present at the facilities.
- 14 CCR § 1722 details financial assurance requirements, including bonding requirements for well exploration, production, and development.
- Effective January 1, 2014, the California Department of Conservation (DOC) established interim regulations to govern oil and gas well stimulation treatment until DOC's proposed permanent regulations are completed and become effective. The interim regulations include requirements for rigorous testing and evaluation before stimulation operations to ensure that wells and geologic formations remain competent and that drinking water is not contaminated. These interim regulations also require a groundwater monitoring plan for any well subject to well stimulation treatment. In addition to having a groundwater monitoring plan, operators are required to publicly disclose the composition and disposition of all water associated with a well stimulation treatment.

Appendix CO-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

Colorado

- Regulations for oil and natural gas exploration and development wastes are regulated by the Colorado Oil and Gas Conservation Commission
- Regulations can be found in the Rules and Regulations of the Commission, Series 100-1200
- Financial assurance requirements are detailed in Series 700 of the Rules and Regulations, and include bonding requirements, plugging and abandonment requirements, requirements for centralized waste management facilities, and details for the Oil and Gas Conservation and Environmental Response Fund.
- Exploration and production waste management regulations are found in Series 900 of the Rules and Regulations
- General pit regulations can be found in Section 902 of the rules and regulations, to include minimum freeboard of 2', prohibition and removal of hydrocarbons from pits, wildlife intrusion protection such as fencing, prohibition of construction of unlined pits constructed on fill material, and multiple well use regulations.
- Section 903 specifies that the Commission reserves the right to prior approval of pit design and construction and in what instances prior approval is required of the pit operator.
- Section 904 details pit liner requirements, which include the pit types requiring liner, the material to be used in a liner, minimum thickness of liners, foundations of liners, allowable alternative liner design, and details regarding centralized waste management facility liners.
- Section 905 details requirements for closure of pits, which includes evacuation of materials and proper disposal of pit contents, liner disposal, and reclamation of the pits, in accordance with Series 1000 of the rules and regulations.
- Section 906 details the requirements for notification, prevention, and remediation and releases of E&P wastes and produced waters.
- Section 907 details the proper management of E&P wastes, including the storage, handling, transportation, treatment, and disposal of waste, including drilling fluids and produced waters.
- Section 909 details the closure requirements for pits other than drilling pits specified in Section 903, which were special waste pits.
- Regarding tanks, the Rules and Regulations sporadically address regulations regarding tanks throughout Series 900, including the requirements for secondary containment of tanks, repair of leaking tanks, and requirements for the disposal of tank bottoms.

Appendix IL-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

Illinois

- Regulations for the management of solid waste from oil and gas exploration and production activities in Illinois are found in the Illinois Administrative Code, Title 44-Part 610 and Title 62-Parts 240 and 250. Additionally, regulations can be found in the Hydraulic Fracturing Regulatory Act, which was passed by the state of Illinois in June 2013. All regulations are enforced by the Illinois Department of Natural Resources' Division of Oil and Gas.
- Hydraulic Fracturing Regulatory Act states that every applicant for a permit to conduct drilling operations must detail a plan for the handling, storage, transportation, and disposal or reuse of hydraulic fracturing fluids and flowback, including description of the capacity of pits or tanks.
- Hydraulic Fracturing Regulatory Act details that in accordance with permit requirements, reserve pits may only be used in the event of a lack of capacity for tank storage due to higher than expected flowback. Pits must comply with liner specifications and construction standards, which include liner material, minimum liner thickness, capacity, berming minimum requirements, and foundation requirements. The Act also details that the removal of all fluids is required within 60 days of the commencement hydraulic fracturing operations. All tanks must be closed, above-ground tanks. Minimum secondary containment of tanks is also described in the act.
- Hydraulic Fracturing Regulatory Act details financial assurance requirements, including bonding requirements. The Act specifies the amount and type of bond required for each hydraulic fracturing activity.
- Illinois Administrative Code, Title 62, Part 240.520 details requirements for drilling fluid handling and storage, including management in pits. This part includes pit capacity requirements and allowable waste storage.
- Illinois Administrative Code, Title 62, Part 240.860 details specific design and construction requirements for pits. This section includes the restoration of historical pits, special handling for pits with radioactive sediment, and inventory of pits. Illinois Administrative Code, Title 62, Part 240.861 details requirements for historical pits.
- Illinois Administrative Code, Title 62, Part 240.1180 details that all excavations and pits must be filled and leveled to original grade within six months after the last well on a lease has been plugged.
- Illinois Administrative Code, Title 62, Part 240.1950 details that at the conclusion of drilling, all drill cuttings shall be buried in drill pits or landspread with the permission of the surface owner and that all pits used in drilling shall be filled and restored to support farm machinery. All drilling debris shall be removed from the site.
- Illinois Administrative Code, Title 62, Part 240.810 details requirements for tanks, including secondary containment requirements, prohibition from underground storage, netting for birds, liners for secondary containment of tank batteries, and maintenance of tanks.

- Illinois Administrative Code, Title 62, Part 240, Subpart O details financial assurance requirements, including bonding requirements. The Act specifies the amount and type of bond required for each oil and gas E&P activity.

Appendix IN-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

Indiana

- Regulation concerning technical requirements for oil field waste pits is found primarily in **312 Indiana Administrative Code - Article 16 - Oil and Gas**.
- 312 IAC 16-4 requires there to be financial assurance in order for the issuance of a well permit, which is required prior to the construction of an exploration or production well. Release of the bond, per 312 IAC 16-4-5 Bond Release, is pending the restoration of the well site, conversion of the well, a replacement bond is issued, and all penalties have been paid.
- 312 IAC 16-5-11 details the requirements of burn off pits, which do not include liner requirements.
- 312 IAC 16-5-12 details the requirement for the construction of a mud circulation and reserve pit
- 312 IAC 16-5-12 details the requirements for the closure of a mud pit following the completion of its life. These closure requirements include the filling and leveling of the pit, returning the former pit area to as close to natural grade as achievable.
- 312 IAC 16-5-13 list the waste fluids which are prohibited from disposal in pits, as well as the requirements for produced water pits (backwash pits). The requirements for produced water pits include:
 - Prevention of run-on from surface waters by construction of walls surrounding pit
 - Siting buffer of minimum 100' from streams, lakes, rivers, or drainage ways
 - Design capacity for the regulatory flood
 - Minimum 2' freeboard at all times
- 312 IAC 16-5-19 details some requirements for removing and restoring tank batteries following the cessation of drilling or production activities at a well.
- 312 IAC 16-5-27 details regulatory requirements for disposal of oil or oil contaminated fluids. This section includes requirements for road-spreading, leak-free tank storage, disposal of contaminated soil as daily cover in MSW landfills, or replacement of contaminated soil with uncontaminated soil.

Appendix KS-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

Kansas

- Regulation concerning technical requirements for oil field waste pits for the state of Kansas is found primarily in the **Kansas Administrative Regulations Agency 82, Article 3**, as regulated by the Oil and Gas Division, Kansas Corporation Commission.
- KAR 82-3-600.f details technical requirements for waste pits, including the installation of liner if the geological conditions are deemed unsuitable for the prevention of fluid transmission in an unlined condition, installation of observation trenches, holes, or wells at the directive of the commission, and preventative measures for run-on to the pit.
- KAR 82-3-600 details that all pits must be permitted before construction through the Division of Oil and Gas.
- KAR 82-3-601a details further technical requirements for pits. These technical design requirements include:
 - Minimum 12” of freeboard for all pits; minimum 30” freeboard for emergency pits
 - Maximum hydraulic conductivity requirements through established liner parameters
 - Minimum of 5’ buffer between highest groundwater elevation and pit bottom
- KAR 82-3-602 details the closure requirements for pits. This includes the timeframe for closure and post-closure activities, removal of all drilling fluids, grading of surface, and return of surface to condition pre-dating the construction of the pit.
- KAR 82-3-604 and KAR 82-3-606 detail some of the operating parameters of pits, including the prohibition of disposal of chemical substances or other non-exempt waste in the pits and the protocol in the event of a discharge to a pit.
- KAR 82-3-607 details the steps to be taken in the final disposal of dike and pit contents along with subsequent violation penalties.
- KAR 82-3-120 details the financial responsibility requirements for well operator licensing. In order to obtain a license for drilling, which is required for any drilling activity, financial assurances must be established in the request for license.

Appendix KY-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

Kentucky

- Regulations concerning technical requirements for waste pits are found primarily Chapter 5 of Title 401 of the Kentucky Administrative Regulations, as regulated by the Division of Water and the Division of Waste Management within the Kentucky Department of Environmental Protection. Additional regulations regarding oil and gas exploration and production wastes are found in Title 805, Chapter 1, as regulated by the Kentucky Division of Oil and Gas.
- 401 KAR 5:037 states design and operation considerations for pits, surface impoundments, and tanks, including use of pit liners and secondary containment.
- 401 KAR 5:090 regulates disposal and surface discharge of produced water, and details requirements for holding and drilling pits.
- 805 KAR 1:050 regulates the requirements for financial assurance as related to oil and natural gas exploration and production activities, including the obtainment of surety bonds.

Appendix LA-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

Louisiana

- Regulation concerning technical requirements for oil field waste pits is found primarily in **Title 43, Part XIX, Chapter 3 of the Louisiana Administrative Code**, namely “Pollution Control - Onsite Storage, Treatment and Disposal of Exploration and Production Waste (E&P Waste) Generated from the Drilling and Production of Oil and Gas Wells (Oilfield Pit Regulations).”
- Rule §303.G requires with limited exception that all produced water pits, onshore terminal pits, and washout pits meet the liner requirements set forth in Rule §307. The limited exception includes the permitting by the Louisiana Water Discharge Permit System permit as set forth in §303.K.8 or a maximum threshold of pit size and capacity as set forth in section §303.M
- Rule §307 requires minimum technical design standards for various classifications of pits, defined in the §303 General Requirements section of the rule. These requirements include:
 - Minimum liner design specification
 - Minimum freeboard requirement
 - Operating procedures
- Rule §309 reserves the right, on the behalf of the Office of Conservation, Department of Natural Resources, to deem it necessary for any pit to develop a plan to prevent the pollution of a groundwater aquifer or underground source of drinking water. The rule also allows the Office of Conservation to employ drainage and collection requirements, monitoring program, or other methods of prevention and detection of contamination.
- Rule §311 requires certain criteria be met for the closure of pits following the completion of their designated life. Pits may be closed, if approved by the Department of Conservation, by the methods of burial, solidification, onsite land development, or other approved techniques. Part C details the various chemical constituents the waste pit must be tested for prior to closure.
- Financial Assurance and Security requirements are found in LAC 45, Part XIX, Chapter 1, Rule §104. These requirements include the provision of financial security prior to issuance of permit, security forms and requirements, and security release criteria.
- LAC 45, Part XIX, Chapter 1, Rule §115 provides the requirements for all exploration and production (E&P) waste fluid storage tanks. Included in these requirements are containment by dike or retaining wall, placement on impervious surface if sited in wetlands, and removal of all fire hazards from within the immediate vicinity of the tank battery.

Appendix MD-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

Maryland

- Regulations regarding technical requirements for waste pits are found primarily in the **Code of Maryland Regulations, Title 26, Subtitle 19**, as regulated by the Maryland Department of the Environment, Division of Solid Waste. Additional regulations can be found in the **Annotated Code of Maryland, Title 14, and Title 5**.
- CMR 26.19.01.06 specifies the criteria that must be met for the issuance of a drilling permit, including bonding, pit design and reclamation plans.
- 20.19.01.10 details design criteria of storage facilities, which includes:
 - Capacity to contain all liquid and solid waste during all drilling and completion activities to include emergency overflow storage
 - Prohibition against discharge into surface waters
 - Impermeability
 - Diversion of surface runoff
- § 14-108 details denial of permit and bond and disposal of well products in areas that will adversely affect wildlife
- § 5-1702 of the Annotated Code details assessments of the effects on the environment of drilling operations and production including the possibility of accidental discharge of oil or gas and recommendations for minimizing any adverse economic, fiscal, or environmental impacts
- Complete regulations concerning oil and gas waste pits can be found in Appendix MD-3.

Appendix MI-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

Michigan

- Regulation concerning technical requirements for oil field waste pits is found primarily in Michigan Oil and Gas Regulations under **Act 451, Part 615-617**.
- Rule 504 states that surface facilities, which are to include pits and tanks, shall not be sited within 300 lineal feet of freshwater wells, private or public structures, areas maintained for public recreation, and the edge of the traveled portion of existing highways.
- Rule 407 states that drill cuttings, muds, and fluids will be confined by a pit, tank, or container which is sized, designed, and located in approval of the supervisor.
- Rule 407 states that there must exist a minimum isolation from groundwater by the bottom of the liner of the pit, with limited exception, of 4'.
- Rule 407-5 and Rule 407-6 set numerous minimum technical design standards for pits. These include:
 - Pits to be constructed using rounded corners and side slopes not less than 20 degrees measure from the vertical
 - A liner exist with minimum performance equal to that of a 20-mm virgin polyvinyl chloride liner
 - Ample liner material to allow for sags, material loadings, and a minimum 10' flat apron on all sides
 - Bottom of lined pits shall be weighted with earthen material prior to anchoring
 - Liner seams are prohibited, as is ripping, tearing, puncturing, or other destruction that may cause loss of fluid
- Rule 407 sets forth several operating standards for pits. These operating standards include:
 - Rule 407-7.a prohibits the placement of salt cuttings in lined pits
 - Rule 407-7.b defines the materials that may be placed in a lined pit
 - Rule 407-7.e requires a permittee to test the fluids being placed in a lined pit to test for benzene, ethylbenzene, toluene, and xylene
- Rule 407 sets several closure standards, which include the removal of all liquids from the pit, the stiffening of the pit by mixing of earthen materials within the pit, encapsulation and burial, covering with material which meets or exceeds performance standards of 20-mm virgin polyvinyl chloride liner, and burial of greater than 4' below original ground surface.
- Michigan has a proposed draft rule which was issued November 1, 2013. Currently, the proposed draft rule includes changes to site restoration requirements and some plan submittal requirements for solid waste disposal. There is not currently a schedule for finalization of the final rule.

Appendix MS-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

Mississippi

- Regulation concerning technical requirements for oil field waste pits is found primarily in **Mississippi State Oil and Gas Board Rule Book, Rule 45.**
- Rule 45, Section E describes the regulations pertaining to Earthen Pits, including definition of pits, the allowable materials to be stored in pits, and all relevant technical directives.
- Rule 45, Section E mandates that all earthen pits following the date of January 1, 1978 must obtain a permit, with specific technical design detailed within the permit language.
- Rule 45, Section E, Part 7 describes the requirements for Reserve Pits (Mudpits). Included in these requirements are the following:
 - Pit must be isolated from surface waters by dikes or drainage ditches
 - Minimum freeboard of 2' at all times within the pit
 - Following completion of activities, pit must be emptied, backfilled, leveled, and compacted within 3 months of completion
- Rule 45, Section F details that impervious containers (tanks) are to be used in lieu of pits should geological conditions prevent the possibility of safe storage of pit fluids.

Appendix MT-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

Montana

- Regulations concerning technical requirements for waste pits are found in Title 36, Chapter 22 and Title 17 Chapter, 24 of the Administrative Rules of Montana, as regulated by the Montana Department of Environmental Quality (MDEQ).
- 36.22.1207 covers temporary use of earthen pits and tanks and waste
- 36.22.1227 details design criteria for earthen pits and ponds for produced water of a specified concentration and volume that includes:
 - liner specifications
 - requirements for dikes or berms
 - fencing/screening requirements
 - prohibition against disposal of hazardous wastes or hazardous
- 36.22.1005 covers pit operation including drilling waste disposal and surface restoration
- 36.22.1207 covers temporary use of earthen pits and tanks and waste
- 36.22.1226 details disposal of produced water including disposal by injection, into lined pits and temporary storage in tanks

Appendix NM-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

New Mexico

- Regulation concerning technical requirements for oil field waste pits are found primarily in the **New Mexico Administrative Code, Title 19 – Natural Resources and Wildlife, Chapter 15 Oil and Gas**, as regulated by the Oil Conservation Division of the New Mexico Energy, Minerals, and Natural Resources Department.
- Section 19.15.17.9 details requirements for permit application and registration, specifying that Form C-144 is used to apply to the NMOCD for pits and below-grade tanks. Requires that all pits must be lined and that NMOCD may issue a single permit for all pits at a specific well. Closed loop systems and sumps do not require a permit or registration, but NMOCD must be notified.
- Section 19.15.17.10 details requirements for newly excavated material, specifically location restrictions.
- Section 19.15.8 details requirements for financial insurance, including for plugging and abandonment and well restoration. Financial assurance can be for a single well or for multiple wells (blanket).
- Section 19.15.17.10 details siting requirements for pits or below grade tanks, which includes minimum setbacks from groundwater, surface water, permanent residences and other infrastructure, and from freshwater wells or springs.
- Section 19.15.17.11 details the construction and design requirements for all pits, which includes a multiple liner system, leak detection system, and other measures, must contain signage and fencing and barbed wiring if located within 1000 feet of specific residences, netting. Temporary pits requirements, including minimum slope, liner requirements, anchoring of liner, prevention of run-on and run-off. The section specifies permanent pit requirements, such as proper foundation, maximum slope requirements, liner requirements, leak detection system, and minimum freeboard. The section includes requirements for below-grade tanks, including requirements for non-double walled tanks.
- Section 19.15.17.12 details the operational requirements for waste pits, which includes limited fluid disposal, liner requirement, freeboard requirements. The section includes requirements for the prevention of contamination of fresh water. The section includes operating requirements for temporary pits, permanent pits, below-grade tanks, sumps, and multi-well fluid management pits.
- Section 19.15.17.13 details closure requirements for pits, which includes closure within 60 days of operations, removal of liners, waste excavation and removal.

- Section 19.15.18.16 details the requirements for tanks, including siting restrictions of tanks, identification and labeling of tanks, buffering requirements, and erection of fire walls.
- Section 19.15.25 details requirements for plugging and abandonment of wells, including restoration and leveling of the surface of the site, removal of debris and 'junk', closure of pits and removal of below-grade tanks, and reporting to the Division.
- Section 19.15.34 details requirements for the appropriate removal, transportation, and disposal of produced waters, along with drilling fluids and other residual liquids without the prior approval of the division.
- Section 19.15.35 details exceptions for when oil and gas exploration and development waste may be disposed in a Subtitle D or Subtitle C landfill. Typically, these wastes are required to be disposed in a "surface waste" landfill. Typically, those materials which are exempt from "surface waste" landfill disposal are those which are not unique and intrinsic to the oil and gas E&P process e.g., paint filters, office trash, brush and vegetation not contaminated, etc.
- Section 19.15.36 details requirements for surface waste management facilities, including definitions, allowed received wastes, permits and applications, financial assurance requirements, siting and operational requirements, landfill requirements, and closure requirements. Section 19.15.36.11 details the financial assurance requirements for surface waste management facilities.

Appendix NY-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

New York

Below is a summary of the regulations concerning technical requirements for tanks and waste pits that are found in **Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR)**, as regulated by the Bureau of Oil and Gas Regulation in the Office of Natural Resources of the New York State Department of Environmental Conservation (NYSDEC). Regulations for oil and gas exploration and development are found in Parts 550-559.

- §551 describes financial assurance requirements for well drilling. In the financial assurance requirements, waste management and environmental mitigation from waste management is not addressed specifically. Financial assurance type and amount is typically based on the depth of the well being drilled.
- §554 details requirements for storage of salt water, brines, and “other polluting fluids” in pits and tanks to be stored for no greater than 45 days without a special dispensation by the Bureau.
- §555 details the requirements of plugging and abandonment, including the filling of any earthen pits or other excavations following the closure of the well. Reasonable effort to smooth the surface of the site to the original contour must be taken.
- §556 details prevention pollution controls, including requirements for the storage of brines and salt waters in earthen pits. Liner requirements extend as restrictively as to the underlying soil stratum must be non-porous.
- §360-6 details requirements for management of liquid wastes, including those found in oil and gas exploration and production. The section details requirements for steel containers, such as construction material and removal of tank, secondary containment systems, surface impoundment/ pit requirements, and closure requirements of liquid storage facilities.

Appendix NC-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

North Carolina

Below are the regulations concerning technical requirements for tanks and waste pits that are found in **Chapter 113 of the North Carolina Statutes, Article 27 Oil and Gas Conservation**. Additional hydraulic fracturing specific regulations can be found in **Title 15A of the North Carolina Administrative Code, Chapter 05, Subchapter D Oil and Gas Conservation**.

- § 113-391 states that there must be basic regulation of pits and tanks and that appropriate construction standards for oil and gas wells must be undertaken.
- § 113-391 states that there should be appropriate siting restrictions should be observed in the construction of well facilities.
- Solid waste regulations for oil and gas typically are regulated in depth under the North Carolina solid waste regulations found in Title 15A of the North Carolina Administrative Code, Chapter 13B.
- North Carolina is currently considering draft rules for the regulation of oil and gas exploration and production resultant of a DENR study on the effects of hydraulic fracturing
 - From DENR's website: Session Law 2011-276 requires DENR, in cooperation with the Department of Commerce, Department of Transportation, Attorney General's Office and Rural Advancement Foundation International, to conduct a study of the potential development of shale gas in North Carolina and make recommendations regarding the regulatory framework necessary for development of this resource.
- The draft rules have been required to specifically consider issues regarding solid waste management of oil and gas E&P wastes
- The draft waste management rule is currently in a rough form and not ready for release. The list of considered criteria for the draft waste management rule can be found here in **Appendix NC-6**.

Appendix ND-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

North Dakota

- Regulations concerning technical requirements for waste pits and tanks are found in **Title 43, Article 43-02, Chapter 43-02-03 of the North Dakota Administrative Code (NDAC)**, as regulated by the Oil and Gas Division of the North Dakota Industrial Commission.
- 43-02-03-15 details bond conditions required for financial assurance, including bonding requirements prior to commencement of drilling operations, alternate forms of financial security, and bond amounts and limitations.
- 43-02-03-15 details permitting requirements before any person can commence drilling activities. These requirements include the obtaining of a bond, submittal of an accurate plat showing the location of the drilling activities, the submittal of the proposed mud program, and the provision of any information at the request of the director.
- 43-02-03-19 describes pit design and storage of muds and fluids in pits in addition to disposal of waste. This section includes site construction requirements, fencing and screening of pits, closure of pits, disposal of waste requirements, and special treatment for waste of shallow wells. This section also identifies prohibited uses and authorized uses for drilling pits, including technical criteria of those pits. This section also includes limited location restriction criteria.
- 43-02-03-30 covers protection against leaks or fires, including specific notification requirements in the event of leak or fire, and leak and spill cleanup requirements.
- 43-02-03-48 covers the requirements of central production facilities and commingling of production, including the location of any and all tanks.
- 43-02-03-50 covers requirements for tank cleaning permits and wastes, including the prior approval is not required to remove tank bottom waste for tanks not used for the storage or sale of crude oil.
- 43-02-03-53 describes saltwater handling including storage and disposal to avoid pollution of freshwater supplies, including technical requirements for surface facilities such as dike construction requirements and liner and secondary containment requirements.

Appendix OH-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

Ohio

- Regulations concerning technical requirements for waste pits are found in **Chapter 1501 of the Ohio Administrative Code (OAC)** and **Rule 1509 of the Ohio Revised Code** (which contains the statutory authority for the regulations promulgated in the OAC), as regulated by the Division of Mineral Resources Management (DMRM) in the Department of Natural Resources (DNR). The complete set of applicable regulations is found in Appendix OH-3.
- OAC 1501:9-1-02 details the requirements for the permitting of wells, including the plan for disposal of water and other waste substances resulting from oil and gas exploration and production activities.
- OAC 1501:9-3-08 details temporary storage of saltwater and other related waste including design criteria for storage pits.
- OAC 1501:9-9-05 specifies tank location restrictions, including setbacks from public roads, inhabited structures, wells, heaters, and other equipment.
- OAC 1501:9-9-03 requires pits of sufficient size and shape must be constructed adjacent to each drilling well to contain all the drilling muds, cuttings, salt water and oil
- OAC 1501:9-9-05 specifies that where a hazard exists, any production equipment at the well-head and related storage tanks must be protected by an earthen dike or earthen pit with a capacity to contain any substances produced by operation of the related oil or gas well
- ORC 1509.072 discusses the obligation to restore the land surface after drilling operations have ceased, including the removal of all equipment, revegetation of the affected area, prevention of sedimentation and erosion, and authorities the chief retains in the closure of a well.
- ORC 1509.22 discusses the prohibition of water contamination and covers storage and disposal of brine. The section also discusses the storage of waste fluids and management allowances for these fluids.

Appendix OK-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

Oklahoma

- Regulation concerning technical requirements for oil field waste pits are found primarily in **Oklahoma Administrative Code, Title 165, Chapter 10, Subchapters 3 and 7** as regulated by the Oklahoma Corporation Commission Division of Oil and Gas.
- 165: 10-7-16 details minimum technical design standards for waste pits. Included in these minimum technical design standards are:
 - Liner requirements if deemed necessary by Commission based on fluids stored
 - Soil Liner, Geomembrane, or no liner
 - Siting requirements
 - Runoff protection
 - Flood protection
- 165:10-7-5 details operating requirements for pits, specifically operating standards in the event of a discharge. Included are required reporting details and requirements along with record-keeping requirements.
- 165:10-7-16.(d) details operating requirements for oil and gas exploration and production activity pits. These operating requirements include:
 - Minimum 24” freeboard at all times in pit
 - Acceptability of contents in pit
 - Recycling/reuse of pits
 - Continued prevention of pollution in pits
- 165:10-3-16.(e) details closure requirements for pits. These requirements include:
 - Complete dewatering of pit
 - Solidification of remaining material
 - Application of soil cover
 - Erosion prevention
 - Timeline for closure requirements
- 165:10-3-17 further closure requirements, primarily the return of the surface conditions at the site of the pit to their original state, free of trash, debris, and equipment, within 90 days of the completion of well activities.
- 165:10-7-16.(f).(10) details the financial assurance requirements for the beginning of activities at a flowback water pit. Additional regulation concerning financial assurance is found in the Oklahoma Statutes, Title 52 O.S. §318.1.

- Oklahoma is currently in the proposed rule stage for a regulation change that would require better manifest of oil and natural gas solid wastes that are disposed of in solid waste landfills under the jurisdiction of the Oklahoma Department of Environmental Quality (DEQ). This manifest system would be a replacement for the current “run ticket” system which is currently used to track oil and gas solid wastes from well to landfill. The finalization of this regulatory change is expected possibly in mid-May, 2014.

Appendix PA-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

Pennsylvania

Regulation concerning technical requirements for oil field waste pits are found primarily in Pennsylvania Code, Title 25 (Environmental Protection), Part 1 (Department of Environmental Protection), Subpart C (Protection of Natural Resources), Article I (Land Resources), Chapter 78 (Oil and Gas Wells) and Chapter 91 (General Provisions). Additional language can be found in the PA Act 13 of 2012.

- PA Act 13 of 2012 §3215 prevents wells from being sited in any floodplain if the well is to employ a pit or impoundment or a tank managing solid wastes from oil and gas exploration and production
- PA Act 13 of 2012 §3216 requires that a well site be restored following cessation of drilling operations. This includes restoration of the earthwork or soil disturbed, removal of all drilling supplies and equipment within 9 months after the completion of the drilling well, and compliance with all applicable requirements of the Clean Streams Law. The restoration period is subject to an extension if certain conditions are met.
- § 78.56 details requirements for pits and tanks that are used to manage wastes temporarily. Some requirements include a minimum of 2' of freeboard for pits or impoundments, structural soundness of pits and tanks, minimum liner requirements, and waste separations and prohibitions.
- § 78.57 details requirements for management of production fluids, including collection of brine and other fluids from the well operations, requirements for pits, removal and disposal of fluids, and restoration of the waste management units or facilities following the closure or cessation of operations.
- § 78.61 details the requirements for disposal of drill cutting, including criteria to be met to allow disposal in a pit, criteria to be met to allow disposal by land application, other methods of disposal of drill cuttings, and compliance requirements for disposal.
- § 78.64 details secondary containment criteria to be met for tanks used on drill sites, including required capacity and inspection requirements.
- § 78.65 details site restoration requirements following the cessation of operations at a well site.
- § 78.301-314 details financial assurance requirements for oil and gas exploration and development, including specific bonding requirements.

- Pennsylvania has proposed regulatory changes to Chapter 78 of the Pennsylvania Administrative Code, Title 25. The public comment period closed in mid-March, 2014. There is currently no schedule to finalization of the proposed regulatory changes.

Appendix TN-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

Tennessee

- Regulations concerning technical requirements for waste pits are found primarily in Chapter 1040 of the Tennessee Rules and Regulations, as regulated by the Tennessee State Oil and Gas Board. The State Oil and Gas Board regulates all oil and gas operations except underground injection control (UIC).

- 0400-52-02-.01 requires that a permit be obtain prior to the commencement of drilling operations that is submitted to the state board. Included in permits is the specification of waste management facilities such as pits and tanks that are to be located on the site.

- 0400-52-09-.05 specifies that all surface pits must be drained and filled when no longer needed for production purposes, and that the site shall be graded and stabilized in order to minimize surface runoff. Additionally, all supplies and equipment must be removed from the site.

- 0400-52-09-.05 details surface reclamation requirements, including specific revegetation requirements following the cessation of drilling activities.

- 0400-53-03-.01 specifies required setback distances of clean-out pits from fire hazards and dwellings, setbacks from highway and county roads of wells, and prohibition of siting of wells, pits, or storage facilities in wetlands or in flood-prone areas.

- 0400-53-03-.02 specifies that tanks are preferred method of management of wastes at drilling sites as opposed to pits, restricts the run-on of surface water from entering pits or other waste management facilities, removal of waste fluids from pits following cessation of drilling activities, requires all pits to be lined with liners of minimum thickness of 10-mm, specifies minimum requirements for secondary containment of surface tanks, and additional fire prevention requirements.

- 0400-53-03-.02 (3) specifies additional liner requirements for specific waste stream pits based on the waste stream to be deposited or managed in the pit, including liner thickness, minimum freeboard, and slope setbacks.

- 0400-52-01-.03 details financial assurances in the form of bonding requirements required for the appropriate restoration and reclamation of a drilling site.

Appendix TX-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

Texas

- Regulations concerning technical requirements for solid waste management of oil and gas exploration, production, and development are found primarily in the Texas Administrative Code, Title 16, Part 1, Chapters 1-20. The Texas Railroad Commission is the primary authority in Texas regarding the regulation of oil and natural gas.
- Rule §3.3 details that all tanks must be clearly identified by signage at all times.
- Rule §3.5 details that a permit is required, issued by the Texas Railroad Commission, in order to drill, deepen, plug back, or reenter any oil, gas, or geothermal resource well. The rule does not include any required specifications for waste management in the permit.
- Rule §3.8 defines the various types and functions of pits that are to be found in the regulations. Additionally, the rule defines oil and gas wastes. The rule defines what pits are prohibited, including for the storage of oil products, requirement to obtain a permit for a pit, authorized disposal methods, liner requirements, minimum freeboard, prevention of run-on from stormwater, and draining of pits and inspection of pits liner. The Rule details instances in which a pit may be used without a permit, including as a reserve pit, completion pit, or basic sediment pit. The Rule also notes that the pit operator must keep records detailing that the pit liner requirements are met.
- Rule §3.15 details the requirements for the removal of all surface equipment from inactive wells, including the removal of all tanks or tank batteries.
- Rule §3.22 details the requirements of screening or netting of pits to protect wildlife, specifically birds.
- Rule §3.57 details the requirements for reclaiming tank bottoms and disposal of other E&P wastes. This includes the requirement for a permit, the use of a reclamation plant, and other miscellaneous requirements.
- Rule §3.78 details financial assurances and fees required in order to commence drilling activities. These financial assurances include bonding requirements for varying operations and number of wells.
- Rule §4.620 prohibits the disposal of Naturally Occurring Radioactive Material (NORM) waste by burying it or applying it with the land surface without obtaining a permit. The section details that the disposal of NORM waste is subject to Rule §3.8.

Appendix UT-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at Hydraulic Fracturing Sites

Utah

- Regulation concerning technical requirements for oil field waste pits are found primarily in the **Utah Administrative Code, Rule 649-9 and Rule 649-3** as enforced by the Utah Division of Oil, Gas and Mining. Additional regulation can be found in the Utah Oil & Gas Conservation Act, Title 40, Chapter 6 of the UAC.
- Title 40, Chapter 6, Section 9.5 details that a permit is required for the construction, operation, or maintenance of a facility producing oil and gas. Any land to be disturbed, including pits, must be specified in the permit.
- Title 40, Chapter 6, Section 19 details financial assurance requirements, specifically bond and sureties.
- R649-3-16 details brief design and closure requirements to be met by waste pits, including discussion of liner alternatives at the site evaluation stage and acceptance of closure criteria based on the Division's Cleanup Levels.
- R649-9-3 details the financial assurance criteria that are to be met with the installation of a disposal pit to ensure proper operation, maintenance, and closure of the pit.
- R649-9-3 requires several requirements that must be met in the design of a waste pit, including:
 - Design by a registered professional engineer
 - Siting restrictions
 - Adequate storage capacity as to prevent overtopping
 - Prevention of run-on
 - Proper securing of pit from livestock, wildlife, and unauthorized personnel
- R649-9-3 allows the use of unlined pits if it is deemed that the hydro geologic conditions of the location of the pit are such that there exists no significant pollution potential to the surrounding environment.
- R649-9-3 details the requirements for produced water pits. These requirements are similar to those for waste pits.
- R649-9-6 lists requirements for recordkeeping, including the reporting of unauthorized spills, occurrences of leaks, the necessity for corrective action, and the volume and type of waste received at each facility.

- R649-9-7 lists requirements for the final closure of pits, including a final closure plan submitted for approval from the department, removal of all equipment, soil sampling criteria, and the release of bond.
- R649-9-9 describes the requirements for financial assurances in the form of bonds, including the parameters of calculation for bond size.

Appendix WV-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

West Virginia

The following regs and statutes are the location of West Virginia oil and natural gas solid waste regulations:

- WV Code Chapter 22 Art. 6 Section 7, Chapter 22 Art. 11 Section 1-27, and Chapter 22 Art. 6 for permitting requirements and authority.
- WV Code Chapter 22 Article 6 Section 7 for waste pits authority of the general permit
- WV Code Chapter 22 Series 6A - Horizontal Well Control Act.
- WV Code Title 35 Series 8 for horizontal well permits on waste cuttings handling and requirements.

Additionally, documentation that dictates surface and groundwater pollution prevention requirements are the following:

- General Water Pollution Control Permit,
- Erosion and Sediment Control Field Manual,
- 35-8 Rules Horizontal Well Development,
- 35-1 Water Pollution Control Rule.

Below is a summary of some relevant sections of the West Virginia code regarding oil and natural gas solid waste regulations.

- §35-1-7 details requirements for dikes, berms and retaining walls at oil and gas operations, requirements for secondary containment of tanks or tank systems, and other associated mechanical operational requirements.
- §35-4-16 details design and operation criteria for pits and impoundments including
 - liner specification
 - overflow prevention specifications
 - reclamation requirements
- §35-4-21 describes design and construction requirements for pits and Impoundments with capacity greater than 5,000 barrels including inspections
- §35-2-3 requires that a permit be obtained by the Division of Environmental Protection, Office of Oil and Gas prior to the commencement of any solid waste facilities at the site of oil and gas exploration and production.
- §35-4-10 details financial assurance requirements for oil and gas exploration and production activities, including the demonstration of financial responsibility of individual and grouped wells,

coincidence with permit application for financial assurance, and the varying forms of financial assurance allowable.

- §35-8-5 details requirements for permits, notice, and review of horizontal wells, including siting restrictions, financial assurance for horizontal wells, and permitting requirements.
- §35-8-12 details all reclamation requirements and record keeping of reclamation activities, including for that of pits. The proposed reclamation must be approved by the Chief of the Office of Oil and Gas prior to commencement of activities. Additionally, this section details pit requirements, including diversion of surface water run-on to pits, requirement for construction of an impermeable liner for the pit of a synthetic material, and dikes must be free of obstruction that could effect the liner.
- In 2012, West Virginia issued “Erosion and Sediment Control Field Manual,” which includes specifications on pit construction and impoundment construction.
- West Virginia passed the Natural Gas Horizontal Well Control Act, §22-6A, in April 2013. Amongst several solid waste requirements are that pits and impoundments must be appropriately regulated and controlled and a certificate of approval must be obtained prior to the construction of an impoundment or pit larger than 210,000 gallons.

Appendix WY-2
Summary of Oil and Natural Gas Regulations Related to Waste Pits at
Hydraulic Fracturing Sites

Wyoming

- Regulations concerning technical requirements for waste pits are found in Wyoming Rules and Regulations under the Oil and Gas Conservation Commission, General Agency, Board of Commission Rules, Chapter 3 and Chapter 4 and in Title 30 (Mines and Minerals), Chapter 5 (Oil and Gas) of the Wyoming State Statutes.
- §30-5-104 of the Wyoming State Statutes reserves the right for the Commission to regulate the installation of all pits, including the location, construction, operation, and reclamation of said pits. This section also reserves the right of the Commission to require a bond or other form of financial assurance for oil and gas E&P operations.
- §30-5-402 of the Wyoming State Statutes details that a notice of proposed oil and gas operations is required to be submitted to the commission and should detail all plans regarding the development of the resource, including location and access to pits.
- Chapter 3, Section 4 of the WYOGCC Rules details bonding requirements regarding the performance of pits to ensure that the pit does not damage the environment or cause undue harm to health and safety of employees and people residing in close proximity to the pit.
- Chapter 3, Section 22 of the WYOGCC Rules details that prior approval issued by the WYOGCC is required before construction of reserve pits, including stipulation for impermeable liner, monitoring systems, and setbacks from various development or infrastructure.
- Chapter 4, Section 1 of the WYOGCC Rules details the various types of pits that are subject to regulation under the WYOGCC. The section requires a permit be approved by the WYOGCC and lists additional types of pits permitted by WY DEQ. The section details site restrictions including those in areas sensitive to high groundwater table and with fill soil. Liner requirements are specified in the section. The section details monitoring requirements that the WYOGCC reserves the right to require for pit construction. The section prohibits the use of pits for storage of any materials not strictly associated with the operation for which the pit was originally constructed. The section details the requirements for closure of a pit.
- Chapter 4, Section 1 of the WYOGCC Rules details that only RCRA exempt wastes should be managed in pits and that all other wastes should be managed in tanks for later recycling, reuse, or proper disposal.

- Chapter 4, Section 4 of the WYOGCC details siting location restrictions for tanks, including minimum setbacks from infrastructure and critical development. The section also details the required maintenance of tanks to be in a “workmanlike” manner to preclude seepage from their confines and provide for all applicable safety measures.